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NORTH CAROLINA

SOLID WASTE MANAGEMENT

FOURTH ANNUAL REPORT

JULY 1, 1993 - JUNE 30, 1994

State of North Carolina
James B. Hunt, Jr., Governor

Department of Environment,
Health, and Natural Resources
Jonathan B. Howes, Secretary

NORTH CAROLINA 1994 SOLID WASTE ANNUAL REPORT

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EXECUTIVE SUMMARY

In Fiscal Year (FY) 1993-94, the ramifications of federal Subtitle D Municipal Solid Waste Landfill Facilities (MSWLFs) Regulations were felt in North Carolina. Fifty-four unlined landfills were closed in the state. All but one of the closed landfills were public unlined MSWLFs. Because of these closings, the need to transport increased volumes of solid waste longer distances grew at a rapid rate. As a result, 25 new transfer stations began operation in FY 1993-94, which shipped waste out-of-county to regional landfills. It is currently anticipated that an aditional 25 lined MSWLFs will be operating by January 1, 1998, bringing the total to 58 lined MSWLFs in North Carolina.

This report meets the reporting requirements of G.S. 130A-309, which requires the state to prepare a Solid Waste Management Annual Report on the status of solid waste management in North Carolina. Data for this report were derived from solid waste facility annual reports completed by local governments, private solid waste facilities and related industries for the period July 1, 1993 to June 30, 1994 and submitted to the state. Data for recycling and other waste management activities come from the solid waste management annual reports submitted by North Carolina's 100 counties and 520 municipalities. Other data and information are based on program activities in the Solid Waste Section, Division of Solid Waste Management or the Office of Waste Reduction (OWR).

The following statements include some key findings of this report:

In FY 1993-94, 111 public landfills received 59.6 percent of the state's waste. Seven private landfills managed 13.1 percent of the MSW disposed in North Carolina. Two scrap tire monofills handled less than 1 percent of the total waste. Two incinerators managed 1.1 percent and 26 industrial landfills managed 22.7 percent (see **Figure 1-5**). **Appendix A** lists all permitted facilities in the state that received waste in FY 1993-94.

The 1989 NC Act to Improve the Management of Solid Waste established a 40 percent waste reduction goal to be reached by June 30, 2001. At the end of the first comparable year (FY 1992-93), the state had reduced by 6.4 percent. By June 30, 1993-94, North Carolina had reduced waste by 5.69 percent.

The per capital disposal rate in FY 1992-93 was 1.01; in FY 1993-94, the per capita disposal rate increased slightly to 1.02 (see **Figure 1-6**).

In FY 1993-94, 122 local governments (52 counties, 70 municipalities) indicated they had some type of source reduction program whether in-house, publicly targeted, or both. This is an increase of 35 percent over the 79 programs reported in FY 1992-93. Although the number is type of source reduction program whether in-house, publicly targeted, or both. This is an increase of 35 percent over the 79 programs reported in FY 1992-93. Although the number is increasing, only 20 percent of North Carolina's 620 local governments have some type of source reduction program.

Since FY 1990-91, the number of local government recycling programs in North Carolina increased from 357 to 580, or 62 percent. **Figure 3-1** shows that the quantity of recyclables collected in local government programs grew 183 percent during this time period. In all, North Carolina local governments diverted 630,138 tons of materials through recycling and yard waste management programs in FY 1993-94.

Curbside recycling programs accounted for 38 percent of all recyclables collected in North Carolina by local governments during FY 1993-94. The number of municipalities offering curbside recycling from FY 1992-93 to FY 1993-94, increased 31 percent. There appears to be a general shift from drop-off programs to curbside programs, which is considered an upgrade in recovery service.

While it is difficult to determine the exact amount of materials being recycled by the private sector in North Carolina, some evidence suggests that it exceeds the public sector numbers to a large degree. As disposal costs rise, as technology changes, as market demand for certain materials increases, and as public sector recovery begins to level off, private companies may become the key to achievement of North Carolina's waste reduction goals.

The White Goods Management Program requires proper removal and management of chlorofluorcarbon refrigerants (CFCs) to protect the stratospheric ozone.

An advance disposal tax was imposed on the sale of white goods effective January 1, 1994, which has provided funding to counties to implement comprehensive white goods and metal recycling programs.

Approximately 50 percent of the 21,589 tons of medical waste incinerated in North Carolina originated from out-of-state.

Ten companies in North Carolina received approval to market new technology to treat medical waste. These technologies include microwave treatment, far-infrared heat treatment, and use of chemical disinfectants and sterilants.

North Carolina generated approximately 6.9 million scrap tires or 1.0 per capita in FY 1993-94. Approximately 42 percent of the scrap tires disposed in North Carolina were diverted from landfills. This was a considerable increase over the previous year's 29 percent.

As of April 1995, the state has identified 210 nuisance tire sites (**Table 4-6**). Of these sites, 39 have been cleaned up and 27 other sites are under going cleanup through various state and local actions. The remaining 144 known sites contain 458,625 tires, which is a relatively small number compared to the eight million estimated in FY 1993-94.

In FY 1993-94, a total of 369 tons of household hazardous waste (HHW) was collected on 11 HHW collection days hosted by seven communities.

Solid Waste Management Annual Reports indicated that local governments diverted from disposal 310,337 tons of yard waste in FY 1993-94.

Each month over one hundred solid waste complaints are responded to by the Section leading to the discovery of as many as twenty to thirty previously undocumented illegal dump sites. Due to the lack of a state clean up program many sites are closed under a compromise plan, or remain on the books as unclosed cases. The Section has established a database to track and rank these illegal sites so that future clean-up may be prioritized.

The potential for groundwater contamination and threat of explosion from build up of methane gas have prompted a new look at the large number of closed landfills that operated with approval from the state in the past. The Section is inventorying those sites and developing a program to bring them under a level of monitoring consistent with the potential threat. The need for new regulations and additional staff is being examined.

Water quality investigations and assessments will be necessary at nearly all unlined landfills in North Carolina to determine the nature and extent of contamination and to assess the potential risk to public health and the environment by contaminant migration. This will allow a proper evaluation of corrective action and remediation strategies for these facilities.

As of March 1, 1995, water quality assessments or ground water investigations are being conducted at 23 landfill sites. Preliminary ground water investigations are presently being required by the Solid Waste Section at 13 additional landfills.

The Groundwater Unit has revised its "Water Quality Monitoring Guidance Document for Solid Waste Management Facilities" to provide technical assistance to the regulated community keeping pace with the changing regulations.

Regional staff evaluate an average of 50 permitted solid waste management facilities monthly to meet the goal of inspecting all active sites twice per year. In addition there are 141 yard waste and 85 land clearing inert debris (LCID) sites permitted by notification that are inspected as time allows.

The Section evaluated approximately 150 business facilities in the past year to determine eligibility for special tax treatment of recycling and resource recovery facilities and equipment under the Tax Certification Program.

This year saw the design and implementation of a computer-based Compliance Tracking System by the Section to improve the effectiveness of tracking compliance activities and increase program efficiency through reduced monthly reporting by Regional Staff.

The Section is currently in the process of reviewing proposed rules for a corporate financial test as a mechanism to satisfy financial assurance requirements for MSWLFs.

In order to comply with OSHA's standards for workplace safety, the Section is in the early phases of developing and implementing a Safety Program.

The Solid Waste Section initiated 152 compliance actions against septage management firms during calendar year 1994.

In FY 1993-94, the Solid Waste Management Trust Fund expended $549,974 with an ending balance on June 30, 1994 of $763,295; **(Table 8-1)** however, $342,065 was encumbered for on-going projects in FY 1993-94, leaving $421,230 in "uncommitted" funds at the end of the fiscal year. Although the 1994 round of grants totaled $553,952, the largest amount ever awarded to local governments and non-profit agencies for establishing or expanding recycling programs, only 24 percent of the proposals received were funded.

The two most used sources of funding to cover the costs of municipal waste management in FY 1993-94 were property taxes and household charges.

A recent U.S. Supreme Court decision effectively eliminated flow control. As a result, some North Carolina counties saw as much as half of their local waste stream leave their jurisdictions. Since the majority of local governments rely on tipping fee revenue from their disposal facilities to fund their solid waste programs, the lack of flow control forced a re-examination of the revenue bases of local public solid waste management.

Eight-one counties and 131 municipalities sponsored solid waste management educational programs. Local government educational activities were targeted mainly at residential participants, school children, and environmental groups.

In FY 1993-94, the OWR created the NC 3R Campaign - a public awareness campaign that encourages people to reduce and reuse along with recycling.

In the past, recyclable materials were viewed as a waste to be recovered for environmental reasons. Today, more and more people recognize recyclable materials as commodities that should be an integral component of the raw materials that supply the industrial sector of our economy.

North Carolina is one of four states selected by the U.S. EPA a to establish Recycling and Reuse Business Assistance Center (RBAC). The Department of Environment, Health, and Natural Resources, in cooperation with the Department of Commerce administers the North Carolina project.

An OWR funded study with the University of North Carolina (UNC) School of Public Health found that approximately 8700 jobs in North Carolina can be attributed to the recycling industry.

Paper and paper products containing some recycled content constituted 36 percent of the total purchases of paper and paper products by state agencies in FY 1993-94.

RECOMMENDATIONS

Based upon the findings in this year's annual report, the following recommendations are proposed to advance and improve solid waste management programs in North Carolina in order to protect the public health and the environment:

Monitor long distance hauling of MSW - The Department should closely monitor the increasing long distance hauling of municipal solid waste to address any adverse impacts on the public health and the environment. Due to the increased number of transfer stations and long distance hauling of waste, the Solid Waste Section should initiate a program to closely monitor this practice. Steps to be taken include inspection of trucks at transfer stations.

Allow White Goods Account Surplus to be expended - The surplus funds in the White Goods Account should be used to assist local governments in developing and implementing comprehensive solid waste management plans. In addition, local governments should move aggressively to use funds in their white goods accounts to establish the infrastructure necessary to more effectively manage white goods. These funds should also be utilized to clean up areas where white goods have been disposed of illegally in the past.

Expedite Clean Up of Nuisance Scrap Tire Sites - Efforts to speed clean up of nuisance scrap tire sites to decrease the spread of the Asian Tiger Mosquito population should be continued. The use of the Department of Corrections' Division of Prisons inmate labor should continue to be used to load tires at small nuisance tire sites.

Increase Waste Reduction Efforts in Commercial and Industrial Sectors - Source reduction and recycling efforts targeted at commercial, industrial and construction and demolition wastes need to be expanded to make substantial progress toward the 40% waste reduction goal.

Fund Illegal Dump Site Clean-Up - The NC General Assembly should investigate sources of funding to support clean up of high priority illegal dump sites. The program should include the development of a database to track and rank these illegal sites so that future clean-up may be prioritized. Depending on the rank of a site, immediate clean-up may be warranted, or the site my require monitoring of methane, groundwater, and land use.

Prevent Illegal Dumping and Improve Enforcement - The Department should provide technical and financial assistance to local governments to implement illegal dumping prevention and enforcement programs. Training needs of local law enforcement agencies, district attorneys, and local public health agencies should be assessed and programs developed to educate these local officials on the magnitude of the illegal dumping problem and what can be done locally about it.

Identify and Monitor Closed Landfill Sites - The Department should develop a program to identify, catalog, and monitor old - previously permitted - closed landfill sites and to assess the potential for harm to the environment and public health. Regulations should be revised to provide the authority to bring these sites under a level of monitoring and control consistent with the potential threat. Additional staff should be allocated to enable the rapid implementation o this program statewide. The initial focus should be to identify critical sites

based on their location in high priority watersheds, economically disadvantaged or minority communities, and the degree and types of environmental releases. The state is considering a proposal for submission to U.S. EPA for funding under the North Carolina Nonpoint Source Management Program (CWA Section 319 (h) grants) to develop strategies for reducing the risk to critical watersheds from these pollution sources.

Assess Environmental Releases at Unlined Landfills - The Department should provide the resources necessary to initiate water quality investigations and assessments at all unlined landfills in North Carolina to determine the nature and extent of contamination and assess the potential risk to public health and the environment by contaminant migration. This will allow a proper evaluation of corrective action and remediation strategies for these facility. Revisions to applicable statutes and regulations should be conducted to provide the necessary authority to do so.

Extend State Disposal Bans to Additional Materials - The General Assembly should consider statewide disposal bans of additional materials that have established markets and opportunities for recycling.

Investigate Options for Obtaining Private Sector Recycling Tonnages - To accurately estimate recyclables recovery in both the public and the private sector, methods of obtaining private sector recycling rates should be investigated.

Significantly Increase Waste Reduction Efforts - To reach the 40% waste reduction goal, the General Assembly should identify methods to significantly increase both public and private efforts in source reduction, reuse, recycling and purchase of recycled content products.

Investigate Funding Source(s) to fully Implement the Solid Waste Management Act - The General Assembly should investigate methods of funding solid waste programs at both the state and local levels. In particular funding is needed for the following activities:

- Development and implementation of comprehensive city/county solid waste management plans.
- Financing of recycling collection and processing equipment, facilities and site preparation.
- Activation of the Solid Waste Revolving Loan Fund.
- Development and implementation of the Used Oil Program.
- Establishment of a recycling business grants and loan program.
- Research and Development of innovative solid waste management technologies and techniques.

Re-evaluate Measurement of Progress toward Waste Reduction Goal - The Department should examine the use of other factors besides a per capita factor to measure statewide and local waste reduction progress (e.g., sales tax measurements, employment factors, etc.)

Regional Aggregation of Supply of Recyclables - With recycling markets at an all time high, the Department should encourage regional aggregation of material supply to take advantage of economies of scale and should provide technical assistance to improve the collection and processing of recyclables on a regional basis.

Evaluation of Success of Mixed Waste Processing - The Department should evaluate the performance of mixed waste processing facilities in regard to percent of recyclables recovered vs. total waste managed at the facility and associated costs per ton of material/waste managed.

CHAPTER ONE

SOLID WASTE DISPOSAL

CHANGES IN MUNICIPAL SOLID WASTE DISPOSAL

Municipal solid waste (MSW) management in North Carolina underwent substantial changes in FY 1993-94. In October 1993, the federal Resource Conservation and Recovery Act (RCRA) Subtitle D regulations for MSW landfills became effective. As a result of these new regulations, many North Carolina landfills closed. Nearly all of the closed landfills were unlined public facilities. The majority of the waste that was formerly managed in these unlined landfills is now being shipped to more environmentally protective lined landfills. With 54 fewer landfills in the State, local governments began to haul waste longer distances to facilities that remained open. Local governments either hauled directly to the disposal facility or shipped waste through transfer stations. Waste was shipped across county borders and out of state. In addition, importation of municipal solid waste began in FY 1993-94. As methods of waste management changed, so did the waste management fees charged by local governments.

Landfills Closed

The new RCRA Subtitle D Regulations for MSW landfills that went into effect on October 9, 1993 significantly changed the way MSW was managed in North Carolina. These regulations require a synthetic liner; leachate collection, removal, and treatment; extensive groundwater monitoring; closure and post closure care with financial assurance; and more location restrictions and operational requirements. Due to these higher standards, 54 landfills closed. All but one of the closed landfills were public unlined MSW landfills (Western Carolina University landfill was privately owned). Twenty-five landfills closed before the October 9, 1993 Subtitle D effective date, and 29 local governments prepared resolutions to close local landfills by April 9, 1994. Local governments that prepared resolutions were not subject to most of the new requirements between October 9, 1993 and April 9, 1994. All of the local governments that prepared resolutions stopped receiving waste by the April 9, 1994 deadline (see **Appendix A-1**). Landfills that stop receiving waste are considered "inactive," but are not considered officially "closed" until closure documentation is complete.

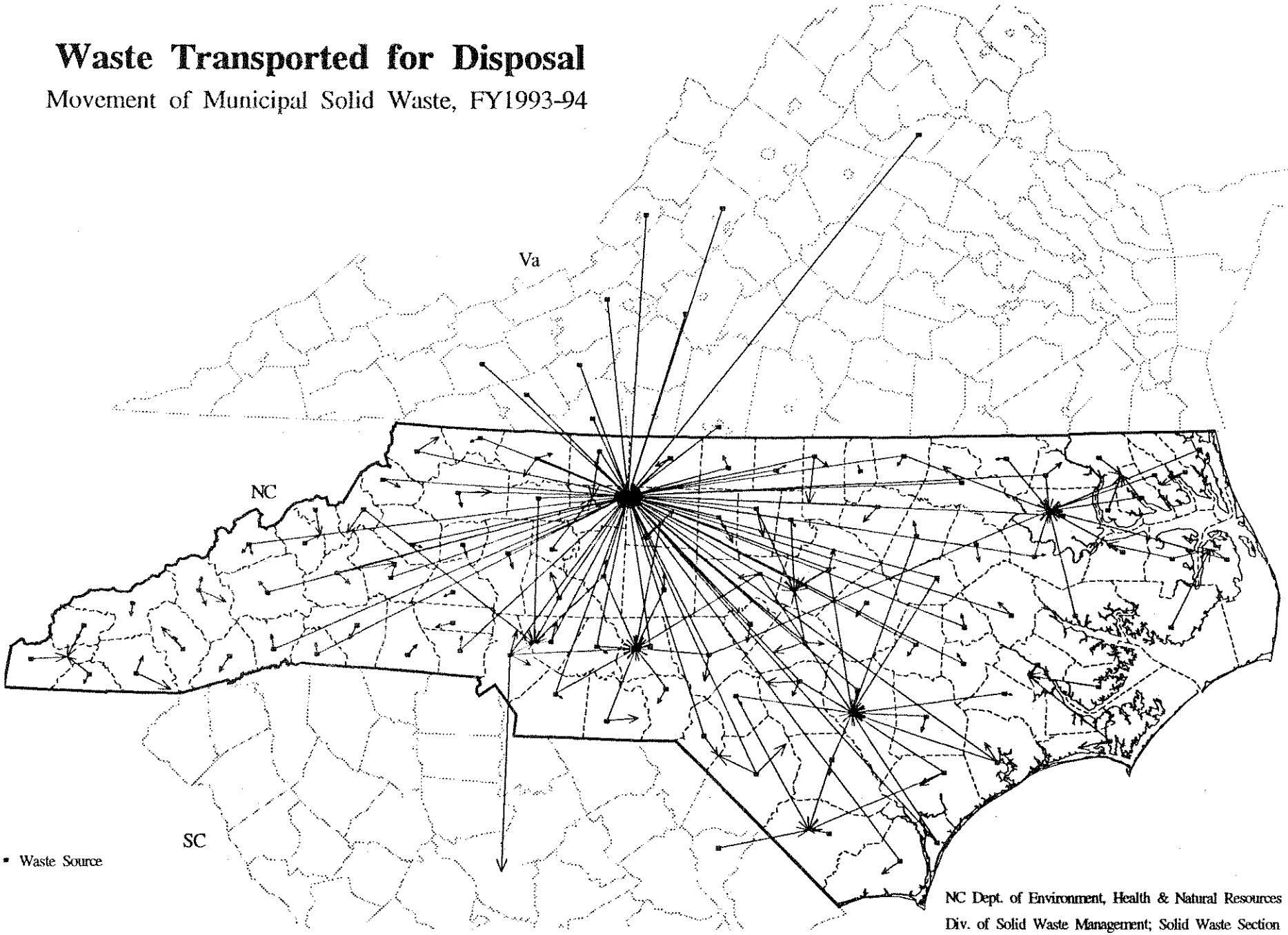
Municipal Solid Waste Transported Long Distances

The 54 landfill closures caused local governments to transport waste to more distant regional disposal facilities. Thirty-seven of the local governments that closed landfills arranged to transport waste to lined facilities. Some municipal solid waste was shipped across county lines and to South Carolina.

Map 1-1 illustrates the movement of MSW from counties to landfills in FY 1993-94. The arrows, which represent the movement of waste, begin at a small square indicating the waste source and point to a landfill disposal destination. Some arrows point to landfills within the source county's borders, while others point to destinations outside the local borders. Landfills that received waste from many sources appear as dark spots on the map.

Waste Transported for Disposal

Movement of Municipal Solid Waste, FY1993-94



▪ Waste Source

NC Dept. of Environment, Health & Natural Resources
Div. of Solid Waste Management; Solid Waste Section
401 Oberlin Rd * Raleigh, NC 27605 * (919) 733-0692

Map produced April 1995 by the
North Carolina Center for Geographic Information and Analysis
115 Hillsborough Street * Raleigh, NC 27603 * (919) 733-2090

MAP 1-1

Data Source: Municipal Solid Waste Facility Annual Reports 1993-94

Map 1-1 shows that many central and eastern North Carolina counties transported waste long distances. Some small western counties, such as Transylvania, Haywood, and Macon counties used local lined landfills within their county borders. A few western counties such as Madison, Buncombe, and Henderson, transported minimal amounts of waste long distances.

The quantities of waste transported range from one ton to 400,000 tons. Fifty percent of the arrows on **Map 1-1** represent 2,000 tons or less. Much of this waste is industrial waste transported to the Piedmont Landfill in Kernersville, NC.

Only 14 of the 244 arrows represent quantities greater than 100,000 tons, and 13 of these represent waste disposed within the county of origin. Only one arrow indicates waste greater than 100,000 tons was sent beyond county borders. This arrows shows waste was transported from Mecklenburg County to the NorthEast Sanitary Landfill in South Carolina. Arrows that indicate waste was sent outside the county borders generally represent quantities of less than 10,000 tons. During FY 1994-95, much larger quantities of waste are expected to cross county borders, because in FY 1993-94 waste was transported only during part of the year.

Several private landfills received a large portion of the MSW transported for disposal. Waste Management of Carolinas' Piedmont Landfill and Recycling Center in Forsyth County, East Carolina Environmental's Landfill in Bertie County, and CMS Development Corporation's Charlotte Motor Speedway Landfill in Cabarrus County were among the largest recipients of transported waste. These three facilities received more than one million tons of waste in FY 1993-94, 15 percent of the total amount of MSW landfilled in the state (see **Appendix A-2**).

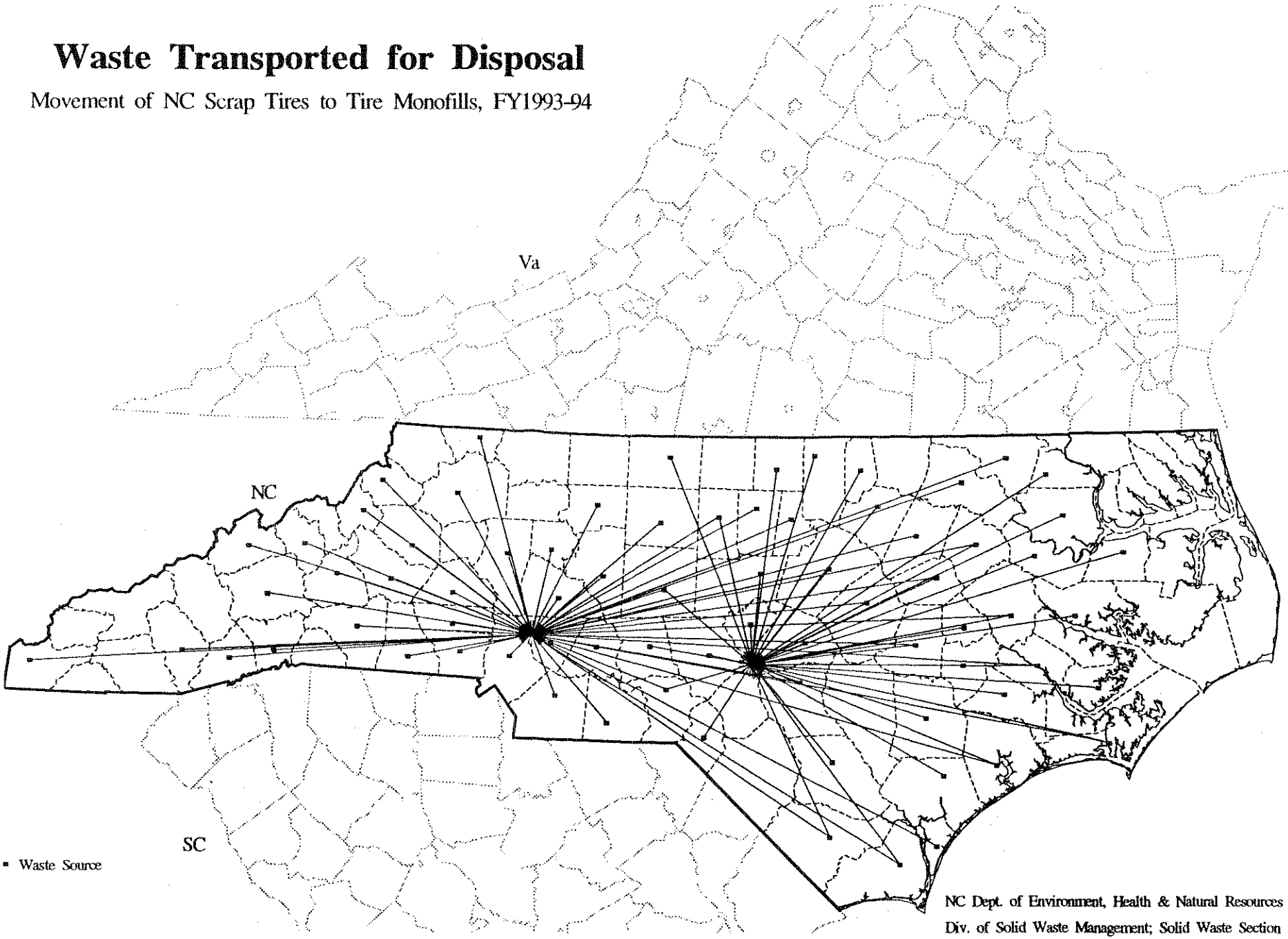
The Montgomery County Landfill, the Columbus County Landfill, and Sampson County Disposal, Inc., all regional facilities that are publicly owned and commercially operated, also received a large amount of transported waste. These three facilities received more than 280,000 tons of waste in FY 1993-94. Private and publicly owned and commercially operated MSW landfills received 4 percent of the MSW landfilled.

Several publicly owned and operated landfills received a total of more than 400,000 tons of MSW from more than one county. The City of Winston-Salem Landfill managed approximately 250,000 tons of waste, but less than 5 percent of it came from other counties. The Coastal Regional Solid Waste Management Authority (CRSWMA) received nearly 70,000 tons from Craven, Carteret, and Pamlico counties. The Cherokee County Landfill accepted waste from Graham and Clay counties. The Burke County Landfill received waste from McDowell County. Regional public MSW landfills received 6 percent of the MSW landfilled in FY 1993-94. Other publicly owned and operated landfills received larger quantities of waste, but were not regional, and therefore did not receive waste from outside their local area.

Municipal solid waste was not the only material transported in FY 1993-94. Two tire monofills accepted 69,666 tons of tires from North Carolina, South Carolina, and Virginia (see **Appendix A-3**). U.S. Tire Recycling Partners, LP, located in Cabarrus County, accepted 26,932 tons of tires from 52 North Carolina counties and 18,483 tons from Virginia and South Carolina. Central Carolina Tire Recycling in Harnett County accepted 24,255 tons of tires from 38 North Carolina counties (see **Map 1-2**). **Map 1-2** shows 90 arrows beginning at the waste source, marked with a small square.

Waste Transported for Disposal

Movement of NC Scrap Tires to Tire Monofills, FY1993-94



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MAP 1-2

Data Source: Municipal Solid Waste Facility Annual Reports 1993-94

converging on the two tire monofills. The imported tires are not shown on the map due to reporting difficulties.

Local Governments Used Transfer Stations

In order to transport waste long distances, counties began widespread use of transfer stations in FY 1993-94. Eighteen permitted transfer stations and 18 permit-pending or temporary transfer stations transferred 644,625 tons of waste to disposal facilities in FY 1993-94 (see **Appendix A-6**).

Map 1-3 illustrates the movement of waste through transfer stations in FY 1993-94. Each arrow on the map begins at the source of the waste, marked by a small square, then goes through a transfer station, marked by a triangle, and finally points to the landfill disposal destination.

Map 1-3 shows several regional solid waste management arrangements. For example, the Albemarle Regional Solid Waste Management Authority includes Currituck, Dare, Hyde, Tyrrell, Chowan, Perquimans and Gates counties. These counties use three transfer stations, located in Perquimans, Dare, and Currituck counties, to haul waste to the East Carolina Environmental Landfill in Bertie County.

Map 1-3 also shows that five transfer stations - Waste Management of Asheville, Waste Management of Carolinas, Polk County, Yancey/Mitchell, and the Tribal Utilities Transfer Station located in the Cherokee Qualla Boundary in Swain County - sent waste to South Carolina.

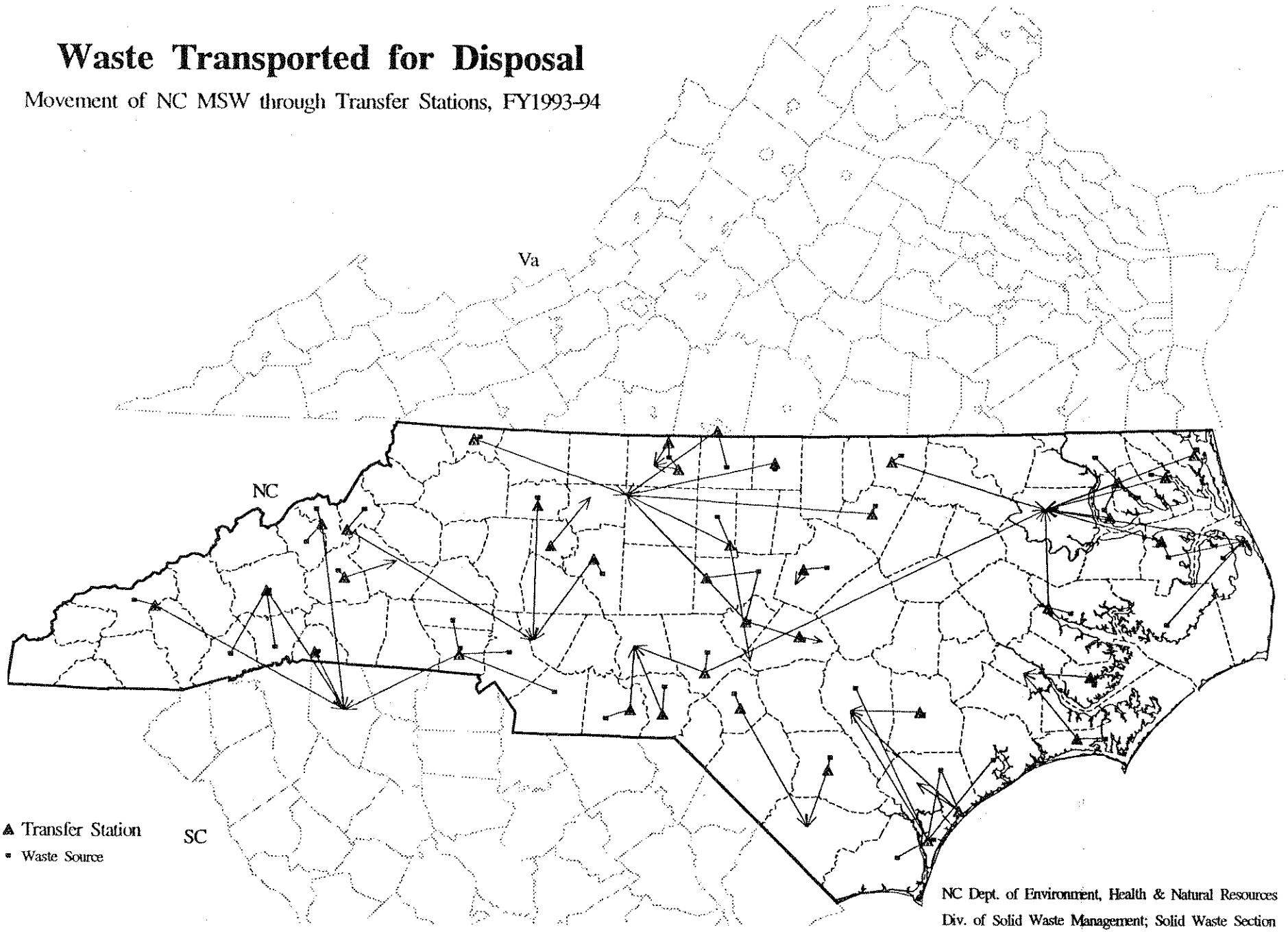
Many local governments constructed transfer stations at inactive landfill sites. Others contracted with private transfer stations. Transfer stations generally consist of a large building with a concrete floor. Garbage trucks dump waste onto the floor and a loader then pushes the waste off the edge of the floor into a large open truck located at the lower level of the building. The larger truck then hauls the waste to a disposal facility. Temporary transfer stations, usually located at inactive landfills, were allowed to operate without a permit until the October 9, 1993 Subtitle D closure deadline.

Twenty-eight transfer stations received waste from a single source, usually a county. Eight transfer stations received waste from more than one county. Most transfer stations sent waste to only one disposal facility, although Uwharrie Environmental in Moore County and the Pender County Transfer Station sent waste to more than one facility.

Swain and Caswell counties both used transfer stations that did not have a North Carolina permit. Swain County transported MSW to the Tribal Utilities Transfer Station in the Cherokee Qualla Boundary in Swain County. This tribally-owned facility is not permitted by the state. The Swain County waste was then hauled to the Palmetto Landfill in South Carolina. Caswell County sent waste to the Waste Management of Piedmont Transfer Station in Danville, Virginia. Waste Management, Inc. then hauled the waste back to North Carolina to the Piedmont Landfill in Kernersville.

Waste Transported for Disposal

Movement of NC MSW through Transfer Stations, FY1993-94



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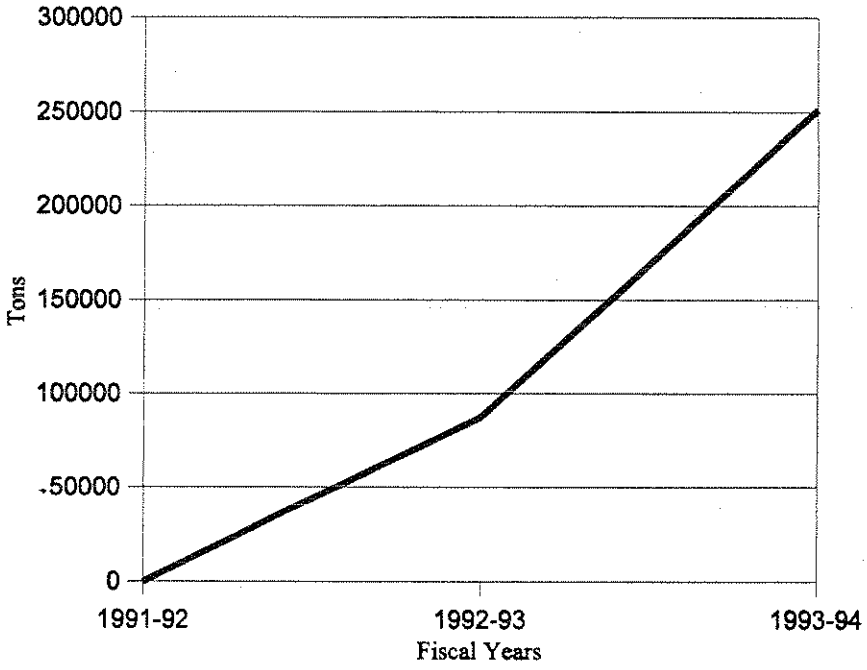
MAP 1-3

Data Source: Municipal Solid Waste Facility Annual Reports 1993-94

Waste Exports Expanded

As more local governments transported waste for disposal, transportation across the state line increased. In FY 1993-94, North Carolina exported a reported 251,243 tons of waste to South Carolina, nearly a 300 percent increase over the previous year when an estimated 87,300 tons were exported (see **Figure 1-1**). In FY 1991-92, a negligible amount of waste may have been exported, although none was recorded. Other waste that was hauled directly out of state was not reported through the state reporting process.

Figure 1-1: NC Waste Exported, FY 1991-92 to FY 1993-94.



More than half of the waste exported (141,291 tons) was hauled through transfer stations to Waste Management Inc.'s Palmetto Landfill in Spartanburg, SC (see **Table 1-1**). Ninety-five percent of this waste was shipped through Waste Management, Inc. owned transfer stations.

Waste was exported by direct haul from Mecklenburg County to South Carolina. Mecklenburg County, which requires haulers to report direct hauls to South Carolina, reported 109,952 tons of waste hauled directly to NorthEast Sanitary Landfill, Inc. in Richland County, SC. Municipal solid waste from other counties may have been exported by direct haul, but none was recorded.

Table 1-1: NC Waste Exported, FY 1993-94.

COUNTY of ORIGIN	TONS	DESTINATION
Transylvania	55.00	Palmetto Landfill, SC
Buncombe	55,174.47	Palmetto Landfill, SC
Henderson	15,432.30	Palmetto Landfill, SC
Union	83.03	Palmetto Landfill, SC
Gaston	36,342.88	Palmetto Landfill, SC
Lincoln	5,689.82	Palmetto Landfill, SC
Mecklenburg	20,745.07	Palmetto Landfill, SC
Polk	786.00	Palmetto Landfill, SC
Yancey	2,522.61	Palmetto Landfill, SC
Mitchell	2,650.53	Palmetto Landfill, SC
Swain	1,809.40	Palmetto Landfill, SC
Mecklenburg	109,952.00	NorthEast Sanitary LF, SC
TOTAL	251,243.11	

Waste Imports Increased

In FY 1993-94, North Carolina began notable importation of MSW from other states. A total of 107,719 tons of municipal solid waste, medical waste, industrial waste, and tires was imported from 13 states and the District of Columbia (see **Table 1-2**). Imported waste was transported to several different types of facilities. Municipal solid waste was imported from Virginia and South Carolina to the Piedmont Landfill in Forsyth County (73,668 tons) and the Columbus County Landfill (4,168 tons). Medical waste was incinerated at BFI Medical Systems, Inc. in Alamance County (1,879 tons) and Recovery Corporation of North Carolina in Mecklenburg County (9,179 tons). Industrial sludge was imported to HOH Corporation in Forsyth County for pre-disposal treatment and then sent to the Piedmont Landfill. U.S. Tire Recycling Partners monofill in Cabarrus County and Thomas Engineering Tire Processing in Harnett County received 18,607 tons of tires from other states.

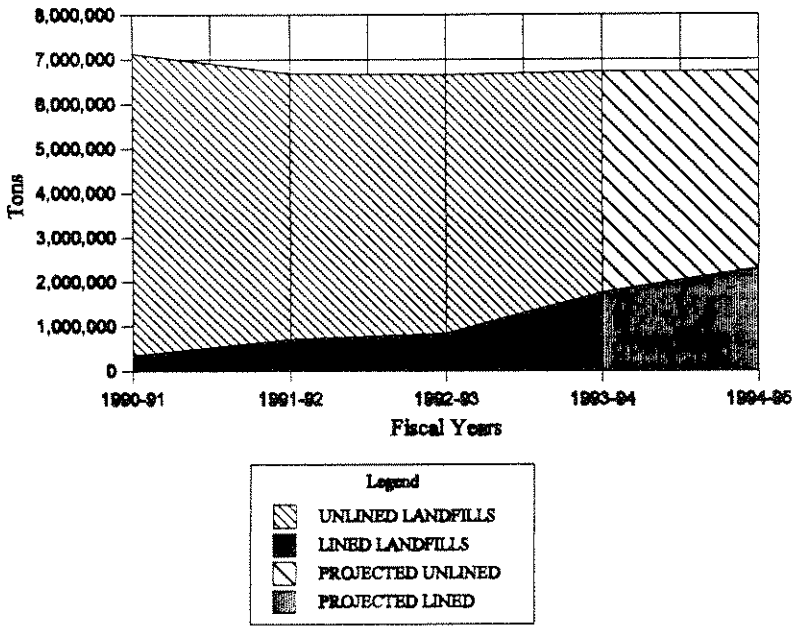
Table 1-2: Waste Imported to North Carolina, FY 1993-94.

WASTE TYPE	SOURCE	TONS IMPORTED
Municipal Solid Waste	SC, VA	77,836.30
Medical Waste	FL, GA, KY, IL, IN, NJ, NY, MD, PA, SC, TN, VA, WV, DC	11,059.11
Industrial Waste	SC, TN, VA, WV	216.17
Scrap Tires	SC, VA	18,607.74
TOTAL		107,719.32

Larger Quantities of Waste Managed at Lined Landfills

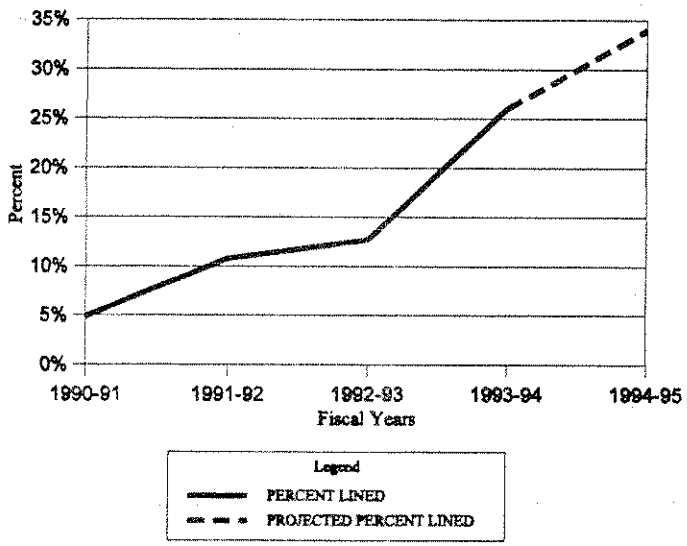
The U.S. Environmental Protection Agency (EPA) designed the Subtitle D Regulations for MSW landfills to protect public health and the environment by requiring states to adopt specific standards for waste management, including liners in MSW landfills. In FY 1993-94, 17 lined landfills were operating. This allowed 1,753,632 tons of MSW to be managed in lined facilities (712,013 tons at 14 public landfills and 1,041,618 tons at three private landfills). During the previous year, 845,752 tons were managed in lined facilities (see **Figure 1-2**). It is projected that in FY 1994-95, approximately 2.3 million tons of MSW will be managed in North Carolina lined facilities. The use of liners will continue to rapidly increase as more of the unlined facilities close.

Figure 1-2: Waste Managed at NC MSW Landfills.



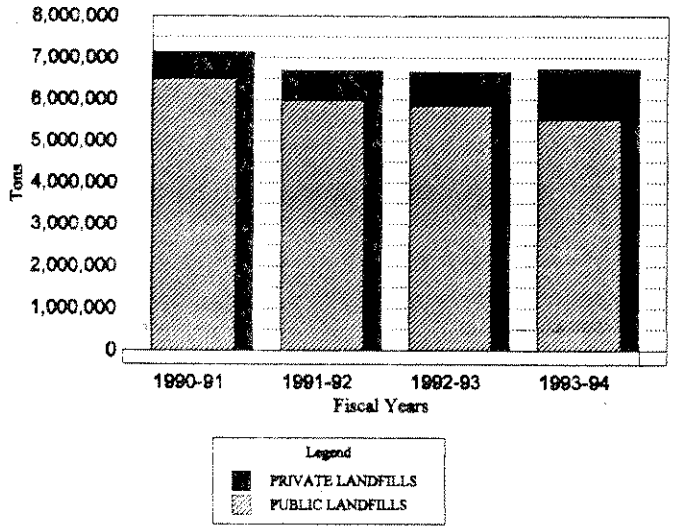
In FY 1990-91, less than 5 percent of MSW was managed in lined facilities. The following year, this amount doubled to 11 percent. Waste managed in lined facilities increased to 13 percent in FY 1992-93, and then doubled again in FY 1993-94 to 26 percent (see **Figure 1-3**). It is expected that by FY 1994-95, approximately 34 percent of the waste landfilled in North Carolina will be managed in a lined facility.

Figure 1-3: Percent Waste Disposed in NC Lined Facilities.



Three of the 17 lined landfills in the state were privately owned in FY 1993-94. A permit was pending for one additional private facility. More solid waste was managed at privately owned landfills than in previous years. In FY 1993-94, 18 percent of the waste disposed in North Carolina landfills (including imports) was landfilled in private facilities, as compared to 12 percent in FY 1992-93, 11 percent in FY 1991-92, and 9 percent in FY 1990-91 (see **Figure 1-4**).

Figure 1-4: Use of Public and Private NC Landfills.



Changes in Waste Management Fees

Local governments, responsible for providing residents with waste disposal, recouped the cost of waste management through tipping fees, user fees, and taxes. These sources of revenue for local governments changed in several different ways during FY 1993-94.

Since 1990, the average tipping fee charged at public MSW landfills increased each year. In FY 1990-91, the average tipping fee, for landfills that charged, was $19.03/ton. The following year, tipping fees increased to an average of $21.28/ton. In FY 1992-93, the tonnage fees increased to $23.37, and to $26.53 in FY 1993-94. Several landfills did not charge a residential waste tipping fee because the county assessed an annual user fee. Therefore, the averages calculated include only those landfills that charged a tipping fee.

As managing solid waste became more material specific, so did the tipping fees charged. Many local governments instituted tiered pricing systems. Some landfills charged different tipping fees for residential waste, commercial waste, and land clearing and inert debris (LCID). In some cases, lower fees were charged for clean wood and yard waste. Some counties charged higher fees for certain wastes. For example, Catawba County charged a standard tipping fee, a higher fee for loads containing more than 15 percent cardboard, and another higher fee for special wastes. Contractual arrangements with regional facilities also resulted in distinct fee schedules. Sampson County Disposal, Inc., for example, charged different rates for in-county waste and out-of-county waste.

In many cases, local governments used tipping fee revenue to pay for source reduction, recycling, and reuse programs. However, local governments that closed the local landfill and used a privately owned transfer station no longer generated revenue through tipping fees. Alternative sources of revenue, such as taxes and user fees, were used to offset the cost of waste management. In some cases, competition for MSW drove tipping fees down. New Hanover County, for instance, reduced its tipping fee and increased its support for solid waste management from the general tax base.

Some local governments charged an annual household or user fee. User fees ranged from approximately $40/year to $195/year in FY 1993-94.

SOLID WASTE DISPOSAL IN FY 1993-94

Waste in North Carolina was managed in several types of facilities, including publicly owned landfills, privately owned landfills, incinerators, private industrial facilities, and tire monofills (see **Table 1-3**). Some waste was exported for disposal.

Table 1-3: North Carolina Solid Waste Disposal Facilities.

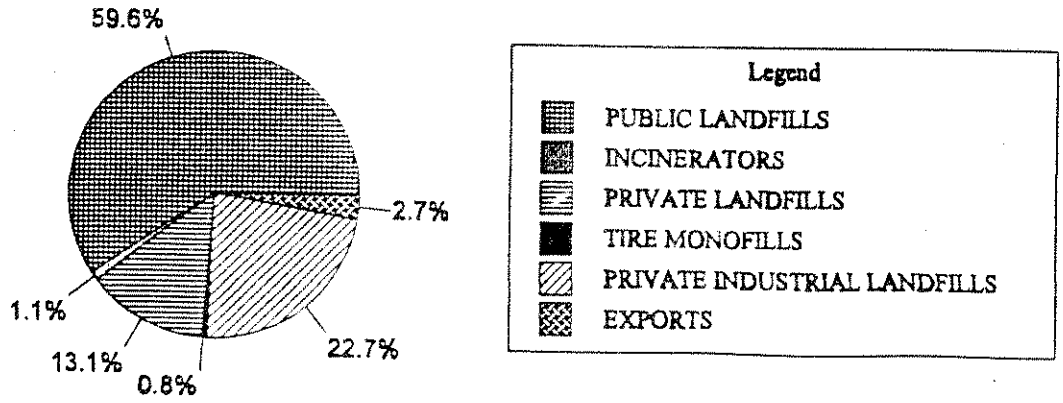
No. of Facilities	Facility Type	Total Tons Managed*
111	Public Landfills	5,515,695.89
7	Private Landfills	1,210,389.81
2	Scrap Tire Monofills	69,666.08
2	Incinerators**	106,130.00
26	Private Industrial Landfills	2,098,994.77
	Exports	251,243.11

* Includes 96319.64 tons of waste imported to N.C. public and private landfills and monofills.
**Does not include medical waste incinerators.
Net total does not include 48,159 tons of ash.

In FY 1993-94, 111 publicly owned landfills received 59.6 percent of the state's solid waste. Seven privately owned landfills managed 13.1 percent of the waste disposed in NC. Two scrap tire monofills handled less than 1 percent of the total waste. Two incinerators managed 1.1 percent and 26 industrial landfills managed 22.7 percent (see **Figure 1-5**). **Appendix A** lists all NC facilities that received waste in FY 1993-94 and have permits from the state.

Waste management in landfills remained the primary method of disposal for North Carolina waste. Although there are various forms of landfills, including public and private landfills, private industrial landfills, and tire monofills, they are all forms of the same management method. North Carolina waste that was exported for disposal was also managed in landfills.

Figure 1-5: Percent of NC Solid Waste Disposal by Facility Type, FY 1993-94.



The state encourages all landfill operators to be certified. The number of public landfills operated by certified operators increased from 43 to 53 during FY 1993-94. Twenty-four of the remaining public landfills do not have an operator with some type of certification. The three privately owned MSW landfills continued to be operated by certified operators. Certification courses generally instruct participants about landfill design, operation, compliance, landfill closure, and other topics.

STATE PROGRESS TOWARD WASTE REDUCTION GOAL

The 1989 the Act to Improve the Management of Solid Waste established a statewide 40 percent waste reduction goal to be reached by June 30, 2001. At the end of the first comparable year (FY 1992-93), the state had reduced its waste by 6.4 percent. By June 30, 1994, North Carolina reduced waste by 5.69 percent.

Waste reduction was measured by comparing the amount of waste each person disposed (per capita disposal rate) in the base year (FY 1991-92) to the per capita disposal rate achieved in FY 1993-94.

The base year per capita disposal rate was calculated by dividing the FY 1991-92 tons managed by the state's July 1991 population. The tons managed figure was determined by adding the total amount of municipal solid waste disposed in landfills and incinerators to the amount of waste managed through recycling, composting, and mulching efforts of local governments in FY 1991-92. Recycling, composting, and mulching were added to the tons disposed in order to give credit to counties that began waste reduction programs prior to 1991. Industrial waste managed at private industrial landfills was not included in the calculation.

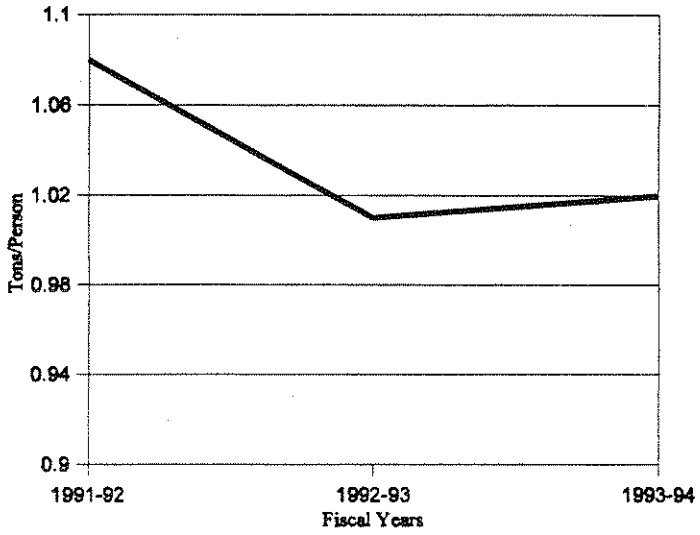
The per capita managed rate for the 1991-92 base year was 1.08 tons. In FY 1993-94, the per capita disposal rate rose slightly to 1.02 tons compared to the FY 1992-93 per capita disposal rate of 1.01 tons (see **Table 1-4**).

Table 1-4: NC Per Capita Disposal Rates and Waste Reduction, FYs 1990 to 1993.

Fiscal Years	Tons Disposed	Population	Per Capita Disposal Rate	Percent Waste Reduction
1990-91	7,161,455.00	6,648,689	1.07	
1991-92	6,822,890.35	6,739,959	1.01	
1991-92	7,257,428.09 (managed)	6,739,959	1.08 (managed rate)	
1992-93	6,890,818.15	6,836,977	1.01	6.40%
1993-94	7,056,805.18	6,949,095	1.02 1.01	5.69%

The per capita disposal rate has stabilized since the initial reduction after the base year. The initial reduction, from 1.08 to 1.01, was significant, due in part to the fact that tons recycled, composted and mulched were used to calculate the base year per capita managed rate. In FY 1993-94, the per capita disposal rate increased slightly to 1.02 (**see Figure 1-6**).

Figure 1-6: NC Per Capita Disposal Rates.



COUNTY PROGRESS TOWARD WASTE REDUCTION GOAL

While the state, as a whole, reduced waste disposed by only 5.69 percent, many individual counties reduced a great deal more. Eighteen counties achieved greater than 25 percent waste reduction (see **Appendix B-1**).

Several counties have made remarkable progress toward meeting the goal and implementing comprehensive solid waste management programs. For example, Craven County has county-wide collection for both waste and recycling; has started charging a per bag fee for household waste; and is part of the Coastal Regional Solid Waste Management Authority, which manages waste in a lined facility.

Another county with a large decrease in waste disposed is Yadkin County. Changing from an unmanned greenbox system to a manned convenience system prevented out-of-county waste from being deposited in Yadkin. Use of higher tipping fees encouraged local industry to establish aggressive recycling programs for cardboard, textiles, and other industrial wastes.

In contrast to the counties that reduced waste, many actually increased the amount of waste disposed. In some cases, increased economic activity resulted in greater waste disposal. A good example is Granville County, which has a shingle manufacturing business that disposes of large quantities of waste during economically productive years.

Individual county per capita disposal rates ranged from .33 to 1.8 in FY 1993-94 (see **Appendix B-2**). Dare County, which manages a large quantity of seasonal tourist waste, had 1.8 tons per capita. Caswell County, which had a per capita disposal rate of .33 tons, has a small industrial base.

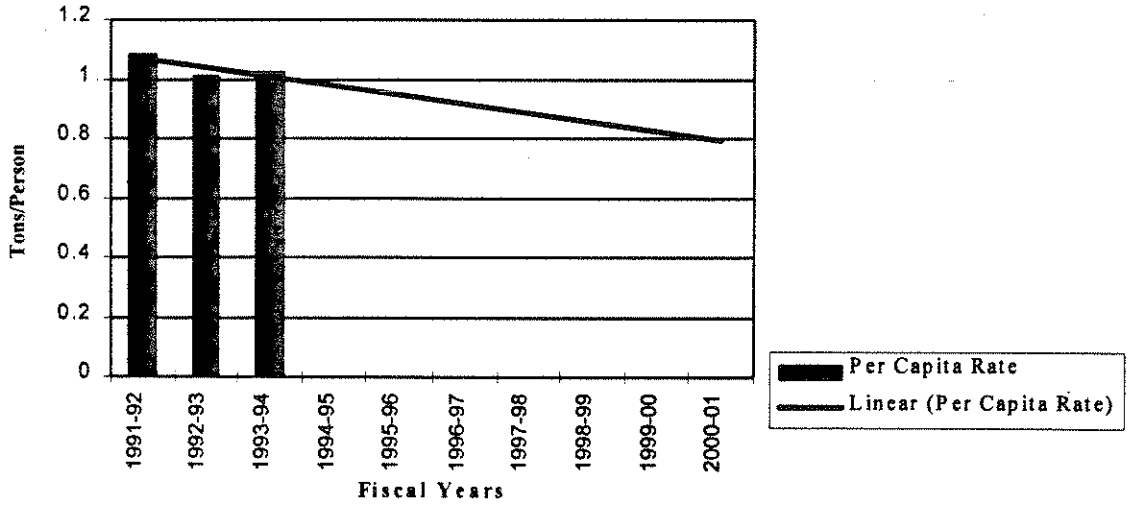
FORECASTING WASTE DISPOSAL IN NORTH CAROLINA

The Solid Waste Section began receiving data from the Annual Solid Waste Management Facility Reports in 1990. Using this data, North Carolina per capita disposal rates can be projected using linear regression trend lines. Several trend analyses have been made in order to examine potential future outcomes.

In order to achieve the state goal of 40 percent waste reduction by June 30, 2001, the state per capita disposal rate would have to decrease to .65 tons per person. This reduction in disposal rate would require that between two and three million tons of waste currently being disposed would either have to be managed in some other fashion or not be generated. In order to decrease from the current 1.02 tons to the goal .65 tons, waste reduction efforts need to be expanded dramatically.

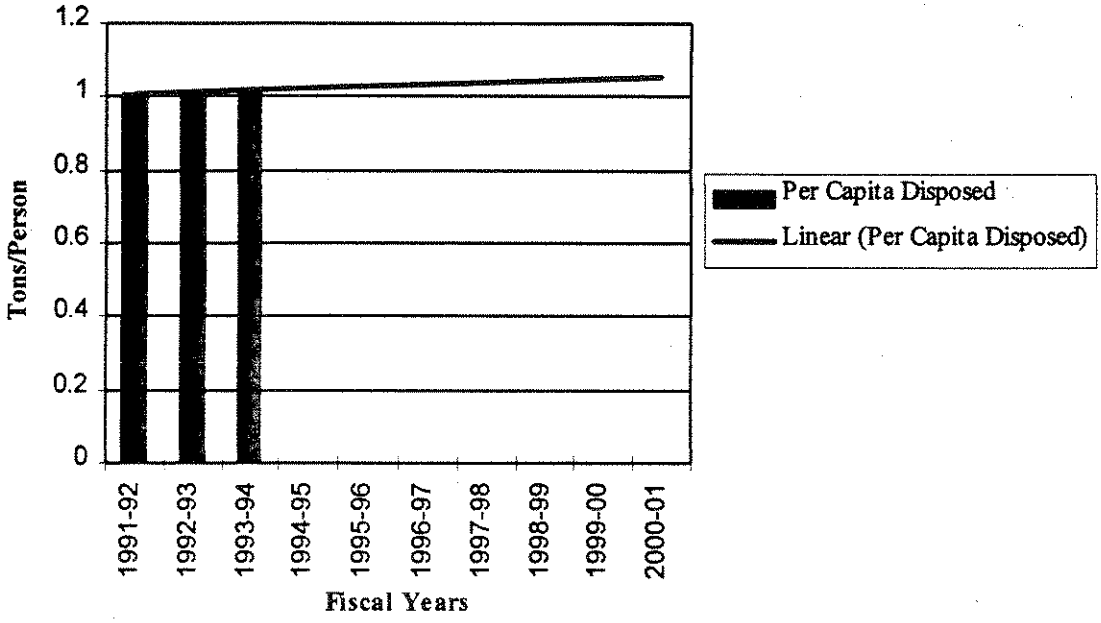
This trend analysis projects future disposal rates assuming no dramatic increase in waste reduction efforts occurs. Data from previous years is used to project future per capita disposal rates and thus waste reduction. Using the base year 1991-92 per capita management rate of 1.08 and the per capita disposal rates for the following two years, a linear trend line is used to project the per capita disposal rate North Carolina for FY 2000-01. **Figure 1-7** illustrates that, based solely on historic data, the state per capita disposal rate is likely to be between .70 and .80 tons in FY 2000-01. Using this scenario, the goal of .65 per capita disposal rate would be achieved in 2005.

Figure 1-7: Per Capita Trends Using FY 1991-92 Managed Rate.



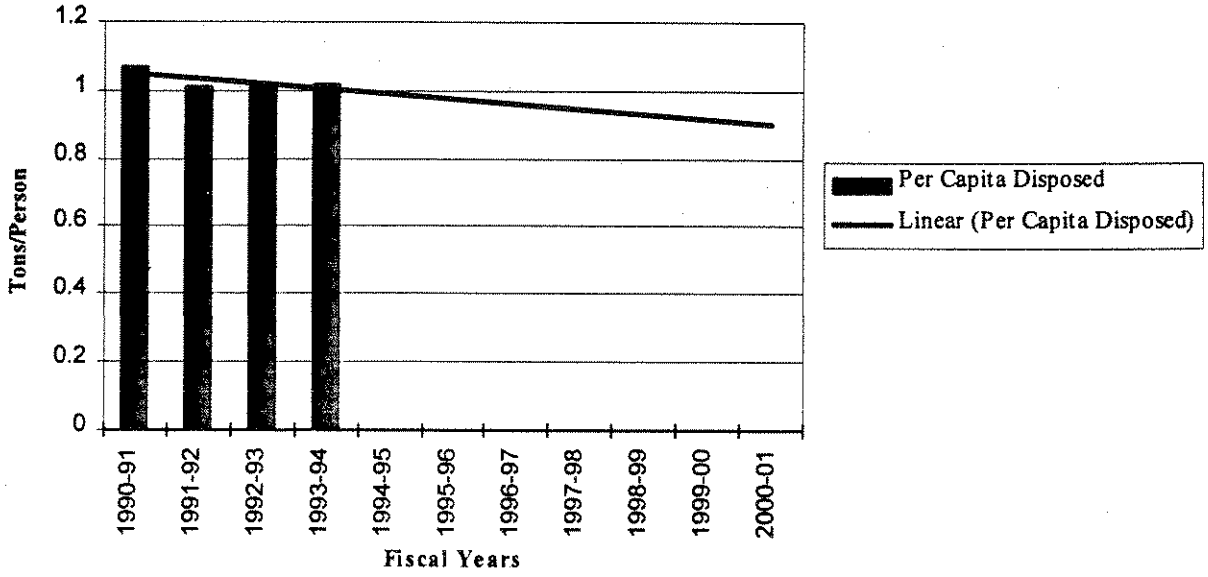
Since the 1.08 per capita managed rate is not a true disposal rate, another scenario is examined. The FY 1991-92 per capita disposal rate was 1.01. Using only true disposal rates, **Figure 1-8** indicates that the North Carolina per capita disposal rate will rise and the State will not achieve the 40 percent waste reduction goal.

Figure 1-8: Per Capita Disposal Trends FYs 1991-92 to 2000-01.



A greater number of historic data points makes a stronger analysis. Therefore, the third scenario uses the year prior to the base year. The FY 1990-91 per capita disposal rate of 1.07 was used in the third scenario. This data is less accurate than the following three years because many landfills did not use weigh scales at that time. However, there were solid waste management practices that are recognized in the FY 1990-91 per capita disposal rate that may be important to the analysis. Using data from FY 1990-91 through FY 1993-94, **Figure 1-9** indicates that, based solely on historic data, the state per capita disposal rate will decline slowly and the state waste reduction goal will not be achieved by June 30, 2001. According to this scenario, the state per capita disposal rate may be .9 tons in 2001. This analysis indicates that the goal .65 tons per capita disposal rate would be achieved in 2017.

Figure 1-9: Per Capita Disposal Trends FYs 1990-91 to 2000-01.



In summary, municipal solid waste management changed significantly in FY 1993-94. Subtitle D Regulations for MSW landfills encouraged landfills to close or endure significant cost increases for both operation and closure, the use of transfer stations increased greatly, while imports, exports, and tipping fees increased. Progress toward the state goal slowed as the tons of waste generated per person each year rose slightly in FY 1993-94. The state goal may still be achieved, however it is unlikely that it will be achieved by June 30, 2001 without a significant increase in source reduction, recycling, and composting efforts.

CHAPTER TWO

SOURCE REDUCTION

By statute, waste reduction at the source, or "source reduction," is the first priority in managing solid waste in North Carolina's hierarchy of solid waste disposal.

Recycling and disposal programs dominate staff and financial resources of local governments at the expense of source reduction programs. Some reasons for the absence of source reduction programs may stem from a lack of demand by citizens, a lack of information available to local government officials on the types of programs and their effect, and the difficulty in measuring source reduction efforts thereby making funding requests to governing boards difficult.

Questions in the source reduction section of the Fiscal Year (FY) 1993-94 Local Government Solid Waste Management Annual Reports were modified significantly from previous years to better access specific information on local government source reduction programs. As source reduction does not deal with management of generated waste, but seeks to prevent generated waste, gathering information on program efforts and their effect can be challenging.

WHAT IS SOURCE REDUCTION?

Source reduction is reducing the amount or toxicity of waste before it is generated. Source reduction eliminates waste or increases the intensity of use or promotes reuse. It decreases the quantity of materials that must be collected, processed, or disposed of through landfilling, incineration, municipal composting or recycling.

Source Reduction	**Waste Generated/Managed (not Source Reduction)**	**Greater Toxicity (not Source Reduction)**
Backyard composting	Municipal composting	
Using cedar chips		Using moth balls
Replaceable razor heads	Disposable razors	
Bulk dispensers	One-time containers (non-refillable)	
Using vinegar-based cleaners	Household Hazardous Waste Collection Day	Using ammonia-based cleaners

For many people, source reduction remains a confusing subject. Local governments' answers to questions on source reduction programs still describe curbside or drop-off recycling programs. It is important to remember that recycling programs manage materials after they have been discarded and are not source reduction, whereas source reduction **prevents** the generation of waste.

Example: **Landfilling vs Recycling vs Source Reduction**
A paper mill that landfills inferior paper generates waste. A paper mill that takes that paper, re-pulps it and creates new paper is recycling. A paper mill that recalibrates its machinery to increase efficiency is practicing source reduction because the recalibration prevents the generation of inferior paper for recycling or landfilling. Recycling and landfilling answer the question "What can we do with this material?" Source reduction answers "Why is this material here in the first place?"

PROGRAMS REPORTED BY LOCAL GOVERNMENT

Source reduction methods employed by local governments may include those that are implemented in-house, those that are directed at the public, or both. Thirty-one of 620 local governments in North Carolina report that they have staff time dedicated specifically for source reduction. Across North Carolina, 52 staff members spend an average of 9 percent of their time on source reduction programs.

Approximately $103,000 was reported as budgeted for source reduction programs by North Carolina local governments. This amount is likely a low estimate since some local governments that indicated staff time was spent on source reduction did not report spending any money for source reduction programs. For example, Mecklenburg County reported that three staff members spent 66 percent of their time on source reduction programs but did not report any money spent. Also, a portion of the $103,000 spent for source reduction was not spent on staff alone but also on related programs. For example, Stokes County reported spending $43,500 on 10 backyard composting demonstration sites, but did not report any staff time or money spent for staff on their source reduction program. As reported, Stokes County's spending represents 42 percent of all local government money spent in the state on source reduction for FY 1993-94.

For the first time, the FY 1993-94 annual report form included questions regarding unit-pricing programs. These programs charge for residential solid waste collection on a volume or weight basis. Since unit-pricing programs charge for the amount disposed, they are often seen as more equitable. For example, a single person would pay less for solid waste collection and disposal than a family of four that generates three times as much solid waste. As residents are charged for the amount of solid waste generated, a unit-pricing program or variable rate financing program often leads to increased recycling by residents. It also leads to increased source reduction by residents because they purchase more durable goods, use repair and reuse shops, use thrift stores, and backyard compost. As residents are charged directly for solid waste services, the incentive to reduce costs to dispose of garbage makes recycling and source reduction more attractive.

For local governments, effective unit-pricing programs may require more intensive enforcement of anti-littering provisions. Each community must decide whether or not unit-pricing is an appropriate option. Additional information on variable rate financing can be found in the local government funding section of this chapter.

In-House Programs

In-house programs may target reducing their own solid waste streams in a variety of ways. Some of the types of programs involve computer services (e-mail) or purchasing such as delivery and quantities of wastewater treatment plant chemicals ordered or janitorial cleaning supplies ordered or specified in cleaning contracts. Examples of in-house source reduction efforts by 40 local governments are included in the chart below.

Source Reduction Program	Local Governments with In-House Source Reduction Programs	
	Number	% of Total NC Local Govts. (620)
Duplex copying	23	4%
Use of Ceramic Mugs (Reusable)	23	4%
Scratch Pads from single-sided copies	33	6%
Use of reusable laser toner cartridges	12	2%
Electronic memos	5	1%
Route memos	13	3%
Use of less or non-toxic supplies	15	3%
Other	3	1%
Total Local Governments	**40**	

Mandates in Executive Order 8, and Senate Bills 90 and 572 from the 1993 General Assembly require state agencies to examine source reduction as a tool to reduce solid wastes.

Publicly Targeted Programs

According to the annual reports, 106 local governments said they promoted some type of publicly targeted source reduction program.

More local governments (90) have programs to promote backyard composting than any other activity. Programs may include offering classes with a local cooperative extension agency such as the *Master Composter* or *Master Waste Manager* classes. Other local governments have sponsored compost poster contests in their schools or distribution of free or at-cost backyard compost bins. Both New Hanover County and Farmville received grant money from the Office of Waste Reduction for FY 1994-95 for backyard composting efforts. New Hanover County ($4,667) takes used pallets and constructs backyard compost bins in a resident's yard and has several backyard composting demonstration sites. The Town of Farmville is using a portion of their $15,000 grant for thier backyard composting program which offers backyard composting classes and gives away bins to residents. Of the 90 local governments with a backyard composting program, 45 host 90 backyard composting demonstration sites. Stokes (10), Alexander (6), Caldwell (7), and Duplin (14) counties lead the state in the number of backyard composting demonstration sites provided to citizens. Durham (2), Mars Hill (2), Chapel Hill (3), and Marshville (2) are municipal leaders in the number of backyard composting demonstration sites provided to citizens.

Reduction Program	No. of Local Governments with Publicly Targeted Programs
Backyard Composting	90
Grasscycling	52
Xeriscaping	10
Enviroshopping	35
Promote use of non-toxics	29
Pallet Exchange	12
Paint Exchange	12
Materials Exchange	14
Source Reduction Workshop	17
Bulk Mail Reduction	16
Other	14
Total Local Governments	**106**

In addition to the above mentioned programs, eight local governments reported having a unit-pricing program that charges for the amount of residential solid waste disposed. Two local governments charge for residential solid waste by weight, three charge by the size container provided to residents, two charge by the bag, and one charges citizens using a sticker that must be affixed to solid waste to be disposed. As local governments look to remove solid waste charges from the tax base, a variable rate program is one program option that may offer an equitable way to charge for solid waste services.

DATA SUMMARY

Fifty-two counties and 70 municipalities said they had some type of source reduction program whether in-house, publicly targeted, or both. This is an increase of 35 percent over the 79 programs reported in FY 1992-93. Although the number is increasing, only 20 percent of North Carolina's 620 local governments have some type of source reduction program. It is difficult to measure these efforts and their effect on the waste stream. However, if the percent of staff time and resources spent is used to measure the success of source reduction efforts, North Carolina communities have only begun to reach citizens with source reduction information. **Table 2-1** summarizes where local governments' source reduction efforts were targeted.

Table 2-1: Summary NC Local Government Source Reduction Programs or Policies-FY 1993-94.

Program	County			City			Totals		
	FY 1991-92	FY 1992-93	**FY 1993-94**	FY 1991-92	FY 1992-93	**FY 1993-94**	FY 1991-92	FY 1992-93	**FY 1993-94**
Public Only	10	8	**33**	13	3	**49**	23	11	**82**
In-House Only	9	12	**2**	17	24	**15**	26	36	**17**
Both	4	13	**17**	7	19	**6**	11	32	**23**
Totals	23	33	**52**	27	46	**70**	60	79	**122**

	Source Reduction Policy	Separate Source Reduction Goal from Recycling
Total Local Government	5	6

CONCLUSION

Although source reduction is the preferred solid waste management method identified in North Carolina's solid waste management legislation, it is neglected by most local governments. Understandably, safe disposal capacity is a significant concern to local governments. Recycling programs offer tangible benefits in tons diverted and offer local governments material revenues. Source reduction efforts often require some lead-time before the effects are felt and may reduce both solid waste and recycling revenues as less tonnage is generated initially. There also is confusion about source reduction. Recycling programs are often incorrectly reported as source reduction programs; conversely, some source reduction programs go unreported by local governments.

Source reduction is hard to measure. Unlike recycling and disposal programs that manage tons of solid waste collected, source reduction - preventing the generation of waste - does not require facilities to be built, materials to be collected, marketed, and sold, and is a less tangible activity making it much more difficult to measure results. To increase efforts focused on source reduction, the Office of Waste Reduction modified its 1995 Recycling Assistance Grant program to designate specific categories for funding. OWR earmarked $40,000 for source reduction grants with a maximum grant amount of $5,000 per applicant. Of the grant funds available this year ($200,000), funds for source reduction grants equal 20 percent of total funds. Greater efforts by local governments and state agencies will help increase source reduction practices by citizens and businesses in North Carolina.

CHAPTER THREE

RECYCLING

The second element of North Carolina's solid waste management hierarchy is recycling and reuse. Together with source reduction and composting, recycling is a major mechanism for reducing North Carolina's reliance on disposal and for achieving the state's 40 percent solid waste reduction goal by the year 2001.

Both the public and private sectors are active in recovering, processing, and marketing recyclable materials in North Carolina. However, the only formal and comprehensive data available on recycling are on local government programs reported through the Local Government Solid Waste Management Annual Reports. This chapter details statistics regarding local government programs in FY 1993-94. Additional comments are made regarding the perceived status of private sector recycling efforts outside of local government programs.

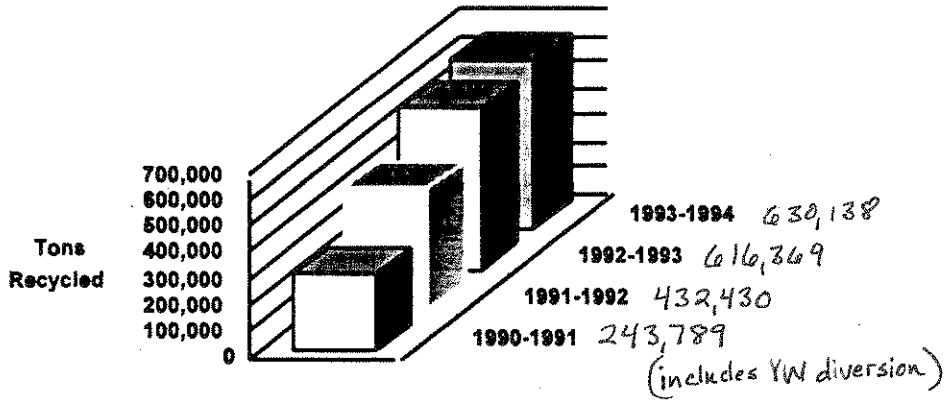
Local Government Recycling in Fiscal Year 1993-94

The FY 1993-94 Local Government Solid Waste Management Annual Reports reveal that recycling programs continue to increase in effectiveness and quality. The data show growth in the overall number of programs and in material tonnages collected by local governments.

Since statewide recycling measurements began in 1990, the state has tried to help communities with a reporting system that consistently and accurately reflects their recycling and solid waste diversion activities. Because of changes and improvements in the reporting mechanisms, comparisons from year to year are not perfectly accurate. In FY 1992-93, for example, some diverted yard waste was counted twice. The next year, a better measurement method was used to compile the annual reports, so the increase in total tonnage in FY 1993-94 does not appear to be as dramatic as in previous years. However, the FY 1993-94 data are the most reliable yet received and more accurately indicate the accomplishments by cities and counties to reduce solid waste.

Following a national trend, the growth in the number of local government recycling programs started to level off during FY 1993-94. However, since FY 1990-91, the number of local government recycling programs in North Carolina increased from 357 to 580, or 62 percent. Many local governments have more than one program. **Figure 3-1** shows that the quantity of recyclables collected in local government programs grew 183 percent during this time period. In all, North Carolina local governments diverted 630,138 tons of materials through recycling and yard waste management programs in FY 1993-94.

Figure 3-1: Total Tonnage Recycled By NC Local Governments, FY 1990-91 to 1993-94.



Note: The figures in this graph include yard waste and white goods.

Local governments reported recycling activities in one of five program categories: curbside, drop-off, buy-back, "other," and an additional category added for the FY 1993-94 report, "mixed waste processing." Many local governments provided recycling collection services for commercial and industrial customers as well as for residents (an important aspect of local government efforts, since approximately two-thirds of the state's total solid waste stream is commercial and industrial waste). There appears to be a general shift from drop-off to curbside programs, which is considered an upgrade in recovery service.

Curbside recycling programs accounted for 38 percent of all recyclables collected in North Carolina by local governments during FY 1993-94, an increase of 7 percent over the previous year. Overall, the number of curbside programs increased by 24 percent. The number of municipalities offering curbside recycling has increased by 161 percent since FY 1990-91, and jumped by 31 percent from FY 1992-93 to FY 1993-94. A few counties also began offering curbside service in unincorporated areas in FY 1993-94, including very rural areas such as Northampton County.

More than one-third of all North Carolinians had access to a municipal or county government curbside recycling program in FY 1993-94, with about 60 percent of that group, (1.8 million citizens) reportedly participating in such programs. Almost half of local government curbside programs (122) provided services to commercial and/or industrial customers.

Drop-Off recycling centers collected 41 percent of the recyclables in FY 1993-94, a decline of six percent from the previous year. The number of drop-off programs also decreased by 3 percent, from 235 reported in FY 1992-93 to 229 in FY 1993-94. An estimated 1.13 million North Carolinians participated in drop-off recycling programs in

FY 1993-94. A total of 120 local governments reported providing drop-off service to commercial and industrial customers.

Buy-Back recycling programs were used sparingly by local governments in FY 1993-94. The private sector operates most buy-back centers in North Carolina (e.g., for aluminum cans), although 16 local governments (two more than reported the previous year) operated their own buy-back centers. These facilities accounted for 1.2 percent of the recyclables collected.

"Other" recycling programs included commercial, school, multi-family, special event, and additional types of recycling programs operated by local governments. The overall number of "other" programs dropped by 16 percent from FY 1992-93 to FY 1993-94. Of the recyclables collected during FY 1993-94, 14 percent were attributed to this category.

"Mixed Waste Processing" was a recovery method used by six local governments in FY 1993-94. Mixed waste processing relies on recovery of recyclables directly from municipal solid waste at centralized processing facilities, basically eliminating the need for extensive source separation (as, for example, in curbside). Approximately 6 percent of the state's recyclables were collected through mixed waste processing in FY 1993-94, the first year data were received in this category.

Table 3-1 and 3-2 show the number of local governments that sponsor curbside, drop-off, buy-back, "other," and mixed waste processing programs.

Table 3-1: County Recycling Programs, FYs 1990-91 to 1993-94.

Program	FY1990-91	FY1991-92	FY1992-93	FY1993-94	Percentage change, FY1992-93 to FY1993-94
Curbside	7	7	10	16	60%
Drop-off	73	85	98	93	-5%
Buy-Back	14	11	12	12	0%
Other	22	45	42	30	-29%
MW Process.	N/A	N/A	N/A	5	N/A
TOTAL	116	148	162	156	-4%

Table 3-2: Municipal Recycling Programs, FYs 1990-91 to 1993-94.

Program	FY1990-91	FY1991-92	FY1992-93	FY1993-94	Percentage change FY1992-93 to FY1993-94
Curbside	88	119	189	247	31%
Drop-off	126	132	137	136	-1%
Buy-Back	4	3	2	4	100%
Other	23	37	37	36	-3%
MW Process.	N/A	N/A	N/A	1	N/A
TOTAL	241	291	365	424	16%

The Local Government Solid Waste Management Annual Reports can be analyzed further to show implementation of municipal recycling programs by community size. As **Table 3-3** reveals, curbside and drop-off programs have been implemented by towns ranging from the smallest to the largest. Almost half of all towns in North Carolina offered curbside service and over a quarter had drop-off programs.

Table 3-3: Selected Municipal Recycling Activities by Population, FY 1993-94.

Population	Number of Cities Reporting	Curbside Program	Drop-Off Program
Less than 1,000	231	75 (32%)	31 (13%)
1,000 to 2,500	120	59 (49%)	33 (28%)
2,500 to 5,000	77	48 (62%)	28 (36%)
5,000 to 10,000	39	26 (67%)	11 (28%)
10,000 to 25,000	31	21 (68%)	17 (55%)
25,000 to 50,000	7	7 (100%)	3 (43%)
50,000 to 100,000	9	6 (66%)	9 (100%)
Over 100,000	5	5 (100%)	4 (80%)
Total:	520	247 (48%)	136 (26%)

Table 3-4 below shows the amount of specific types of materials collected by each kind of recovery method in FY 1993-94, excluding yard waste and white goods (specific collection method data is not available for either of these two materials). The table also shows total tonnage for each major material type. Much of the material labeled "other" in the curbside category is commingled recyclables that local governments were unable to separate by material type.

In addition to the materials in **Table 3-4**, local governments also recycled 34,126.05 tons of white goods and mulched, composted, or delivered directly to end-users 310,337 tons of yard waste.

Table 3-4: Tonnage Collected for Major Recyclable Material by Program Type, FY 1993-94.

Material	Curbside	Drop-Off	Buy-Back	Mixed-Waste Processing	Other	Totals
Glass	20,954.04	14,769.74	223.57	532.94	1,056.63	37,536.92
Plastic	5,942.97	3,151.15	24.38	239.30	439.22	97,97.02
Metal	5,471.96	9,591.82	694.21	1,120.74	463.46	17,342.19
Paper	71,534.16	53,664.65	2,456.63	2804.74	34,346.16	164,806.34
Wood	448.58	26,630.11	0.00	9,400.10	3,326.15	30,804.94
Other	4,479.83	10,686.62	146.90	0.00	1,074.04	16387.39
Total	108.831.54	118,494.09	3,545.69	14,097.82	40,705.66	285,674.80

Further analysis of information in **Table 3-4** shows that curbside programs collect 55 percent of the glass, 61 percent of the plastic, 32 percent of the metal, and 43 percent of the paper. Drop-off programs accounted for 40 percent of the glass, 32 percent of the plastic, 55 percent of the metal, 33 percent of the paper, 67 percent of the wood, and 65 percent of the "other" recyclables collected. "Other" programs collected a large amount of paper (21 percent), and mixed waste processing accounted for a substantial portion of all wood waste recovered (24 percent).

Figure 3-2 shows the amount of material collected by each type of program.

Figure 3-2: Materials Collected by Program Type, FY 1993-94.

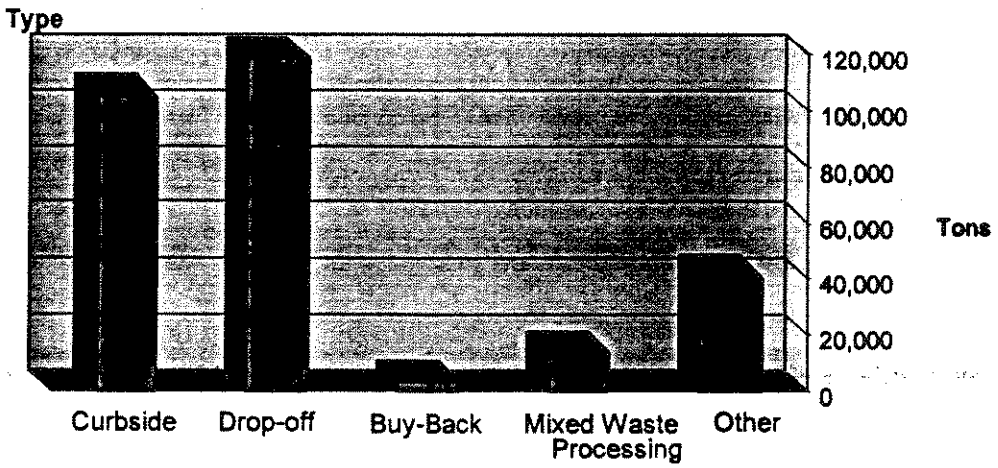


Table 3-5 provides more details on types of materials collected under the major material groups and how many programs targeted specific materials for recycling. FY 1993-94 saw

increases for many of the major recyclable materials such as newspaper, glass, steel cans, and #1 and #2 plastics. Aluminum dropped slightly, perhaps reflecting the effect of private sector recovery efforts. Mixed paper dropped substantially, probably because of consumption cut-backs by the Celotex plant in Goldsboro. Office paper also dropped dramatically for unknown reasons. Both mixed and office papers as distinct grades may be hidden slightly in the increases in the "other paper" category.

Table 3-5: Tonnage of Materials Collected and Number of Collection Programs.

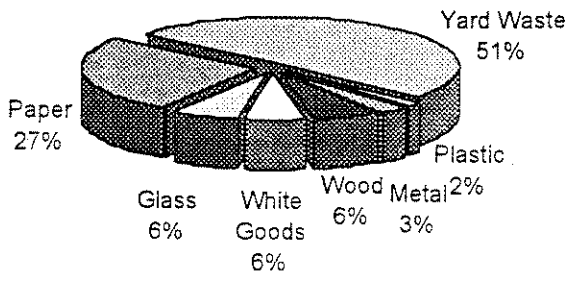
Material Collected	FY 1991-92 Tons	FY 1992-93 Tons	FY 1993-94 Tons	Number of Programs		
Newspaper	70,866.14	85,727.53	97,534.27	346	412	570
Cardboard	14,257.06	27,679.33	42,904.74	204	250	271
Magazines	NA	1,289.33	2,738.84	NA	86	145
Office Paper	1,869.96	13,499.73	4,920.94	109	140	143
Mixed Paper	10,974.68	15,004.4	6,972.92	110	96	110
Other Paper	761.78	8,475.9	9,734.63	45	53	44
Clear Glass	12,176.19	18,580.02	21,275.91	359	420	462
Brown Glass	8,261.06	7,611.56	8,919.80	349	407	440
Green Glass	4,279.95	6,419.28	7,341.21	345	409	394
Aluminum	2,601.92	4,484.13	4,208.04	379	441	493
Steel Cans	1,597.61	3,179.4	4,288.87	180	255	313
#1 plastic	2,660.16	4,856.69	5,308.29	278	349	394
#2 plastic	2,989.5	3,500.85	4,117.99	272	328	367
#3 plastic	76.29	10.28	11.64	32	33	27
#4 plastic	148.86	180.2	19.05	27	32	25
#5 plastic	34.23	185.99	172.70	27	24	25
#6 plastic	166.5	194.34	143.53	26	25	30

Figure 3-3 shows the percentage of materials recycled by local government programs. Programs to divert yard waste from disposal account for more than half of all materials recovered. Paper comprises the next largest material collected.

Trends in Local Government Recovery Efforts

As the state entered FY 1993-94, a number of trends became apparent in the recovery of recyclables by local governments. First, more counties are adding or considering curbside solid waste collection and recycling service for their unincorporated areas. Many of the predominantly rural counties in the northeast and some of the state's urban counties with relatively high population densities fall into this category. Those counties that are not choosing this option and who do not staff convenience centers are moving toward instituting such centers in part to enhance recyclables recovery. A number of counties with staffed convenience centers have begun or are considering charging disposal fees for solid as a way to encourage waste as a way to encourage waste reduction (see the Local Government Funding and Source Reduction Chapters for more detail). Finally, the number of municipal curbside and drop-off programs seems to be leveling off, with only a few more programs expected to come on line in FY 1994-95.

Figure 3.3: Percentage of Materials Recycled by Local Government Programs, North Carolina FY 1993-94



A factor limiting the addition of curbside and drop-off programs and perhaps the most important trend in local government recycling, is local government contracting with mixed waste processing firms to conduct the recovery of recyclables. Haywood, Onslow, Montgomery, and Richmond counties (along with most of their municipalities) and the city of High Point all used such facilities in FY 1993-94. The counties of Wilson, Cumberland, Hoke, and Bladen also have signed contracts with Vedco, a company that conducts mixed waste processing and makes refuse-derived fuel. Two Vedco plants will be operational within a few years. Other counties considering signing on with Vedco include Edgecombe, Nash, Harnett, and Brunswick. If these counties sign such contracts, as much as 15 percent of North Carolina's total waste stream could be committed to recovery through mixed waste processing by the end of the decade.

The use of mixed waste processing may lead some communities to abandon their current source separation programs (i.e., curbside and drop-off). Ironically, three current users of mixed waste processing (Onslow and Haywood counties, and High Point) have begun encouraging citizens to use "blue bags" to separate recyclables from waste, so as to increase the effectiveness of recovery efforts on their picking lines. The city of High Point has also maintained its drop-off program for newspaper. Some mixed waste processors are looking for options to control contamination and bolster recovery numbers by reducing certain commercial and industrial wastes before they reach the facility and by installing composting programs for organics such as food waste and processing residues ("fines"). Because mixed waste processing quickly reaches a recovery "ceiling," the need to examine other methods for achieving waste reduction can be accelerated.

A last major trend in recovery is the continued investment in processing facilities in the state. Brand new material recovery facilities (MRFs) in Greenville, Greensboro, and Hendersonville, and planned expansion of a MRF in Charlotte are signs of expanding recovery and healthy markets.

Markets for Recovered Materials Increase in 1994

Markets for recovered materials improved dramatically for many recyclable materials during calendar year 1994, as shown in **Table 3-6**. For any one commodity, fluctuations in recycled materials markets are to be expected. However, by the end of 1994, all projections pointed to overall market stabilization and stronger prices for the foreseeable future. Some local governments reported meeting FY 1994-95 budgeted revenue expectations from recycling within the first six months of the fiscal year.

Table 3-6: Markets for Recovered Materials, 1994.

RECOVERED MATERIAL	January 1994	December 1994	PERCENTAGE CHANGE
Aluminum cans	$0.20/lb	$0.43/lb	+115%
HDPE (#2 plastic)	$0.07/lb	$0.18/lb	+157%
PETE (#1 plastic)	$0.075/lb	$0.09/lb	+20%
Corrugated cardboard	$30/ton	$80/ton	+167%
Computer paper	$180/ton	$250/ton	+39%
Newspaper	$20/ton	$80/ton	+300%

Source:
Recycling Times, December 27, 1994

Material Disposal Restrictions

The use of local material disposal restriction ordinances (often called "disposal bans") grew in FY 1993-94. The ordinances generally target one or more materials in the local waste stream for restriction. This is usually accomplished by a system of fines and penalties on their disposal. The most commonly targeted material is corrugated cardboard, but Alamance, Wayne, Pasquotank and Camden counties, and the town of Blowing Rock target all common household recyclables. Davidson County has restricted wood waste, and Alamance has banned perhaps the most unusual item -- metal coat hangers. At least eight local governments added material restriction ordinances in FY 1993-94. A complete list of North Carolina local governments' current restriction ordinances is available from the Office of Waste Reduction at (919) 571-4100.

Private Sector Recovery of Recyclables

North Carolina has no formal means of collecting data on private sector recycling efforts. The February 1992 State Plan estimated a 17 percent recycling rate in the state at a time when public sector efforts were in their infancy, thus indicating a great deal of private sector activity. Classic scenarios of private sector recovery include the large amount of material handled annually by scrap metal dealers, the widespread private buy-back stations for aluminum cans, the recycling of corrugated cardboard by food stores, and the long-standing recycling of specific industrial process wastes, such as textiles and wood waste.

In addition to these ongoing efforts, the capacity and activity level of private sector recovery appears to be expanding across the state. One example is the recent rapid growth in the number and size of pallet recycling companies, with facilities and pallet recycling services in operation now in almost every major industrial area of the state. Another example is dramatic increases in the recovery of corrugated cardboard as the result of the passage of numerous local material disposal restriction ordinances. A third example is the growth in the recycling of construction and demolition (C & D) wastes. With major facilities in Havelock, Jacksonville, Wilmington , and Greensboro, and a number of firms strongly considering creating or adding capacity to recycle specific types of C & D wastes, this category of recovery is perhaps the fastest growing in the state on a tonnage basis. Finally, strong market demand and national growth in de-inking capacity is driving increased private sector recovery of paper, and in particular office papers. Large paper dealers and paper companies that had previously concentrated on processing are now entering the collection business in order to guarantee a flow of materials to the many new recycled paper mills in the Southeast.

In summary, while it is difficult to determine the exact amount of materials being recycled by the private sector in North Carolina, some evidence suggests that it exceeds the public sector numbers to a large degree. As disposal costs rise, as technology changes, as market demand for certain materials increases, and as public sector recovery begins to level off, private companies may become the key to achievement of North Carolina's waste reduction goal.

CHAPTER FOUR

SPECIAL WASTES

Special wastes are defined in G.S. 130A-294 as "solid wastes that can require special handling and management, including white goods, whole tires, used oil, lead-acid batteries, and medical wastes." Information was collected from the solid waste management annual reports on lead-acid batteries, white goods (refrigerators, washers, stoves, etc.), used oil, medical waste, and tires for FY 1993-94.

In addition to special handling requirements, these wastes may also be banned from landfilling or have other requirements associated with disposal. Many of the banned materials have traditionally been recycled or can be recycled. Reduced demand periods are occasionally experienced within the recycling market, but through the years there generally has been successful recycling programs for these materials.

Some special wastes present particular hazards to the environment and public health. White goods that contain chlorofluorcarbon refrigerants (CFCs) must be specially managed to avoid release of these ozone - depleting compounds into the atmosphere. Medical waste presents biological hazards to waste handlers and other solid waste workers. The medical waste management regulations specify landfill bans for untreated regulated medical waste and many other special requirements.

LEAD-ACID BATTERIES

Lead-acid batteries have been collected and recycled for their lead content for many years. Current state law requires retailers offering batteries for sale to accept old batteries in return. Lead-acid battery manufacturers have supported this action and indications are that a very high percentage of used batteries are recovered through the retail recovery process. Local governments reported receiving 36,637 batteries in FY 1993 -94 (**Table 4-1**).

Table 4-1: Special Waste Volumes FYs 1990-91 to 1993-94.

Special Waste Material	FY 1990-91	FY 1991-92	FY 1992-93	FY 1993-94
Lead Acid Batteries(#)	3,338	16,312	21,918	36,637
White Goods (Tons)	47,354	25,749	28,769	34,126
Used Oil (Gallons)	147,816	262,559	356,771	391,178

WHITE GOODS

White goods are managed in a comprehensive program, that is an important part of efforts to protect stratospheric ozone. The White Goods Management Program requires proper removal and management of chlorofluorocarbon refrigerants (CFCs) from discarded appliances. Failure to remove CFCs from appliances being disposed is a violation of state law (G.S. 130A-309.84) and subject to severe penalties.

Discarded white goods have significant value as scrap metal and have been recovered for years through existing scrap yard dealers and metal recoverers. The need to manage CFC presents added cost and difficulty in recycling white goods, such as refrigerators and freezers that contain CFCs. CFCs are recovered by working with contractors, local metal dealers, and through local government programs.

An advance disposal tax was imposed on the sale of white goods effective January 1, 1994. The tax is $10 for white goods that contain CFCs and $5 for white goods that do not contain CFCs. Seventy-five percent of the tax revenues are distributed directly to the counties on a per capita basis to provide for white goods management and to provide for freon removal. County landfills are not allowed to charge fees for white goods disposal. The tax and disposal fee ban will be discontinued in June 1998.

This funding enables counties to implement comprehensive white goods and metal recycling programs. The funds are crucial for developing an infrastructure for proper CFCs removal, as well as for recycling the metal content. Counties are using the funds to purchase CFCs removal equipment, train personnel in CFCs removal, and to construct concrete pads and overhead shelters in areas for processing white goods. Other direct expenses such as labor and transportation are paid from this fund. Many counties are also using the funds to clean up illegal dump sites of discarded white goods.

White Goods Management Account

The white goods management account is a special fund set up to assist counties that incur costs that exceed their normal share of the disposal tax revenue. The account receives 20 percent of the revenue from the white goods disposal tax. Grants totalling $166,203 were distributed to 16 counties for losses incurred from January through June of 1994 (**Table 4-2**).

The Solid Waste Section provides assistance by visiting county collection sites, reviewing the white goods management program, and making suggestions for improvement. Eligibility for grants is based on several factors, including severity of white goods disposal problems and financial ability of the county to manage white goods.

In FY 1993-94, local governments collected 34,126 tons of white goods (**Table 4-1**). A significant number of discarded white goods were taken directly to metal dealers by retailers and individuals. A comprehensive report on white goods management is submitted annually in October to the Environmental Review Commission.

Table 4-2: Grant Requests and Awards from the White Goods Disposal Account from January - June 1994.

County Center	Disposal Tax proceeds Received for 6-Month Period	Grant Request for Cost Over-run	Amount of Grant Award
BRUNSWICK	$15,006.97	$44,935.19	$44,935.19
CARTERET	$15,183.13	$10,257.87	$10,257.87
CHATHAM	$11,210.01	$24,176.24	$24,176.24
CLEVELAND	$23,665.86	$12,065.69	$12,065.69
CURRITUCK	$4,009.46	$22,181.31	$22,181.31
DARE	$6,402.57	$2,148.33	$2,148.33
DUPLIN	$11,303.87	$3,233.79	$3,233.79
GRAHAM	$1,958.48	$17,953.52	$17,953.52
HYDE	$1,480.63	$1,720.15	$1,720.15
MADISON	$4,742.75	$1,177.25	$1,177.25
MITCHELL	$3,989.91	$3,232.99	$3,232.99
NORTHAMPTON	$5,706.72	$7,455.70	$7,455.70
PASQUOTANK	$8,806.71	$3,595.29	$3,595.29
TYRRELL	$1,069.96	$550.04	$550.04
WASHINGTON	$3,850.63	$9,150.00	$9,150.00
YANCEY	$4,352.71	$2,370.19	$2,370.19
TOTALS	**$122,740.37**	**$166,203.55**	**$166,203.55**

USED OIL

Used oil has been recovered and used as fuel and a fuel supplement for many years. This is due to processors in the state who collect and market used oil as a fuel. The bulk of used oil recovered and used for fuel comes from service stations and fleet operations, such as bus and trucking companies and other operations with large numbers of motor vehicles.

Collection of used oil from the "do it yourselfers" (DIY) or individuals who change their own oil has been less successful. In FY 1993-94, local governments collected 391,178 gallons of used oil. In addition, a limited number of private facilities offered collection services to the public. An estimated 60 percent of the approximately 21,000,000 gallons of oil sold for light trucks and

automobiles in North Carolina are sold to DIY. Even though some DIY transport used oil to private facilities and some is non-recoverable (burned or leaked), it is evident that the 391,178 gallons collected at public used oil facilities is far short of the estimated millions of gallons that could be collected from those who change their own oil.

Medical Waste

North Carolina had two commercial medical waste incinerators in operation in FY 1993-94, which treated waste shipped predominately from hospitals and medical clinics in North Carolina and other states. The combined capacity was 8,300 pounds of medical waste per operational hour for the two incinerators. Recovery Corporation of America treated 15,079 tons of medical waste, which was 70 percent of the total (**Table 4-3**).

Table 4-3: Tonnage of Medical Waste Incinerated by Two Commercial Incinerators in FY 1993-94.

TONS

Incinerator	North Carolina	Out-of-State	Total
RCA	5,900	9,179	15,079
BFI	4,630	1880	6,510
Total (Tons)	10,530	11059	21,589

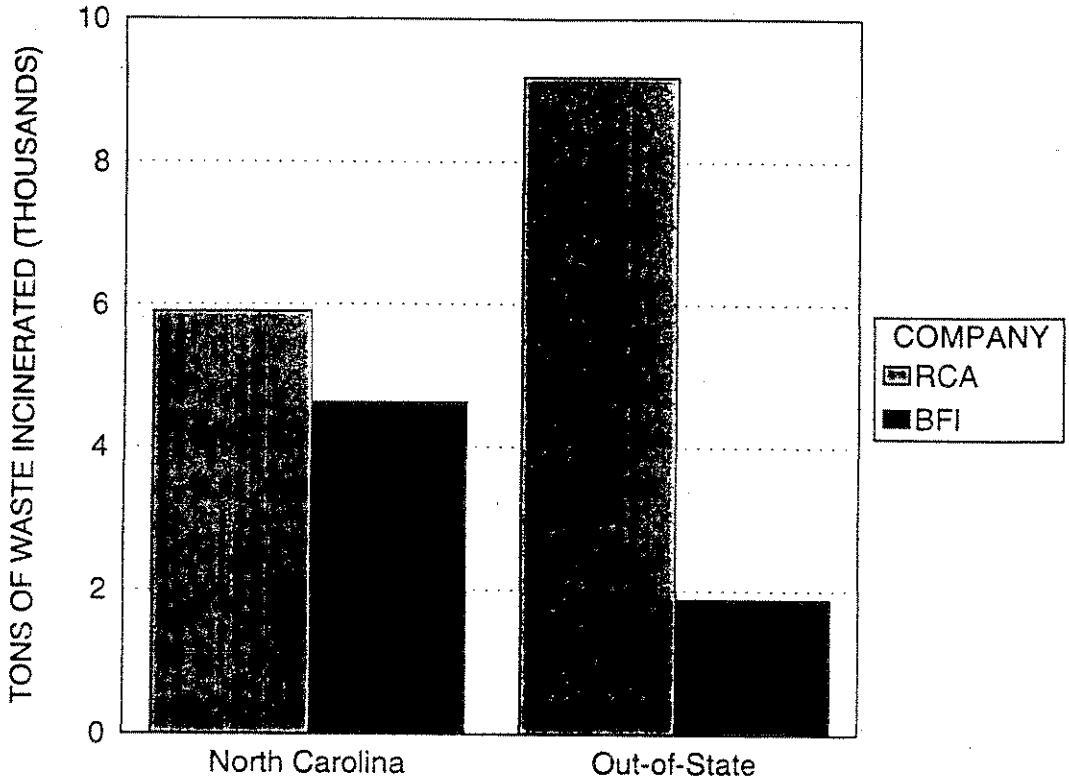
*RCA - Recovery Corporation of America, Matthews, NC
BFI - Browning Ferris Industries, Haw River, NC

About 23 North Carolina hospitals own and operate medical waste incinerators and treat waste generated on site. These hospitals are not required to have a solid waste permit or to submit an annual report to the state.

The North Carolina Medical Waste Management Regulations designate incineration as an acceptable treatment for regulated medical waste (bulk blood, microbiological waste, and pathological waste), which is a small portion of the total medical waste stream. The waste that is typically incinerated is mostly nonregulated medical waste such as used gloves, tubing, drapes, sharps, bloody gauze and dressings.

Approximately 50 percent (11,059 tons) of the 21,589 tons of medical waste incinerated in North Carolina originated out-of-state (**Figure 4-1**) from 14 other states, including New York, New Jersey, Pennsylvania, and South Carolina.

Fig 4-1: Origin of Medical Waste Incinerated by Two N.C. Commercial Facilities.



Incineration has traditionally been the preferred means of treating medical waste in North Carolina hospitals. However, many small incinerators have been closed the past several years due to inability to meet new standards for incinerator operation.

Recent U.S. EPA studies have identified medical waste incinerators as the largest known source of dioxin emissions, exceeding hazardous waste incinerators and cement kilns. Also, medical waste incinerators were identified as the largest known source of mercury emissions. Other emissions of concern are nitrogen oxides (contributor to ozone smog), particulate matter, sulfur dioxide, lead, and cadmium. As a result, the EPA has proposed regulations that are expected to cause closure of 80 percent of existing medical waste incinerators over the next three years because they will be unable to meet the more protective standards.

Innovative Medical Waste Treatment Technologies

New technologies for the treatment of medical waste are receiving increased attention at North Carolina medical facilities. A new steam sterilization process is used at the High Point Regional Medical Center in High Point. The sterilizer draws a vacuum in the initial stage of the cycle. This feature helps overcome the problem of incomplete steam penetration that occurs in standard autoclaves. To avoid air emissions the steam is condensed and discharged into the sanitary sewer.

Forsyth Hospital in Winston-Salem uses a microwave treatment unit to treat medical waste generated on site. The unit has been used to treat approximately 500 tons per year since 1990. This technology uses microwave energy to generate moist heat that decontaminates the waste. Waste is shredded to ensure uniform treatment, and there are no harmful air emissions.

A mobile microwave unit is used to treat hospital medical waste on-site at the following hospitals: Memorial Mission Hospital, St. Joseph's Hospital, and VA Medical Center in Asheville; Presbyterian Hospital and Mercy Hospital in Charlotte; Valdese Hospital in Valdese; Lincoln County Hospital in Lincolnton; Presbyterian Matthews Hospital in Matthews; and Cabarrus Memorial Hospital in Concord. Additionally, a permitted microwave treatment facility near Asheville treats waste shipped from five hospitals and smaller healthcare facilities and offices.

Technical Reviews and Approval of Innovative Technologies

Innovative technologies can be used in North Carolina to treat regulated medical waste only after obtaining approval, as specified in 15A NCAC 13B .1203 (b). This includes a review of the validity of experimental data submitted to describe the unit's ability to deactivate microorganisms. The review includes:

- Microbiology review. Adequacy of the experimental design of the lab studies is evaluated. The materials and methods used are compared with standard procedures used in microbiological studies. The data is reviewed and the appropriateness of conclusions drawn from the data is evaluated.
- Review of environmental discharges. Vendors are referred to the appropriate agency if air or water discharge permits are needed.
- Review of worker safety and operator training. Parts of the equipment to be serviced should undergo decontamination procedures prior to being accessed by workers.
- Review of wastestream to be treated and applicable regulations.

Ten companies have obtained approval to market their treatment equipment in North Carolina (**Table 4-4**). This includes technologies such as microwave treatment, far-infrared heat treatment, and use of chemical disinfectants and sterilants. Six other technologies are under review.

Table 4-4: Technical Review and Approval of Innovative Medical Waste Treatment Technologies.

(Medical Waste Treatment Technologies Approved for Use in North Carolina)

Company	Name of unit	Type of Technology
Spintech, Inc	TAPS	Thermal treatment
Winfield Environ Corp	Winfield Condor	Shred/Chemical treatment (chlorine dioxide)
Mediclean Tech, Inc	IWP-1000	Shred/Chemical (chlorine dioxide)
Ecomed Company	Ecomed	Shred/Chemical (iodophor)
Medical Safetec, Inc		Shred/Chemical (sodium hypochlorite)
Medifor-X Corporation	Dispoz-All 2000	Infra-red heat treatment
Isolyzer Company	Sharps Disposal System	Chemically treat/solidify
D.O.C.C. Inc	Demolyzer	Thermal treatment
Steris Corporation	Steris 20/EcoCycle 10	Shred/Chemical sterilant (peracetic acid)
Bioconversion, Inc		Shred/Enzyme treatment(bioremediation)

(Medical Waste Treatment Technologies under Review for Approval)

Tempico, Inc	Rotoclave	Shred/Steam sterilize
MedAway, International	MedAway 1	Dry heat sterilization
Medical Materials and Technology		Dry chemical sterilant
Vance IDS, Inc		Plasma arc furnace
Princeton Environ, Inc		Shred/Steam sterilize
ThermoKill, Inc	Model 1001	Dry heat sterilization

(Technologies That Do Not Require State Approval When Used as Specified in Regulations)

GTH Roland North America, Inc	ZDA-M3	Shred/Steam sterilize
Medivators, Inc	DSI System 2000	Thermal treatment of sharps

SCRAP TIRES

Tires present complex disposal problems and create unique hazards to the environment and public health. The presence of illegal tire dumps around the state has resulted in the introduction and potential establishment of an exotic mosquito, the Asian Tiger Mosquito (Aedes albopictus). In research by NC State University, the mosquito was identified in 29 of 38 sites sampled in 1993.

In 1989, a 1 percent scrap tire disposal tax was imposed on the sale of new tires, and a scrap tire program was required in each county. In October 1993, the tax was increased to 2 percent, and counties were prohibited from charging disposal fees for scrap tires generated in North Carolina. The removal of landfill disposal fees eliminated a major factor that contributed to illegal dumping of scrap tires.

North Carolina generated approximately 6.9 million scrap tires or 1.0 per capita in FY 1993-94. The counties reported managing about 7,032,000 tires, which was more than 100 percent of the total. The numbers of tires managed by the counties has increased annually since the scrap tire program began in 1990 as shown below:

Year	Estimated Number Generated	Number of Tires Disposed	Percentage Of Total Generated
FY 1990-91	6,628,000	5,110,000	77%
FY 1991-92	6,739,000	6,104,000	90%
FY 1992-93	6,836,000	6,282,000	92%
FY 1993-94	6,949,000	7,611,000	110%

The increased number of disposed tires over the four years reflects the success of the tire program. The program has been more successful as awareness of the regulations and cooperation of affected parties has increased.

Part of the increase in numbers of disposed tires in FY 1993-94 is likely due to illegal disposal of out-of-state tires at county collection sites. The Solid Waste Section is assisting counties in initiating policies to avoid receiving such tires. These include:

- Improving screening of tire loads by requiring complete scrap tire certifications. These forms provide details on the origin of each load;

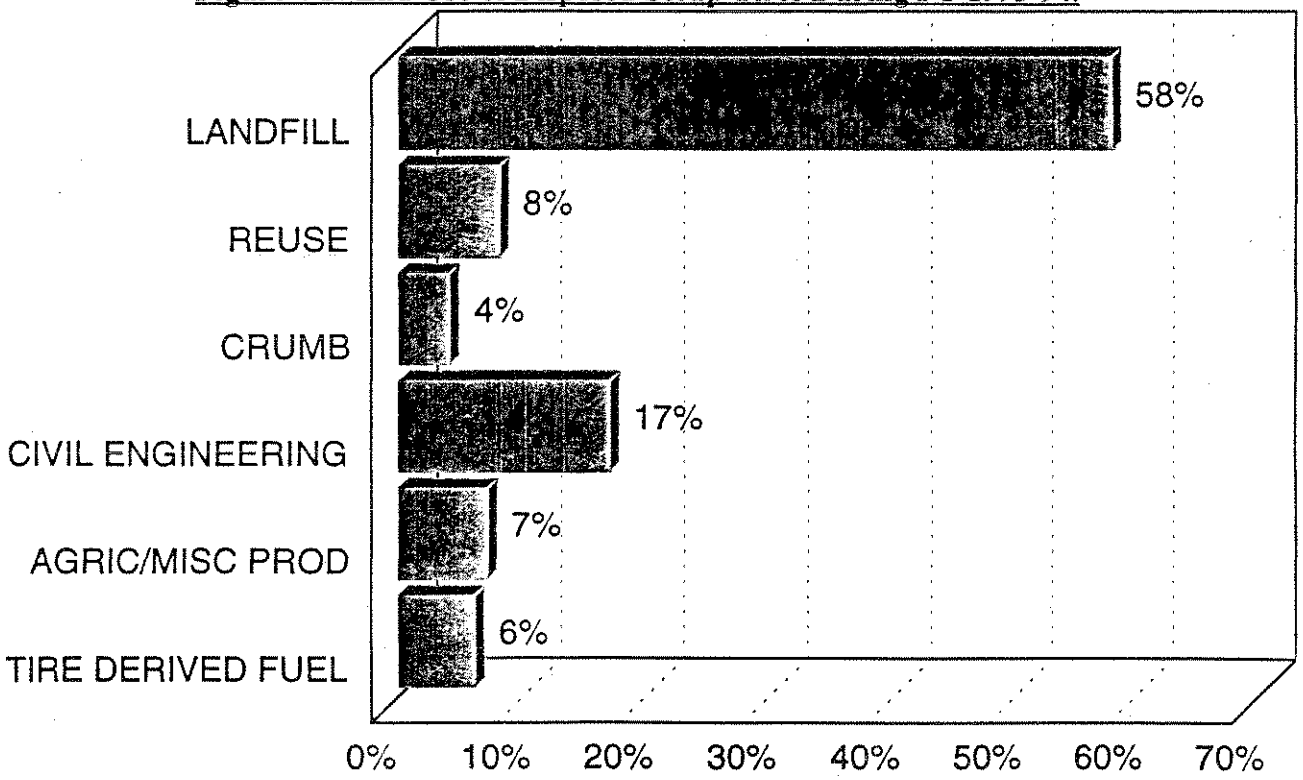
- Visiting generators to discuss tire program requirements; and
- Making spot checks of loads by calling to verify the origin and size of loads brought by haulers.

The Solid Waste Section provides assistance by visiting county collection sites, reviewing the scrap tire programs, reviewing certifications, and making suggestions for improvement. Efforts made to avoid abuse is a factor in eligibility for grants from the Scrap Tire Disposal Account to cover cost over-runs.

Tire Recycling

Approximately 3.1 million scrap tires or about 42 percent of the scrap tires disposed in North Carolina were diverted from landfills for various uses in FY 1993-94 (**Figure 4-2**). This was a considerable increase over the previous year when only 29 percent of the scrap tires were recycled.

Figure 4-2: End Use of Disposed Scrap Tires During FY 1993-94.



The scrap tire program requires scrap tire haulers to register with the Solid Waste Section and obtain a scrap tire hauler identification number. Tire retailers who haul their own tires are exempt from this requirement. The number of haulers increased during the fiscal year as shown below:

Scrap Tire Haulers Registered in FY 1993-94	126
Total Tire Haulers Registered	810

Nuisance Tire Site Cleanups

The Solid Waste Section is currently funding cleanups of nuisance tire sites across the state. Nuisance tire sites are ranked for cleanup according to the hazards they pose to public health and the environment. Funds to clean up sites became available in October 1993 when the scrap tire disposal tax was increased from 1 percent to 2 percent.

The Scrap Tire Disposal Account (STDA) is a special fund that receives 27 percent of revenues from the scrap tire disposal tax on the sale of new tires. The current tax rate is 2 percent for tires that are less than 20 inches and one percent for tires that are 20 inches and over. Twenty-five percent of funds in this account are used for grants to counties that did not receive sufficient revenues to operate their scrap tire management programs. The other 75 percent of the fund is used for nuisance tire site cleanups (**Table 4-5**).

In May 1994, the section let bids for the two largest sites in the state; one in Richmond county with an estimated 5 million scrap tires, and one in Pender County with an estimated 1 million scrap tires. The contract for the cleanup of these sites was awarded to U.S. Tire Recycling Partners, L.P. in Concord, NC. These sites represent about 72 percent of the state's known nuisance tires. The Solid Waste Section will allocate $1.2 million per year ($300,000 per quarter) of the Scrap Tire Disposal Account for this contract. Cleanup started in November 1994, and as of March 1995, almost 400,000 scrap tires (4,000 tons) had been removed from the two sites.

Table 4-5: Use of Funds From the Scrap Tire Disposal Account (STDA).

TOTAL FUNDS AVAILABLE (February 15, 1995)				$2,542,270.16
Program Projects/Contracts		Funds Collected To Date	Funds Allocated To Projects	Funds Expended
25%	County Cost Overruns	$635,567.55	$137,474.39	$498,093.16
75%	Pender/ Richmond	$700,000.00	$395,227.27	$304,772.73
	5 Large Sites State RFP	$1,000,000.00	$1,000,000.00	0.00
	Small sites in Counties	$206,702.61	$173,826.74	$30,166.01
TOTALS		$2,542,270.16	$1,706,528.40	$833,031.90

The Department recently completed the bidding process for cleaning the next five largest sites. These sites are located in Greene (500,000 tires), Chatham (400,000 tires), Brunswick (130,000 tires), and two sites in Harnett (100,000 tires each) counties. There were nine bids received for cleanups of five sites on February 24, 1995. Cleanups at four of these five sites began in May 1995.

Smaller nuisance tire site cleanups are being addressed through local county scrap tire management programs. More than 230,000 scrap tires have been removed from 39 nuisance tire sites, and 20 other smaller sites are undergoing cleanups. The Section has funded cleanups for six of the higher ranked smaller sites with funds from the STDA.

The total amount received after five quarters to the STDA is $2,542,270. The present allocations and expenditures balances are presented in **Table 4 -5**. The account will receive funds for 45 months and will be discontinued in June 1997. Based on the current rate of collection, it is projected that the account will receive $7,368,481 from October 1993 to June 1997.

The state currently has information on 210 nuisance tire sites **(Table 4-6).** Of these sites, 39 have been cleaned up, and 27 other sites are being cleaned through various state and local actions. The remaining 144 known sites contain 458,625 tires.

Table 4-6: Status of Nuisance Tire Site Cleanup Program.

Known Sites	Number/sites	Total Known Tires	Tires Removed	Percent/ Total
Total Sites	210	8,462,647	N/A	100.00
Sites Cleaned Up	39	188,022	188,022	2.22
Contracted for Cleanup Sites	12	7,465,000	326,243	88.21
Other Ongoing Cleanup Sites	15	351,000	19,600	4.15
Total Sites Under Cleanup	27	7,816,000	533,865	92.36
Next Sites To Negotiate	3	39,500	N/A	0.47
Sites/Tires Remaining	141	419,125	N/A	4.95

The Solid Waste Section has developed a program to clean up some smaller sites working with existing county tire management programs and the N.C. Department of Correction. This program uses inmate labor to load tires and clean up the sites. There is currently $176,536 available for this effort. Cleanup was completed by inmate labor at an Anson County nuisance tire site with about 9,800 tires in September 1994 at a cost to the state of $8,992. Cleanup using inmate labor at a nuisance tire site in Stokes County with about 40,000 tires started in October 1994. Nearly 8,000 tires have been removed as of May 1995 and the section has paid $5,300 to Stokes County. Rutherford County is actively cleaning up a site with about 80,000 tires. More than 20,000 nuisance tires had been removed as of May 1995 with the section paying $15,872 to the county.

The section allocated $173,826 for completing the Stokes and Rutherford sites, as well as three other sites in Onslow (90,000 tires), Lenoir (15,000 tires), and Yadkin (10,000 tires) counties. The higher priority sites will be addressed when additional funds become available.

A few other sites have ongoing cleanup operations started by responsible parties. The state is continuing with the required enforcement action at several of the larger sites to enable the state to take possession of the tires and clean up the sites. Upon completion of the cleanup, cost recovery actions may be pursued by the state's attorney general.

Scrap Tire Disposal Account Grants

Twenty-five percent of the funds in the Scrap Tire Disposal Account is used for grants to counties that did not receive sufficient funds to operate their scrap tire management program. These grants are available to reimburse losses incurred by counties during the six-month period preceding the application. Grants totalling $216,638 were awarded to 23 counties in August 1994 to assist with losses incurred from October 1993 to March 1994 (**Table 4-7**). Grants totalling $281,455 were awarded to 34 in February 1995 to counties to reimburse losses incurred from April to September 1994. A total of $137,474 (nearly 25 percent of the February 15 distribution) is currently available for these grants and will be combined with the May 1995 allocation and awarded in July 1995.

The ability to make grants to counties that incur deficits is crucial since some counties have unique difficulties with tire disposal. Three examples of special circumstances and situations are described below:

Geography

Shipping distance to tire recyclers is a key factor in cost. Counties in the extreme east and west typically incur higher costs.

Presence of Specialty Tire Dealers

Pasquotank and Alamance counties are examples of counties that host tire dealers who specialize in large equipment tires and provide service to several adjacent counties. These companies replace tires on farm tractors and heavy equipment in the field and transport the old tires back to their facilities. Providing disposal services for these tires created deficits in the tire programs of these counties.

Presence of Special Industries

Washington County has a large logging industry and receives a big volume of large equipment and truck tires from about 12 logging companies. Such tires are expensive to dispose, and the county also incurs high hauling costs since it is a long distance from facilities that can dispose of such tires. Perquimans County is host to the Division 1 NC Department of Transportation shop that disposes of equipment tires. The county reported that the volume of tires from this source increased considerably when free disposal was required.

TABLE 4-7 : Grant Requests and Awards from the Scrap Tire Disposal Account to Reimburse Counties for Losses Incurred October 1993 - September 1994.

Grants Awarded August 1994

CATAWBA	$31,519.53
CLEVELAND	$10,937.68
CRAVEN	$ 8,595.66
CURRITUCK	$ 2,245.07
DARE	$ 3,433.04
DAVIE	$ 2,184.62
DUPLIN	$10,390.74
FORSYTH	$ 7,447.92
GASTON	$ 4,683.10
GUILFORD	$18,257.18
HAYWOOD	$ 6,809.65
HERTFORD	$ 1,667.57
JACKSON	$ 2,050.81
JONES	$ 7,184.14
MACON	$ 5,288.43
MADISON	$ 1,352.45
NEW HANOVER	$45,462.93
PASQUOTANK	$ 7,240.75
PE/CH/GA	$ 5,551.68
ROCKINGHAM	$22,408.82
WATAUGA	$ 944.37
YANCEY	$ 4,740.69
TOTALS	$216,638.15

Grants Awarded February 1995

ALAMANCE	$14,459.25
ALEXANDER	$ 245.87
AVERY	$ 1,044.51
BUNCOMBE	$ 6,856.64
CALDWELL	$ 4,324.86
CARTERET	$ 2,583.16
CATAWBA	$33,408.04
CHATHAM	$ 892.52
CLAY	$ 359.34
CLEVELAND	$10,465.31
CRAVEN	$ 2,512.74
DAVIE	$ 6,187.04
DUPLIN	$14,530.64
FORSYTH	$25,700.79
GUILFORD	$26,080.46
HARNETT	$ 2,215.56
HERTFORD	$ 2,145.69
IREDELL	$ 8,697.00
MACON	$ 3,722.31
MADISON	$ 1,998.93
MITCHELL	$ 1,733.03
NEW HANOVER	$29,843.41
ORANGE	$ 6,681.86
PASQUOTANK	$10,593.59
PERQUIMANS/CHOWAN/GATES	$10,192.35
RICHMOND	$ 9,059.31
ROCKINGHAM	$10,627.96
RUTHERFORD	$ 2,204.96
SAMPSON	$11,340.67
SWAIN	$ 1,881.46
UNION	$ 8,862.45
WASHINGTON	$ 4,934.69
WILKES	$ 3,332.19
YANCEY	$ 1,736.42
TOTALS	**$281,455.01**

For a more detailed presentation of the status of North Carolina's scrap tire management, please request the Solid Waste Section to send a copy of the Scrap Tire Management Report dated April 1, 1995.

HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste (HHW) is considered a "solid waste" and is subject to the regulations under Subtitle D of the Resource Conservation and Recovery Act (RCRA). The Solid Waste Section (section) encourages the establishment of permanent HHW collection facilities at permitted solid waste management facilities.

Thus far, only two permanent HHW collection facilities (Cumberland County and ECOFLO in Greensboro) have been permitted in the State. However, applications are currently being reviewed for four additional permanent HHW collection facilities (Chatham, Orange, and Wake counties and the City of Durham). Application requirements to obtain a permit for a permanent HHW collection facility include an approved environmental assessment (EA) and an approved permit application, which includes site plans, floor plans, and an operational plan that meets the requirements in Section Policy Memorandum #15.

In addition to permanent HHW collection facilities, the section encourages temporary HHW collection days. The section assigns temporary HHW identification numbers for tracking the collection, treatment, disposal, and recycling of HHW in the state. The application required to obtain a temporary HHW identification number requires information such as the material to be collected, the address and contact person for the agency collecting the HHW, and the address and contact person for the transportation and disposal facility or facilities.

In FY 1993-94, HHW was collected on 11 household hazardous waste collection days; the seven hosting communities for these collection days were Buncombe, Forsyth, Wake, Rockingham, Durham, Person, and Gaston counties. The items most frequently collected and either recycled or re-used from these HHW collection days included used motor oil, latex paints, oil-based paints, propane tanks and cylinders, and aerosol cans. The counties reported 737,529 pounds of household hazardous waste collected.

CHAPTER FIVE

PERMITTING

MUNICIPAL SOLID WASTE LANDFILL CONSTRUCTION

As of May 1995 there are four lined MSWLFs under construction (Orange County Landfill, Uwharrie Environmental Landfill in Montgomery County, Rockingham County Landfill, North Wake County Landfill). Permit applications for 11 lined landfills are also under review by the Solid Waste Section (Anson County Regional Landfill, Buncombe County Landfill, Granville County Landfill, Johnston County Landfill, Camp Lejeune Landfill, South Wake County Landfill, Yancey-Mitchell Counties Landfill, Cumberland County Landfill, Cherokee County Regional Landfill, City of Winston-Salem Landfill, and Catawba County Landfill). It is anticipated that an additional 25 MSWLFs will be in operation by January 1, 1998, bringing the total to 58 lined MSWLFs operating in North Carolina.

TRANSFER OF MUNICIPAL SOLID WASTE

The trend is toward fewer but larger landfills. This is substantiated by the fact that approximately one-half of the MSWLFs operating prior to FY 1993-94 have closed. It is also reflected by the dramatic increase in the number of transfer facilities that have received permits during FY 1993-94. Of the 30 transfer facilities operating in May 1995, 25 began operation during FY 1993-94. All of these 25 facilities transfer municipal solid waste out-of-county to a regional landfill. Of these facilities, 10 are privately owned and operated.

However, the trend toward the transfer of municipal solid waste to regional lined landfills does not include wastes such as construction and demolition debris, which does not require disposal in a lined landfill. In fact, the majority of the MSWLFs that closed during FY 1993-94 have submitted applications for a construction and demolition landfill.

MIXED WASTE PROCESSING AND RESOURCE RECOVERY

Bladen, Cumberland, and Hoke counties entered into an agreement with BCH Energy for the processing, recycling, and energy recovery (resource recovery) from municipal solid waste generated within those counties. The mixed-waste processing facility now under construction at the Cumberland County landfill in Fayetteville will recover paper, plastic, metal, etc., and produce refuse-derived fuel (RDF). The RDF will be transferred to an energy generation facility at the E.I. DuPont DeNemour plant in Bladen County. This facility, now under construction, will use a fluidized bed boiler to burn 100 percent RDF and supply steam to DuPont for electric power generation and process steam. The excess electricity will be sold to Carolina Power and Light.

Permit applications for two similar facilities, located in Wilson and Lenoir counties and taking municipal solid waste from surrounding counties, are currently under review by the Solid Waste Section.

CHAPTER SIX

SOLID WASTE ENFORCEMENT AND FIELD OPERATIONS

The compliance and enforcement responsibilities of the Solid Waste Section cover a wide range of enforcement and compliance concerns. A significant amount of staff time is spent providing technical assistance to the regulated community and the public on all aspects of integrated solid waste management. These include planning, waste reduction, recycling and composting programs, operational requirements and the Solid Waste Management Rules and Law. Technical assistance demands approximately one-third of field operations staff time and is a major tool in promoting compliance as well as maximizing the use of existing disposal capacity.

The section evaluated approximately 150 business facilities in FY 1993-94 to determine eligibility for special tax treatment under the Tax Certification Program. This program allows tax credits and property tax exemptions on recycling equipment, facilities and land to encourage solid waste resource recovery and recycling. Certification of a facility or equipment for this special tax treatment requires on-site inspections in most cases to verify that they qualify. The branch initiated several procedural changes in the program that will improve efficiency while providing more detailed information on the types of businesses taking advantage of the tax breaks.

In order to comply with OSHA's standards for workplace safety, the section is in the early phases of developing and starting a safety program for the Solid Waste Section. This program, patterned after the program of the Hazardous Waste Section, will assess hazard exposure to staff working under various field conditions, determine the need for personal protective equipment and training, and the development and implementation of appropriate training.

ILLEGAL DUMPING

Since the passage of comprehensive solid waste legislation in 1989, major changes have taken place throughout the state in solid waste management. There has bee increased emphasis on planning and implementing comprehensive solid waste management programs, including recycling and waste reduction components. Landfill disposal has been met with far more stringent design, operation, and closure requirements. All these changes have driven up the cost of solid waste management significantly during the past five years. The state's solid waste regulatory program is directly affected by these changes.

Illegal dumping is a rapidly growing problem within North Carolina due to increased tipping fees, availability of fewer permitted facilities, and an under capacity in facilities to receive construction and demolition waste. More than 100 solid waste-related complaints per month are received, investigated and responded to by the field operations staff. These complaints lead to the discovery of as many as 40 previously undocumented open dump sites each month.

This growing incidence of illegal dumping is compounded by inadequate resources for state enforcement and cleanup. Likewise, those incidences of illegal dumping, or littering - a local government responsibility - are also being reported more frequently. The range of illegally

disposed materials reported through complaints include tires, septage, land clearing debris, construction and demolition waste (including asbestos), household garbage, medical waste, waste oil and commercial and industrial waste.

The responsibility for prevention, investigation, enforcement, and cleanup is divided between the state (Solid Waste Section) and local governments. The state assumes responsibility for dump sites that do not have permits and are operated for economic gain. Local governments, through health departments and solid waste enforcement officers, address littering and illegal dumping that occurs without the permission or control of the landowner.

However, when local governments develop their budgets to fund solid waste management, programs for prevention and enforcement of illegal dumping generally are not considered. Less than half of the state's counties have "solid waste enforcement officers" or "litter officers" designated to deal with solid waste dumping. Most local agencies, such as health, planning and zoning, or law enforcement, have higher priorities with other mandated programs. Due to the lack of enforcement capability or interest in many counties, the field operations staff is called upon more and more to deal with illegal dumping, regardless of who is officially responsible.

Regional staff who investigate and take enforcement actions against the parties (if found) responsible for establishing these illegal sites are often frustrated because the individuals lack the financial resources required to clean up the site. Additionally, no state funds have been allocated for state-sponsored cleanup of these sites. The result is that in the past, many sites have been closed under a compromise plan, or remain on the books as unclosed cases.

The section has established a database to track these illegal sites and is currently developing a ranking system so that future cleanup of illegal sites will become prioritized according to certain criteria, such as potential danger to public health and environment, size of the site, proximity to receptors, and types of waste disposed. A key area for joint efforts between state and local governments will be education of groups that play a role in illegal dumping, and developing strategies to eliminate any advantage of illegal disposal over approved practices.

COMPLIANCE ASSURANCE

Monitoring permitted facilities to assure compliance with construction and operational requirements within the Solid Waste Management Rules is another critical activity performed by the Solid Waste Section. Currently, there are 65 MSW (municipal solid waste) landfills, 26 industrial waste landfills, 248 land clearing and inert debris landfills, six incinerators, 17 yard waste composting facilities, 12 mixed waste processing facilities (including C&D), 18 permitted and 18 temporary transfer stations, 94 scrap tire collection sites, 232 septage sites and 365 septage firms. Regional staff evaluate an average of 50 permitted sites monthly to meet official inspections goals of twice per year. In addition, there are 141 yard waste and 85 LCID (land clearing inert debris) sites permitted by notification. These sites are inspected on a discretionary basis as time allows.

A computer-based compliance tracking system was initiated in 1995. This system will improve the effectiveness of tracking compliance activities and increase program efficiency through reduced monthly reporting by regional staff.

The Financial Assurance Rule, 15A NCAC 13B, .1628 became effective on April 9, 1994. This rule requires the owners and operators of municipal solid waste landfills to provide assurance that sufficient funds will be available for proper closure and post-closure care of existing facilities. The financial assurance program reviews the required documentation to ensure compliance with the rule. The section is currently reviewing proposed rules for a corporate financial test as a way to satisfy financial assurance requirements.

One area of increased concern is the large number of landfills that operated with approval from the section in the past and closed prior to current requirements for long-term maintenance and monitoring. The potential for groundwater contamination and threat of explosion from methane gas buildup have prompted a new look at these facilities. The section is planning a program designed to bring these facilities under some level of monitoring consistent with the potential threat posed. Field operations staff are compiling a list of these closed facilities, developing an inspection protocol and defining ranking criteria. The need for new regulations and additional staff resources to protect public health and the environment from hazards posed by these facilities is being examined.

Over the past several years, the Solid Waste Section has steadily increased enforcement actions. Depending on the particulars of a violation, the Compliance Program uses a variety of techniques to bring permitted facilities or illegal sites into compliance. Technical assistance is often effective to eliminate the need for formal enforcement actions and is the preferred approach to improve compliance at permitted facilities with good compliance histories.

Some circumstances, however, might require "Warning Letters," "Notices of Violation" (NOVs), "Compliance Orders" (with or without penalties) or "Consent Agreements" to bring a site into compliance. The section has developed standard operating procedures to improve the level of consistency in applying the rules and the various compliance tools.

TABLE 6-1: Compliance Orders Issued for Period July 1, 1990 to March 31, 1995.

N.C. Fiscal Year	Category Type	Violation	Penalty Totals
1990-91	17-Non-conforming	No Permit	$272,250.00
1990-91	1-Sanitary Landfill 5-Demolition Landfill	Operational Requirements	$ 35,700.00
1991-92	1-Sanitary Landfill	Operational Requirements	$ 3,000.00
1991-92	1-Sanitary Landfill	No Scales	$ 200.00 per day*
1991-92	6-Non-conforming	No Permit	$ 79,500.00
1992-93	4-Non-conforming	No Permit	$ 23,750.00
1992-93	3-Sanitary Landfill	Operational Requirements	$ 20,000.00
1992-93	1-Private Sanitary Landfill	No Scales	$ 2,000.00
1992-93	1-Demolition Landfill	Operational Requirements	$ 5,000.00
July 1 1993-March 31, 1994	12-Non-conforming	No Permit	$130,500.00
July 1, 1993-March 31, 1994	3-Permitted Landfill	Operational Requirements	$ 31,250.00
July 1, 1993-March 31, 1994	11-Nuisance Tire Sites	Non-conforming Scrap Tire	N/A
July 1, 1994 - March 31, 1995	12-Non-conforming	No Permit	$114,000.00
July 1, 1994 - March 31, 1995	5-Permitted Landfill	Operational Requirements	$60,450.00
July 1, 1994 - March 31, 1995	5- Nuisance Tire Sites	Non-conforming Scrap Tire	$20,500.00
July 1, 1994 - March 31, 1995	6-Septage Sites	Illegal Disposal of Septage	$82,000.00
		TOTAL	**$878,100.00***

*Total does not include $200 per day contingent penalty since case disposition and final penalty have not been settled.

TABLE 6-2: Summary of Compliance Actions FY 1989-90 to March 1995.

FY - 89	25 NOVs
	9 Compliance Orders
Total	34
FY - 90	59 NOVs
	1 Injunctive Action
	4 Compliance Orders
Total	64
FY - 91	113 NOVs
	21 Compliance Orders
Total	135
FY - 92	20 NOVs
	8 Compliance Orders
	1 Injunctive Action
Total	29
FY - 93	97 NOVs
	9 Compliance Orders
Total	106
FY - 94	192 NOVs
	26 Compliance Orders
Total	218
FY - 95*	204 NOVs
	18 Compliance Orders
Total	222

*FY 95 calculated reporting from July 1, 1994 to March 31, 1995.

GROUNDWATER COMPLIANCE

The section's Groundwater Compliance Unit is responsible for implementing 15A NCAC 13B Section .0600 of the Solid Waste Management Rules, which requires water quality monitoring at solid waste management facilities. The unit also administers Rules .1630 through .1637, which address groundwater monitoring at municipal solid waste landfill facilities (MSWLFs). The primary functions of the Groundwater Compliance Unit are:

1. To monitor the effect of the disposal facility on the ground and surface water quality in the area in order to protect public health and the environment;

2. To monitor the effectiveness of the design and operation of the monitoring system to detect contaminants leaving the landfill or other solid waste management unit;

3. Develop and use programs for assessing groundwater facilities where contamination has been detected;

4. To prioritize facilities for remediation action based on groundwater data and monitor remediation activities; and

5. To evaluate the proper reporting of methane monitoring data and appropriateness of methane corrective action plans.

Changes in the N.C. Solid Waste Management Rules, as a result of the EPA RCRA 40 CFR Part 258 Solid Waste Disposal Facility Criteria (Subtitle D), recently became effective, resulting in significant changes in the groundwater monitoring program for active municipal solid waste landfill units. These include increased sampling frequency; routine detection monitoring for a more extensive constituent list, including volatile organic analysis; statistical analysis of water quality data; and an automatic increase to Phase II assessment monitoring if significant increases are reported in the routine detection monitoring. The new rules for MSWLF units also include more formalized procedures for groundwater assessments and corrective action, and at least 30 years of post-closure monitoring.

All permitted sanitary landfills in North Carolina have been required since 1989 to monitor groundwater quality. Groundwater monitoring is presently being conducted at closed sanitary landfills, open sanitary landfills, industrial landfills, municipal solid waste landfills, and several non-conforming open dump sites. Groundwater monitoring at recently permitted construction and demolition landfills is now required. There are more than 1,000 groundwater monitoring wells. As new facilities are permitted and as water quality assessments and investigations are increased at sites found to have contamination, the number of wells will continue to increase. The Groundwater Unit has revised its "Water Quality Monitoring Guidance Document for Solid Waste Management Facilities" in an effort to keep pace with the changing regulations in providing technical assistance to the regulated community.

Although unlined MSWLFs are being phased out of operation, the majority of currently permitted landfills and virtually all of the closed landfill units are unlined. Leachate generated at each of these unlined landfills has affected groundwater quality in the immediate vicinity of the disposal areas. More than 90 percent of the unlined landfills have shown evidence of some degradation of groundwater quality in the monitoring systems where wells are located close to the waste boundaries within the landfill permitted areas.

The detection monitoring systems are designed to provide an early warning of groundwater contamination so that any water quality problems can be assessed and corrected before there is any threat to public health. Because most landfill facilities are located in relatively remote areas near groundwater discharge features, the potential threat to public health from groundwater contamination from these facilities is minimal. There has been no significant degradation of surface water quality off site in the streams serving as discharge features.

Water quality investigations and assessments will become necessary at nearly all of the unlined landfill facilities to determine the nature and extent of contamination and to assess the potential risk to public health and the environment if contamination moves off site or can be predicted to move outside the permitted boundary. This will allow a proper evaluation of corrective action and remediation strategies for these facilities.

As of March 1, 1995, water quality assessments or groundwater investigations are being conducted at 15 landfill sites. Formal water quality assessments are being conducted with approval of the Solid Waste Section under administrative consent agreements at the following facilities:

- Catawba County/Newton Landfill
- High Point Riverdale Road Landfill
- Charlotte York Road Landfill
- Ashe County Landfill
- Watauga County Landfill
- Buncombe County Landfill
- Northampton County Landfill
- Lexington Landfill
- Champion International Landfill #6
- Hertford County Landfill
- Two (2) Yadkin County Landfills
- Dare County Landfill
- Franklin County Landfill
- Pitt County Landfill

The Groundwater Compliance Unit is currently managing water quality assessments at the following sites:

- ReUse Technologies, Alamac Road site
- Town of Kernersville's closed landfill
- Duplin County Landfill
- Perquimans County Landfill
- Johnston County Landfill
- The Fishburne Landfill
- Phoenix C&D Recycling Facility
- Davidson County Landfill
- Needmore Road Landfill.

Formal assessments are also being conducted by other state or federal agencies at several landfill facilities. Preliminary groundwater investigations are presently being required by the Solid Waste Section at 13 landfills, where the section has requested site specific geographic and/or geologic information, more frequent sampling and/or sampling for additional chemical constituents.

CHAPTER SEVEN

COMPOSTING AND LAND APPLICATION

SOLID WASTE COMPOSTING

Composting allows organic elements of the solid waste stream to be converted into a material that can be used by agricultural and horticultural industries. Properly used, compost can improve the physical, chemical, and biological characteristics of soil or the various soil mixes used in horticulture.

Rules governing municipal solid waste (MSW) composting went into effect December 1, 1991. The rules address minimum criteria for siting, design, and operation of solid waste compost facilities and establish standards for the classification and use of the compost product.

Compost pilot or demonstration projects are approved by the Solid Waste Section (section). These projects give individuals, businesses, and local government an opportunity to evaluate the feasibility of composting without having to strictly adhere to all the rules or bear the expense of plan preparation. Applications do not have to bear the seal of a professional engineer and generally do not require the submission of detailed drawings. Variances, depending on the waste type, may be given for certain site preparation, monitoring, and product testing requirements, but are seldom granted for siting requirements. Project approvals are generally for one year.

Eight compost pilot or demonstration approvals were given in FY 1993-94. Four of the approvals were for food processing wastes, three for seafood and one for rainbow trout. The remaining projects involved cooking grease and oils, poultry wastes, masonite processing waste, and poultry hatchery waste. In FY 1993-94, 1,228 tons of crab waste, 112 tons of fish waste, 2,628 tons of tobacco waste, 26 tons of non-recyclable cardboard, and 388 tons of tomato waste were composted rather than landfilled.

LAND APPLICATION

The Solid Waste Section recognizes land application as a viable alternative to disposing of certain wastes in a landfill. Primary emphasis is placed on wastes that, if applied to the soil surface, will not create an environmental or public health hazard and will provide some benefit to soil or to crops grown on the land. Approvals were given for the land application of wood ash, tobacco dust, coal dust and ground wallboard in FY 1993-94. Wood ash acts as a liming agent, tobacco dust is a source of nitrogen and potassium, and ground wallboard is a source of calcium. In FY 1993-94, land application of wood ash from previous approvals totaled 16,680 tons. The wood ash was applied to private crop or timber lands. Wastes are applied at agronomic rates for the nutrients they contain.

SEPTAGE MANAGEMENT

The Septage Management Program was established in 1988 to ensure that septage is managed in a safe and consistent manner statewide. The term "septage" includes domestic septage (the sewage solids, liquids, and sludges of human or domestic origin removed from septic tanks); material pumped from grease traps; certain sludges; industrial septage; and the waste from portable toilets and certain marine toilets.

In 1994, 355 septage management firms held permits to operate in North Carolina, which shows an increase of 42 from the previous year. This increase is attributable to recent legislation that required the permitting of portable toilet firms.

Section septage management responsibilities include permitting septage management firms and septage land application sites, providing technical assistance to site operators, and inspecting vehicles used in septage management. The section's waste management specialists conduct complaint investigations and provide technical assistance on cleanup methods at illegal disposal sites.

North Carolina currently hosts approximately 231 permitted septage land application sites, which are located in 65 counties across the state. Forty-one such sites were permitted in 1994.

Regulations now require septage land application site operators to grow crops on the sites. The process of growing and harvesting crops often results in the removal of a significant amount of nutrients from the sites. Such a removal helps prevent the buildup of metals in the soils and contamination of groundwater caused by nitrogen moving through the soil.

In 1994, 822 pump vehicles were inspected. The number of pump vehicles per firm ranges from one for most firms to as many as 24 vehicles.

The section took 152 compliance actions against septage management firms in 1994.

Notice of Violations	**Compliance Orders**	**Reason**
96	23	Non Payment of Permit Fees
13		Failure to Complete Permit Application
20		Vehicle Inspections

Domestic septage and portable toilet waste are accepted for treatment and disposal at 93 wastewater treatment plants across the state. Many of these plants however, will not accept material pumped from grease traps.

Nine counties (Avery, Clay, Greene, Hyde, Jones, Mitchell, New Hanover, Tyrrell and Yancey), do not have a permitted septage disposal site or a wastewater treatment plant that accepts septage. Lack of treatment capacity and operator reluctance to deal with septage are the primary reasons many plants will not accept septage. Septage pumped in those counties is transported to disposal sites or treatment plants in adjacent counties, and in a few cases, to disposal facilities outside North Carolina.

YARD WASTE MANAGEMENT

Beginning January 1, 1993, yard waste was banned from municipal solid waste landfills in North Carolina. As a result, many counties and municipalities established facilities for processing yard waste. Yard waste facilities processing less than 6,000 cubic yards of waste per quarter are not required to be permitted as a yard waste facility, but are required to notify the Solid Waste Section of their operation. Permitted yard waste facilities are the responsibility of the section's regional engineers in the Fayetteville and Winston-Salem regional offices.

Notifications for yard waste facilities must be submitted annually. Application information must include site locations, site operator, types of waste to be received, amount of waste processed the previous year, composting process to be used, and the intended distribution of the finished product.

These facilities process a variety of waste for mulch or compost, including leaves, grass, limbs and brush, stumps, pallets, and untreated wood waste. Animal waste may be included as a nitrogen source to promote the compost process. Yard waste facilities are required to operate in accordance with the requirements of the yard waste rules (Section .0900 of the Solid Waste Rules).

Solid Waste Management Annual Report forms indicate that local governments local governments diverted from disposal 310,337 tons (1,551,685 cubic yards) of yard waste in FY 1993-94. Thirty counties and 107 municipalities operated yard waste facilities. Privately owned permitted yard waste facilities reported processing 32,000 tons of material.

Table 7-1: Amounts of Material Handled in FY 1993-94, by Operator Type.

Facility Operator	Number	Material Produced	Tons
county	26	mulch	84,704
county	5	compost	11,294
municipality	76	mulch	68,653
municipality	43	compost	113295
private	5	mulch and compost	32,000

One county and 11 municipal facilities produced both mulch and compost. Only the five permitted private yard waste facilities reported their tonnage.

Yard waste that has been processed into mulch or compost is available for use in public works projects and for use by private citizens and landscapers. The N.C. Department of Transportation uses compost in some roadside planting projects. Forty seven of the local government facilities charge for their mulch or compost. The price per ton ranges up to $30.

Table 7-2 Distribution Method of Processed Yard Waste from Local Government Facilities FY 1993-94.

Distribution Method	Percentage
Stockpiled On Site	4%
Given to Individuals	29%
Sold	14%
Used by Public Agencies	12%
Given to Professional Users	5%
Total	100%

CHAPTER EIGHT
SOLID WASTE MANAGEMENT TRUST FUND

This chapter details for FY 1993-94 the activities and expenditures of the Solid Waste Management Trust Fund, the primary source of state funds supporting solid waste projects. The trust fund was created by the Solid Waste Management Act of 1989 (SB 111) and is funded by a fee on the sale of new tires, a tax on virgin newsprint, and an advance disposal fee on white goods (appliances). The trust fund provides funding for a wide range of solid waste management activities, including: technical assistance to local governments, businesses and others on solid waste issues; solid waste educational activities; research and demonstration projects; and recycling market development activities.

TABLE 8-1: Summary of Trust Fund Expenditures and Revenue - FY 1993-94.

Fund Status	Total FY 1993-94
Beginning Balance	$ 856,717
Revenue	$ 456,552
Expenditures	$ 549,974
Ending Balance	$ 763,295
Encumbrances	$ 342,065
"Uncommitted" Funds as of 6/30/94	$ 421,230

BREAKDOWN OF REVENUE SOURCES FOR THE SOLID WASTE MANAGEMENT TRUST FUND - FY 1993-94

Trust fund revenues as indicated in the table above came from three of the five possible revenue sources identified in the general statutes. Activity from each revenue source is described below:

2% Tire tax - Revenues generated from the tax on the sale of new tires accounted for $ 356,776 or 78 percent of the total trust fund revenues during FY 1993-94, down slightly from the tax revenue of $ 414,356 in FY 1992-93. This decrease reflects the legislative change in the tire tax allocation due to the passage of HB 83, which became effective on October 1, 1993. The original tire tax allocation to the trust fund was 10 percent of the overall revenues from a 1 percent fee on the sale of new tires. The "new" tire tax allocation to the trust fund is 5 percent of the total revenues from a 2 percent tax on the sale of new tires that are 20 inches in diameter or less. Tires larger than 20 inches (truck and off-road tires) continue at the 1 percent tax. It is very likely that the drop in revenues is the result of increasing the tax on only a portion of the tires.

White Goods Tax - On January 1, 1994, the advance disposal fee on white goods went into effect, the result of the passage of Senate Bill 60 during the 1993 Legislative Session. The tax was in effect during the third and fourth quarters of the fiscal year, but only the third quarter allocation was received as of June 30, 1994. This allocation was $41,426, or about nine percent of the year's revenues to the trust fund.

Virgin Newsprint Tax - During FY 1993-94, no revenues were received from the virgin newsprint tax.

General Appropriations - When the trust fund was first established in 1989, a one-time appropriation of $300,000 was allocated to provide initial funds. Since that time, however, there have been no further appropriations to the trust fund.

Private Sector Contributions to the Trust Fund - FY 1993-94 marked the first time that a concerted effort was made to recruit private sector contributions to the trust fund. More than 80 private businesses, industries and trade associations were contacted and asked to help increase the amount of available funding for recycling infrastructure development through OWR's Recycling Assistance Grants Program. Three companies contributed a total of $54,000 to the trust fund, including the American Plastics Council ($35,000), Addington Environmental ($15,000) and Carolina Power and Light ($4,000).

TRUST FUND EXPENDITURES - FY 1993-94

Table 8-1 shows that in FY 1993-94, the Solid Waste Management Trust Fund received approximately $456,552 in revenues, or an average of $114,138 per quarter. The Office of Waste Reduction expended $549,974 of the trust fund in the same period. While the ending balance on June 30, 1994 was $763,295, $342,065 had been encumbered for ongoing projects in FY 1993-94, leaving only $421,230 in "uncommitted" funds at the end of the fiscal year. All of the remaining funds, however, have been earmarked, along with a sizable portion of FY 1994-95 revenues, to fund the 20 recycling assistance grants awarded in July 1994. The 1994 round of grants totaled $ 553,952, the largest amount ever awarded to local governments and non-profit agencies for establishing or expanding recycling programs. Even with this substantial grant award, only 24 percent of the proposals received were funded. Total funding requested in 1994 was slightly more than $ 1.6 million.

Items funded through the trust fund fall within three main categories: grants, educational projects, and staff support, which includes two student interns each year. The following text describes in greater detail the projects completed and ongoing activities of the trust fund during FY 1993-94.

GRANTS

Grants given the first two years of the trust fund were for "innovative and unique" demonstration projects that could be copied throughout the state. In response to local government requests, the focus was changed in 1992 to smaller, less restrictive grants called Recycling Assistance Grants. These grants could be used for waste reduction needs such as equipment purchase and funding recycling coordinator salaries. The Recycling Assistance Grants are typically between $15,000 and $50,000, depending on the number of parties involved in a project (regionalization is rewarded with higher amounts). In order to ensure local support of a grant, a 30 percent match is required of the grantee.

Completed Recycling Assistance Grants

The following Recycling Assistance Grant projects were completed during FY 1993-94:

1. **Person County** (Region K Council of Governments). Five counties in the Region K Council of Governments (Franklin, Person, Granville, Vance and Warren) cooperatively purchased a mobile tub grinder for processing yard and other wood wastes used by each county on a rotating basis ($40,000).

2. **Town of Marshville**. The town established a recycling program that included a drop-off site for recyclables and the construction of a mobile recycling unit ($15,000).

3. **Lincoln County**. Two composting operations were established enabling residents of the towns of Denver, Westport, and Lake Norman to be serviced through this cooperative effort ($15,000).

4. **Town of Spender**. The town purchased recycling equipment and developed educational materials through this grant ($11,200).

5. **Tricounty Solid Waste Management Authority**. Cherokee, Clay and Graham counties formed a regional solid waste authority and financed the salary of a full-time recycling coordinator to coordinate the multi-county efforts ($40,000).

6. **Towns of Burgaw and St. Helena**. The two towns collaborated on a joint yard waste program, which included the purchase of composting equipment ($35,000).

7. **Town of Smithfield**. The town established a curbside recycling program and funded a recycling coordinator's salary through this grant ($15,000).

8. **City of Jacksonville**. A commercial recycling project was developed to reduce waste from businesses in the city ($15,000).

9. **Northampton County**. The county used the grant funds to establish its "Recycle Now" project and to hire a full-time recycling coordinator for the program ($15,000).

Ongoing Recycling Assistance Grant Projects

The following grant projects were still in progress at the end of FY 1993-94. For specific information about these grants, contact the Office of Waste Reduction at (919)571-4100.

1. Jackson/Macon/Swain Counties - $40,000
2. New Hanover County - $2,000
3. Catawba County - $15,000
4. Mecklenburg County - $7,825
5. Town of Wallace $15,000
6. Caldwell County - $15,000
7. City of Laurinburg - $13,085
8. Burke County - $15,000
9. Cape Fear Council of Governments - $31,798
10. Town of Franklinton - $13,590
11. Camden County - $7,467
12. Edgecombe County - $15,000
13. Ashe County - $15,000
14. Town of Marshville - $8,957
15. Town of Lake Waccamaw - $15,000
16. Orange Regional Landfill - $4,900
17. Watauga County - $15,000
18. Iredell County - $15,000
19. Hyde County - $15,000
20. Madison County - $15,000
21. Town of Faison - $12,400
22. Town of Princeville - $15,000
23. Town of Butner/Granville - $11,900
24. Northampton County - $5,000
25. Hertford County - $15,000
26. Town of Andrews - $15,000
27. Union/Anson/Stanly Counties - $25,000

1994 Recycling Assistance Grant Awards

OWR received 83 grant proposals requesting a total of $1.6 million during its 1994 grant cycle. The review process was completed in June 1994. The total amount awarded for the 20 projects selected was $553,942. Specific information on recipients of 1994 Recycling Assistance Grants and their projects can be received from the Office of Waste Reduction at (919)571-4100.

EDUCATIONAL/RESEARCH PROJECTS:

In addition to waste reduction grants, the trust fund enables OWR to fund special training programs, research projects, and the development of publications that can be distributed statewide. In many ways, these special projects have a greater impact than individual grant projects, which are relevant to only a restricted area of the state. While some of the education and/or research projects are initiated by OWR staff in response to a perceived need for assistance by a given segment of the population (e.g. school teachers/administrators) or on a given commodity (e.g. glass), in many cases, the project is proposed by an outside party. In the latter case, funding requests are reviewed on a case-by-case basis and are evaluated for funding based upon consistency with overall state waste reduction goals and demonstrated need for the proposed project.

Projects

1. **County and Municipal Recycling Coordinators Training Course** ($11,675). During FY 1993-94, the 1993 Training Course was completed, and OWR awarded a contract to the North Carolina Recycling Association (NCRA) to help conducting the state's 1994 2 1/2 day training course for local government recycling coordinators. Seventy-one individuals completed the 1993 course offered in Greenville and Asheville during the month of September. To date, 217 recycling coordinators have completed the course.

2. **N.C. Recyclables Market Development Council** ($15,000). A 1-time grant to the NCRA was awarded to provide staff support for the N.C. Recyclables Market Development Council and to conduct a N.C. Summit on Recycling Market Development. Through both efforts, NCRA brought together key players in recycling market development, including public and private sector entities, non-profit organizations and others to develop long-range strategies for new markets that collect recyclable materials in North Carolina. The Council helped North Carolina develop its proposal and receive nearly $500,000 in funding from the U.S. EPA to establish a Recycling and Reuse Business Assistance Center (RBAC). The Council is currently looking for additional funds for recycling market development needs in the state.

3. **Eastern Regional Glass Transfer Facility** ($15,000). Through the efforts of the OWR, the Pitt County Engineering Department, the Carolinas Glass Program, and the Eastern Carolina Vocational Center (ECVC), a regional glass transfer facility was established. The purpose of the facility is to provide a cost-effective means of regionally aggregating glass from more than 15 eastern North Carolina counties prior to transport to Raleigh for further processing. The bunker is physically located at ECVC on Pitt County property in Greenville. OWR contributed $15,000 to the project, Pitt County contributed $6,000, and the Carolinas Glass Program contributed $4,000 for a combined total project cost of $26,000.

4. **Chatham County Tire Aggregate Study** ($72,500). This 2-year study examines the potential for shredded tires to be used as an aggregate in septic systems. The first year entails bench studies at N.C. State University to determine leaching characteristics of the tire chips. The second year of the study will involve actual field testing in Chatham County in at least three different soil types.

5. **School Waste Reduction Guide** ($14,978). The Environmental Resource Program at UNC-Chapel Hill is developing under contract a manual entitled, "Beyond Recycling: A Waste Reduction Manual for Schools" which highlights successful school waste reduction programs in North Carolina. The manual discusses waste reduction comprehensively and provides information on how to establish programs addressing source reduction (waste prevention), recycling, reuse and composting in a school setting. The manual was completed in April 1995.

STAFF SUPPORT:

While the majority of trust fund expenditures are for grants or educational projects to support waste reduction efforts, a portion of it is used to support three full-time staff positions: two in the OWR and one in the Division of Solid Waste Management (DSWM). During FY 1993-94, $156,892 was expended to pay for salaries, benefits and some limited operational support. These three positions are:

Market Development Specialist (OWR). This was the state's first full-time position dedicated to helping improve the market situation for recyclable materials. The specialist was hired in May 1993.

Educational Specialist (OWR). In addition to conducting the annual Recycling Coordinator's Training Course and other training seminars, the person in this position is responsible for development of educational materials and programs on solid waste issues for audiences ranging from school children to adults. Additionally, this person develops many of the publications produced by OWR.

Nuisance Tire Site Clean-Up Coordinator (DSWM). The person in this position oversees the cleanup of nuisance tire sites in all 100 counties across the state. (Through an agreement with the Solid Waste Section, funding from the trust fund for this position will sunset in 1996).

GRADUATE INTERN PROGRAM:

Through a contract ($23,940) with the University of North Carolina at Chapel Hill's Department of City and Regional Planning, the OWR obtains the services of two student interns for a full year. The students work full time (40 hours/week) during the summer months and 12 hours per week during the academic year. Student interns during FY 1993-94 were from the Public Policy Analysis Program in the Department of City and Regional Planning and the Environmental Sciences and Engineering Program in the UNC School of Public Health. Student projects throughout the year included the development of OWR's Recycling Markets Directory, production of a Recycled Manufacturing Products Guide, assistance with data analysis on the local government annual reports, a review of other states' minimum content laws for newsprint, and assistance with some of OWR's education and training programs. Both interns have taken full-time recycling positions elsewhere.

PLANNED EXPENDITURES FOR FY 1994-95

Planned trust fund expenditures for FY 1994-95 include: funding the fourth round of the Recycling Coordinators Training Course; a series of regional "Buy-Recycled" workshops to promote recycled product procurement; funding a statewide recycled products media campaign through the Environmental Defense Fund and the National Ad Council; increased emphasis on market

development, initiatives including funding the statutorily-required Recyclable Materials Market Assessment Report; conducting a study using mixed paper as animal bedding in chicken houses; helping to provide the state's match on the federal grant from the U.S. Environmental Protection Agency to establish a Recycling and Reuse Business Assistance Center (RBAC); funding a Jobs Through Recycling Study; and the development of technical assistance documents to help North Carolina cities and counties prepare for the development and implementation of their local solid waste management plans.

CHAPTER NINE

LOCAL GOVERNMENT SOLID WASTE PROGRAM FUNDING

Data from the Local Government Solid Waste Management Annual Reports provide an overview of municipal and county funding of solid waste programs FY 1993-94. Municipalities and counties report funding sources for three different types of services: solid waste collection, disposal, and waste reduction (including source reduction, recycling, and composting). Many local governments, including those that operate enterprise funds for their solid waste systems, use multiple funding sources. The most popular revenue sources continue to be tipping fees, ad valorem (property) taxes, and household fees.

Local government financing of solid waste management has faced various challenges and opportunities in the past few years. Among local governments' concerns are how to maintain funding with a lack of flow control, whether or not to implement variable rate pricing of solid waste collection, what revenues to expect in the long term from the sale of recyclables, and what are the true costs for waste disposal and waste reduction. These factors make the issue of local government financing dynamic and point toward less predictability in how local government will finance future programs.

FUNDING OF COUNTY SOLID WASTE PROGRAMS

Table 9-1 shows funding sources for solid waste disposal, collection, and recycling services provided by North Carolina counties in FY 1993-94.

TABLE 9-1: Number of Counties Using Specific Funding Sources for Specific Solid Waste Services.

Funding Source	Disposal	Collection	Recycling Services
Tipping fees	76	30	24
Property taxes	35	49	26
Household charges	31	37	17
Volume/weight-based fees	5	4	1
Sale of recyclables	25	16	13
Grants	12	4	5
Tire tax refunds	51	NA	NA
Diversion credits	N/A	N/A	0
Other	15	18	9

Of the 76 counties using tipping fees for disposal revenues, 12 relied on the fees to provide 100 percent of funding and 22 used the fees to fund more than 90 percent of their disposal costs. Of 35 counties using property taxes to support disposal, four relied on them as the sole source of revenue; and an additional three used property tax revenue to finance more than 90 percent of disposal costs.

To cover solid waste collection service costs, three counties used tipping fees for 100 percent of revenues and one other county relied on tipping fees to fund more than 90 percent of its solid waste collection costs. The most popular source of funding for solid waste collection was property taxes, with 15 counties using them as the sole revenue source and six relying on them for 90 percent of collection financing. The second most popular source of funds for solid waste collection was household fees, with five counties using them as their sole revenue source and seven more using the fees for 90 percent or more of collection funding. According to data supplied by the counties, the use of household fees jumped 300 percent between FY 1992-93 and FY 1993-94.

Fifty-five counties (55 percent) used enterprise funds for solid waste management.

Table 9-2: Number of Municipalities Using Specific Funding Sources for Specific Solid Waste Services.

Funding Source	Disposal	Collection	Recycling Services
Tipping fees	20	22	80
Property taxes	108	334	190
Household charges	79	184	101
Volume/weight-based fees	5	16	2
Sale of recyclables	8	9	31
Grants	0	0	4
Tire tax refunds	2	N/A	N/A
Diversion credits	N/A	N/A	9
Other	10	26	3

The two most important sources of funding to cover the costs of municipal waste management in FY 1993-94 were property taxes and household charges. Fifty-nine of 108 cities and towns covered disposal charges exclusively with their property tax revenues, and 36 of 79 used household fees to cover 100 percent of disposal costs. Property taxes were even more important in covering solid waste collection services: 193 municipalities relied on them to fund 100 percent of collection costs and another 18 used taxes to cover more than 90 percent of costs. Household fee revenues were used exclusively to fund solid waste collection costs by 69 municipalities. Finally, 123 municipalities paid for recycling services using only property taxes as the revenue source, while 58 cities and towns used household fees to fund 100 percent of recycling costs.

TRENDS IN LOCAL GOVERNMENT FINANCING

The financing of solid waste management continues to be a challenging enterprise for North Carolina local governments. The issues of flow control, variable rate financing, recycling revenues, and full cost comparisons of programs appear to be consistent concerns with local government decision-makers.

The national headline story on flow control had some North Carolina chapters in FY 1993-94. A number of mostly urban local governments in North Carolina ran into obstacles in maintaining current and future flow of solid waste to publicly owned disposal facilities. A recent U.S. Supreme Court decision effectively eliminated flow control. It will be up to Congress to determine local government's future ability to control the disposal destination of locally generated wastes. With the development of four large private landfills in North Carolina and the presence of other large private disposal facilities just outside of state boundaries (most notably the Waste Management, Inc. landfill in Spartanburg, SC), some North Carolina counties saw as much as half of their local waste stream leave their jurisdictions.

Because so many local governments rely on tipping fee revenue from their disposal facilities to fund their solid waste programs, the lack of flow control forced a re-examination of the revenue bases of local public solid waste management. In some instances, North Carolina counties felt it necessary to reduce tipping fees to compete with private facilities and place some programs (e.g., recycling) under other revenues sources, such as property taxes, household fees, or withdrawals from local general fund balances. With uncertainty in the ultimate fate of flow control and a number of counties now moving ahead with new Subtitle D landfills, many North Carolina local governments will continue to face challenges in finding the right balance of local revenue sources to maintain or improve solid waste management services.

At the same time, some North Carolina local governments have sought to encourage more waste reduction by implementing residential variable rate pricing systems in their solid waste collection services. In such systems, residential generators of solid waste are charged for disposal of their wastes in the local solid waste collection system on a per unit basis, such as by the bag, by weight, or by the size of a container. Alexander, Henderson, Rowan, Craven, Scotland, Union, Yadkin, Transylvania, Catawba, and Buncombe counties and the cities of Wilmington, Chapel Hill, and Hope Mills have all implemented some form of a variable rate program. A variation on variable rates is the city of Oxford's program offering collection charge rebates to recyclers. With a strong push from the U.S. EPA, and more North Carolina local governments trying variable rate pricing, this option may receive stronger attention as cities and counties reconfigure their solid waste funding sources.

A third major factor in the funding of local solid waste programs has been the selling price of recyclable materials. In late FY 1993-94, the price paid for a number of materials, most notably corrugated cardboard, aluminum and some plastic bottles, jumped dramatically. Other materials,

such as newspaper saw less dramatic increases, but more stable market prices, while markets for previously hard-to-move materials, such as mixed paper, suddenly became viable. While some of the more drastic price hikes were short-lived, long-term trends point toward a more favorable supply-demand balance for most recyclables. Price increases in turn have provided a boon to some local government recycling programs, particularly those that process and market materials directly, and those whose contracts with private collectors and processors allow for sharing of recycling revenues.

Although some unpredictability remains in material prices, recycling revenues as a source of local government funding should be much stronger and more stable in the foreseeable future. Local governments that currently do not share revenues with their recycling contractors may consider adding such provisions to their contracts upon renewal.

A final factor in the funding of local government solid waste management is full cost analysis of programs. Local governments have sometimes been reluctant to invest in waste reduction programs because of perceptions that they were much more costly on a per-ton basis than disposal. However, there is a growing body of evidence that under full cost analysis, which seeks to identify and correctly apportion all costs associated with each aspect of each solid waste service, waste reduction and disposal compare favorably. Studies completed in the states of Washington, Minnesota, and Indiana all point to waste reduction efforts being slightly less expensive than disposal.

A study conducted for the Office of Waste Reduction by Chris Benjamin, a Duke University graduate student, with the cooperation of Chatham County and the municipalities of Apex and Cary, also found their waste reduction and disposal costs to be closer than commonly perceived. Although waste reduction costs about $20 more per ton than disposal in Chatham County, the cost of waste reduction has dropped by over 30 percent in two years. In Cary, the household recycling service costs more than 20 percent less than solid waste collection and disposal in FY 1993-94. (Results from Apex were not available at the time of this report). With these types of preliminary results, full cost analysis may provide an effective framework for future local government solid waste funding decisions in North Carolina.

CHAPTER TEN

SOLID WASTE EDUCATIONAL ACTIVITIES

Public education is essential to the success of any solid waste program. It must be continual and provide periodic reminders and new information about solid waste operations in the community.

The State of North Carolina recommends proactive solid waste education programs that reach school children, adults and many other sub-groups of the population. Public education should contain a motivational message to encourage responsible waste management practices and explain participation opportunities in local solid waste management programs.

Data in **Table 10-1** reveal that 81 counties and 131 municipalities sponsored solid waste management educational programs. These programs used many activities to educate the public about solid waste.

Table 10-1: County and Municipal Educational Programs.

Methods or Media Used	County Programs 81	total	Municipal Programs 131	total
Radio	**33**	*41%*	**20**	*15%*
Television	**16**	*20%*	**14**	*11%*
Newspaper	**61**	*75%*	**61**	*47%*
Mass Mailings	**13**	*16%*	**35**	*27%*
Direct Mail	**16**	*20%*	**35**	*27%*
Indirect Mail (utility bills etc.)	**15**	*19%*	**46**	*35%*
Special Events	**38**	*47%*	**26**	*20%*
Take Home Items (brochures, magnets, etc.)	**59**	*73%*	**72**	*55%*
Telephone "Hotline"	**20**	*25%*	**9**	*7%*
Workshops, Forums, or Conferences	**34**	*42%*	**19**	*15%*
Public School Programs	**58**	*72%*	**44**	*34%*
Volunteer Programs	**31**	*38%*	**17**	*13%*
Other Activities	**13**	*16%*	**27**	*21%*

The local government educational activities were targeted mainly at residential participants, school children, and environmental groups. **Table 10-2** illustrates the number of programs that serve each audience.

Table 10-2: Number of County and Municipal Programs and Targeted Audience.

Targeted Audience	County Programs *81 total*		Municipal Programs *131 total*	
School Children	**67**	*83%*	**55**	*42%*
Manufacturing Firms	**1**	*1%*	**1**	*1%*
Industries	**43**	*53%*	**21**	*16%*
Small Business	**42**	*52%*	**57**	*44%*
Residential Participants	**68**	*84%*	**114**	*87%*
Elected Officials	**39**	*48%*	**34**	*26%*
Institutions (schools, hospitals, etc.)	**45**	*56%*	**27**	*21%*
Government Employees	**43**	*53%*	**33**	*0.25*
News and Editorial Media	**41**	*51%*	**27**	*21%*
Environmental, Neighborhood, and Civic Groups	**51**	*63%*	**35**	*27%*
Trade and Professional Associations	**18**	*22%*	**5**	*4%*
Other	**2**	*2%*	**4**	*3%*

Integrated solid waste management is key to a successful waste reduction program. Source reduction, composting, and reuse are key topics to be taught along with recycling. **Table 10-3** illustrates the topics that were given educational priority by the local governments.

Table 10-3: Number of County and Municipal Programs with Priority Waste Reduction Topics.

Waste Reduction Topics	County Programs *81 total*		Municipal Programs *131 total*	
Residential Source Reduction	**56**	*69%*	**54**	*41%*
Industrial/Commercial Source Reduction	**41**	*51%*	**25**	*0.19*
Reuse	**49**	*60%*	**28**	*21%*
Recycling	**77**	*95%*	**125**	*95%*
Buying Products Made From Recycled Materials	**45**	*56%*	**28**	*21%*
Backyard Composting	**44**	*54%*	**41**	*31%*
MSW Composting	**7**	*9%*	**9**	*7%*
Incineration	**6**	*7%*	**3**	*2%*
Landfilling	**51**	*63%*	**30**	*23%*
Household Hazardous Waste	**19**	*23%*	**14**	*11%*
Other	**5**	*6%*	**9**	*7%*

The Office of Waste Reduction (OWR) coordinates many solid waste educational efforts in North Carolina. OWR educates and trains industries, local governments, trade organizations, professional organizations, citizens' groups, and other agencies critical to the state's overall waste reduction effort. The Solid Waste Reduction Program staff of OWR conduct in-depth training sessions, workshops and conferences, and develop educational materials for statewide distribution.

Buy Recycled Efforts

There were many activities in FY1993-94 that focused on recycled product procurement.

Buy-Recycled Workshops. OWR, in conjunction with the Department of Administration's Division of Purchase and Contract, presented a series of four workshops across the state in September entitled *Buying Recycled in North Carolina.* The workshops were designed to dispel myths about recycled content products; explain the process of routinely purchasing recycled content products; discuss purchasing options; and give tips on purchasing for waste prevention.

These workshops were conducted by Richard Keller of the Northeast Maryland Waste Disposal Authority, and were targeted at both public and private purchasers. Bobby Rhinehardt of Purchase and Contract Division in the Department of Administration presented a session to the public purchasers to address their specific needs. Four workshops were attended by 152 people. The workshops were held in Charlotte, Greensboro, Raleigh, and Wilmington.

DEHNR/Environmental Defense Fund (EDF) Buy-Recycled Media Project. OWR has contracted with the Environmental Defense Fund to produce television, radio, and print public service announcements (PSAs) to promote the purchase of recycled products. Press kits were mailed to media outlets on March 1, 1994. The radio announcements credit OWR as a sponsor; TV and print announcements contain the DEHNR logo. OWR is encouraging recycling coordinators to request that their local media feature the PSAs. The PSAs are very high quality spots that use the slogan "Buy Recycled. And Save." The series were entitled: Wall Street, The Grocery Store, and Pudding.

Between April and September of 1994, two television stations played the spot(s) 18 times, two radio stations aired the spot(s) 19 times, and 16 publications with a circulation of more than 930,000 printed the ad over 30 times. A summary sheet of the media campaign has been developed and is available for further information.

Booklet: North Carolina Manufacturers of Recycled Products. In June 1994, OWR published a booklet highlighting North Carolina end-use facilities that manufacture products using post-consumer recycled materials.

Buy-Recycled Presentations. As an additional forum for educating various audiences about the importance of buying recycled products, the Buy-Recycled Campaign annually

targets purchasing agents, local recycling coordinators, and others through their professional networks. During FY 1993-94, several Buy-Recycled presentations were given to groups including the Carolina's Association of Governmental Purchasers, the North Carolina Recycling Association, the Association of Physical Plant Administrators, the North Carolina Department of Administration's Division of Purchase and Contract, the North Carolina Collegiate Recycling Coalition, and other local and regional organizations.

North Carolina Reduce, Reuse, Recycle "3R" Campaign

In FY 1993-94 the OWR created the NC 3R Campaign, which is a public awareness effort that highlights the reduce and reuse ethics, along with recycling. A steering committee of representatives to develop the campaign was formed from the Department of Commerce - Public Affairs and Travel and Tourism; the Department of Environment, Health, and Natural Resources - Public Affairs, Divisions of Parks and Recreation, Divisions of Environmental Management and Solid Waste Management; and the Department of Transportation - Public Affairs and Highway Beautification. The campaign will first target local governments and state agencies and then the general public. The campaign will be kicked off in the spring of 1995, with a logo, brochure, printer ready slicks, stickers and bumper stickers. It will be highlighted at an exhibit booth at the North Carolina Recycling Association's annual conference. A video for all state employees is planned for release in the summer of 1995.

Source Reduction Workshops

On November 9-10, 1993, the first Source Reduction Workshop was held in Greensboro for 48 participants. Focusing on solid waste, the workshop presented source reduction benefits and program development, as well as residential source reduction activities to encourage attendees to develop policies and procedures that prevent the generation of solid waste. The first session focused on residential waste reduction and the second session on commercial/industrial waste reduction. OWR's Solid Waste Reduction Program (SWRP) and Pollution Prevention Program (PPP) collaborated with the North Carolina Recycling Association, Sun Shares, the North Carolina Cooperative Extension Service, Mecklenburg County, INFORM, the City of Greensboro, and Prete-Wilmot Associates to produce and conduct the workshop.

In the Fall of 1994, OWR in conjunction with the North Carolina Recycling Association, Sun Shares, North Carolina Cooperative Extension Service, and Mecklenburg County presented two Source Reduction Workshops. The workshops were held at two locations: August 10 and 11 in New Bern and October 4 and 5 in Charlotte. The first day of the

2-day session focused on commercial source reduction; the second day concentrated on residential source reduction. A total of 102 people attended the two courses.

Recycling Coordinators Training Course (RCTC)

First offered in 1991, the RCTC is hosted annually for local government recycling coordinators and other solid waste management professionals. By the end of FY 1993-94, 307 participants had completed the course. The 3-day course provides information about integrated solid waste management techniques in an interactive format. The reference manual each participant receives covers legislation, program planning, source reduction, financing, recyclable materials recovery and processing, marketing, education and program promotion, policy options, private and public sector involvement, and yard waste management.

Local Government Commercial and Industrial Solid Waste Workshops

OWR staff participated in organizing and presenting six locally sponsored workshops for industrial and commercial solid waste generators. In FY 1993-94, OWR supported workshops at the High Point Chamber of Commerce and in McDowell, Wilson, Burke, and Lee counties and the Town of Thomasville.

Construction and Demolition Debris Workshop

At the North Carolina Recycling Association Conference in Asheville on March 14, 1994, SWRP staff, along with the Triangle J Council of Governments, conducted the state's first workshop devoted to reduction of construction and demolition (C&D) wastes. The workshop convened both in-state and out-of-state experts to address recovery, processing, and marketing issues involving C&D wastes.

Recycling Assistance Grants Workshops

As state funding for local recycling programs is limited, the Recycling Assistance Grants program is highly competitive. In March 1994, SWRP staff conducted six workshops across the state to explain the grant application process, answer questions, and provide tips on writing an effective grant proposal. Approximately 80 persons attended the regional workshops in Raleigh, Greenville, Fayetteville, Asheville, Winston-Salem, and Wilmington.

Recycling Assistance Grants Targeting Education

The SWRP administers the Recycling Assistance Grants (RAG) program. The grants are funded through the Solid Waste Management Trust Fund, which receives revenues from the statewide tax on tires, appliances, and non-recycled newsprint. Each July, RAGs are awarded to local governments and non-profit agencies to enable them to implement waste reduction and recycling activities that range from source reduction programs to recycling collection and processing to educational initiatives. The FY 1993-94 grant cycle awarded $398,935 to 28 communities across the state. Of the total grant monies, $88,213 was awarded to six communities that incorporated educational activities into their projects. FY 1993-94 grant recipients that conducted educational activities are listed in **Table 10-4**.

Table 10-4: FY 1993-94 Recycling Assistance Grants Targeting Education

Grant Recipient	Waste Reduction/Recycling Activities	Grant Amount
Caldwell County	Construct a staffed recycling drop-off center in a remote area of the county, establish a mobile recycling drop-off, and provide recycling education in county elementary schools.	$15,000
Cape Fear Council of Governments	Develop an integrated solid waste management program. Hire a solid waste management coordinator to establish regionwide solid waste reduction and recycling activities emphasizing commercial/industrial recycling, regional marketing, and public education.	$31,798
Mecklenburg County		$7,825
Northampton County	Educate farm operators on handling, cleaning, and recycling of plastic pesticide containers; set up a collection site to store clean containers; and market the containers.	$5,000
Town of Franklinton	Implement a curbside recycling program. Purchase bins and fund a public education campaign.	$13,590
Watauga County	Develop and integrate a solid waste reduction curriculum for kindergarten through eighth grade science and social studies programs.	$15,000

Research and Education Grants

OWR also administers grants for research and education projects. These grants are used to provide valuable applied research to help advance waste and pollution reduction, to assist in waste reduction education, and to develop educational materials and/or workshops. The grants awarded for solid waste reduction in FY 1993-94 are summarized below.

Use of Gypsum Wallboard as a Soil Amendment in Peanut Production

The purpose of this project was to demonstrate the feasibility of using ground gypsum wallboard scrap as a substitute for commercial "land plaster" in peanut production. The project was a joint effort involving the North Carolina Department of Agriculture, North Carolina Department of Agriculture Extension Services of Pitt County, and OWR. Since gypsum wallboard consists of calcium sulfate, which is required for peanut production, it appears feasible that this gypsum could be used as a soil amendment to replace commercial land plaster. To determine the feasibility of ground gypsum as a soil amendment, a farm test was conducted in Pitt County. Test results and the economics of this project indicated that further investigation is warranted. Since gypsum is approximately 15 percent of the total Construction and Demolition (C&D) debris waste stream, use of ground gypsum as a soil amendment could potentially eliminate disposal of this portion of the C&D waste stream.

Scrap Tire Aggregate Study

OWR is conducting a two-year applied research study on the use of shredded scrap tires as a substitute for gravel in septic systems. The study is taking place in Chatham County, and the Department of Soil Science at North Carolina State University in Raleigh is conducting the research component. The first year of the study entails bench studies to determine leaching characteristics of the tire chips. The second year of the study will involve actual field testing in Chatham County in at least three different soil types and three installation sites to demonstrate the effectiveness of tire chips as an aggregate substitute. The $72,500 study is funded through the Solid Waste Management Trust Fund.

PUBLICATIONS

OWR has developed a series of publications that range from waste reduction tips and fact sheets, to in-depth technical handbooks. OWR also maintains a library that has numerous publications, brochures, fact-sheets, and guidance documents available to North Carolina local governments, institutions, businesses, industries, and interested citizens.

Listed below are some documents the Solid Waste Reduction Program produced in FY 1993-94:

North Carolina Directory of Markets for Recyclable Materials

To continue encouraging and facilitating recycling efforts, OWR published an updated third edition of the North Carolina Directory of Markets for Recyclable Materials. The directory lists more than 400 companies that are haulers, brokers, processors, or end users of recyclable materials. In addition, the directory includes companies that burn waste for fuel. OWR maintains and updates a computerized database of the market information contained in the directory. The directory and the database provide an essential link among businesses, industries, and local governments that are searching for markets for their recyclable materials and the companies that accept materials for reprocessing and reuse.

North Carolina Manufacturers of Recycled Products

In June 1994, OWR published a booklet highlighting North Carolina end use manufacturers who manufacture products using post-consumer recycled materials.

SWRP (Solid Waste Reduction Program) Alerts

SWRP *Alerts* are published to provide fast-breaking information to the audiences SWRP serves. SWRP *Alerts* focus on such topics as recycling assistance grants, new legislation, and recyclable material markets. They are not published on a set schedule.

In FY 1993-94, three issues were published on the following topics:

1993 Recycling Assistance Grant Recipients (4 pages) - August 1993
Update: Recyclable Materials Markets in North Carolina (4 pages) - January 1994
State Measures Progress Toward Solid Waste Diversion Goals (4 pages) - June 1994

SWRP Informational Bulletins

Informational bulletins differ from SWRP *Alerts* in that they contain in-depth information on a specific waste reduction topic. During FY 1993-94, two bulletins were published on the following topics:

Materials Restriction Ordinances (6 pages) - Updated September 1994
Setting Up a Buy-Recycled Program (4 pages) - April 1994

Waste Reduction Programs for Commercial/Industrial Solid Waste Manual

In March 1994, OWR updated and republished the manual, Waste Reduction Programs for Commercial/Industrial Solid Waste. Topics covered in the manual include characterization of the commercial/industrial waste stream, cost avoidance issues, marketing of commercial/industrial recyclables, and material- and business-specific waste reduction techniques.

CHAPTER ELEVEN

RECYCLING MARKETS AND MARKET DEVELOPMENT

In the past, recyclable materials were viewed as a waste to be recovered for environmental reasons. Today, more and more people are viewing them as commodities that should be an integral component of the raw materials that supply the industrial sector of our economy. Adapting to this emerging economy will help us compete more effectively in a global economy where the need for efficient use of materials is already a way of life. The process of collecting, processing, and remanufacturing recyclable material contributes to the growth of industry, the creation of a wide range of job opportunities, and the expansion of the tax base.

THE NORTH CAROLINA RECYCLING AND REUSE BUSINESS ASSISTANCE CENTER

Overview

North Carolina is one of four states that have been selected by the U. S. Environmental Protection Agency (USEPA) to establish Recycling and Reuse Business Assistance Centers (RBAC). California, Minnesota, and New York were the other states chosen from 23 applicants. The Department of Environment, Health, and Natural Resources (DEHNR), in cooperation with the Department of Commerce (DOC), administers the North Carolina project.

Outcomes will be measured in terms of capacity, jobs and capital investment. During the 18 month project, North Carolina end-users and intermediate processors of recyclable materials are expected to increase their feedstock capacity by 150,000 tons per year, create 157 jobs and make $14.3 million in capital investment as a result of RBAC outreach activities.

RBAC's Major Projects

Technical and business development assistance will be provided to recycling businesses and to businesses interested in using recycled materials in lieu of virgin materials. RBAC staff and employees of the Office of Waste Reduction (OWR) and DOC will provide direct technical assistance and will use the basis of the OWR tracking system to quantify this technical assistance.

RBAC staff will develop and conduct cross-training programs designed to encourage economic development and solid waste professionals to promote better understanding of their respective fields. This training will include a briefing for senior officials at DEHNR and DOC on the main goals of the RBAC.

An electronic bulletin board will be developed to give DOC, DEHNR staff and "outside" users access to market information. Other in-house computer capabilities will be developed, such as the ability to search OWR's markets database from each staff person's personal computer and the ability to access other agency databases through the state computer system.

Recycling industrial recruitment materials will be developed and disseminated by RBAC and DOC staff to reflect the commitment the two departments share toward recruiting and retaining recycling industries in North Carolina.

Four demonstration projects will be conducted as part of the project. These include:

Feedstock Conversion Demonstration Project. A company will be selected to convert its manufacturing process from virgin to recycled feedstock.

Capacity Expansion Demonstration Project. An existing North Carolina manufacturing company will be targeted to increase its use of recycled material. RBAC staff will select the company and OWR staff will locate potential supplies of recycled material for the selected company.

Industrial Recruitment Demonstration Project. At least two commodities will be targeted for intensive market development work. RBAC and DOC staff will then target companies that use one of the identified commodities for recruitment to North Carolina. OWR staff will assist in the identification of potential suppliers.

Regional Commodities Demonstration Project. This project will "bridge the gap" between end users or intermediate processors of recyclable materials and local suppliers of materials to decrease transportation and processing costs. OWR staff will provide technical assistance to and identification of cooperative suppliers of materials to the host facility.

JOBS THROUGH RECYCLING STUDY

To determine the impact of recycling on economic development in the state, OWR contracted with a graduate student in the Department of Environmental Sciences and Engineering at the UNC School of Public Health to conduct a recycling jobs study. The study found that approximately 8,700 jobs in North Carolina can be attributed to the recycling industry; and as recycling increases, thousands more could be created by this burgeoning industry. Of all jobs created by recycling, 87 percent are in the private sector, and 13 percent are supported by local governments. The average hourly wage for jobs in the recycling industry is $9.04. According to the study's results, recycling is a net job creator in North Carolina.

RECYCLING BUSINESS FINANCING STUDY

A separate study related to the Jobs Through Recycling Study was conducted on behalf of OWR and the Center for Community Self-Help, a non-profit arm of the Self-Help Credit Union in Durham by KirkWorks, a Durham-based solid waste management consulting firm. As part of the RBAC grant, this study determined the types of business assistance and financing needed by recycling companies such as haulers, processors, brokers, and end-use manufacturers. Preliminary results indicate that 60 percent of North Carolina recycling companies project an average capital financing need of $450,000 over the next three years. Of those surveyed, 35 percent identified the need for technical and/or business development assistance to expand their operations.

OWR RECYCLING MARKET DEVELOPMENT UPDATE

The N.C. Department of Environment, Health, and Natural Resources' (DEHNR) Office of Waste Reduction (OWR) has already taken significant steps to increase its recycling market development efforts in North Carolina. The addition of two full-time market development specialists to OWR's staff illustrates OWR's commitment to assist with implementation of the activities described in the annual report. This commitment is consistent with DEHNR's Strategic Plan Initiative to "develop recycling markets in North Carolina by increasing the demand for recyclable materials."

NC DIRECTORY OF MARKETS FOR RECYCLABLE MATERIALS

To encourage and facilitate recycling efforts, OWR has published three editions of the NC Directory of Markets for Recyclable Materials (previously titled the Directory of Industrial and Commercial Recyclers Serving North Carolina Businesses and Industries). The fourth edition is currently being prepared. OWR maintains the market information contained in this directory on a computerized database, which is continually updated. The directory and the database provide the essential link among businesses, industries, and local governments that are searching for markets for their recyclables and companies that accept the materials for reprocessing and reuse.

More than 5,000 copies of this frequently requested directory have been distributed. The directory identifies 420 industrial and commercial recyclers by business name, location, and materials accepted, and provides contacts for additional information and assistance.

RECYCLING INDUSTRY AND RECYCLED MATERIALS IN NORTH CAROLINA MARKET ASSESSMENT REPORT

Legislation passed during the 1993 session of the NC General Assembly directs OWR to prepare a biennial report assessing the recycling industry and recycling materials markets in the state. To meet this requirement, and to provide a foundation for its expanded market development program, OWR has contracted with SCS Engineers of Reston, Virginia to prepare

the updatedmarket assessment report. KirkWorks of Durham, NC, is a subcontractor on the project. Project team members are assessing the current and potential future supply of various recyclable materials generated in the state or region, and the current and potential demand for recyclable materials by intermediate processors and end users. Data collected on 36 different recyclable materials are being analyzed to determine by material the potential for successful recycling. The analysis will include, but not be limited to: materials identified as having the best match of supply and demand; materials that could be efficiently collected in significant quantities (supply), but have problematic market availability (demand); and materials with promising demand trends, but limited collection efforts to date. Both short and long term trends will be identified.

Based on the information compiled from these activities, overall market development needs and issues will be identified, including an examination of current local, state, and industry initiatives. Recommendations made as a result of this investigation will be expressed as an Agenda for Action.

NORTH CAROLINA'S BUY RECYCLED CAMPAIGN UPDATE

"Buy Recycled" Workshops and Seminars - OWR, in conjunction with the Department of Administration's Division of Purchase and Contract presented four workshops across the state in September entitled, "*Buying Recycled in North Carolina.*" The workshops were designed to: dispel myths about recycled-content products; explain the process of purchasing recycled-content products; discuss purchasing options; and give tips on purchasing for waste prevention.

These workshops were conducted by Richard Keller of the Northeast Maryland Waste Disposal Authority, and were targeted at both public and private purchasers. Purchase and Contract staff presented a session for public purchasers to address their specific needs. The four workshops were attended by 152 persons and were held in Charlotte, Greensboro, Raleigh, and Wilmington.

Booklet: North Carolina Manufacturers of Recycled Products. In June 1994, OWR published a booklet highlighting North Carolina end-use facilities that manufacture products using recycled materials.

CHAPTER TWELVE

WASTE REDUCTION AND PURCHASES OF RECYCLED PRODUCTS BY NORTH CAROLINA STATE AGENCIES

State agencies are directed by North Carolina law and Governor Hunt's Executive Order #8 to reduce their disposal of solid waste and to purchase and use products made from recycled materials when feasible and practicable. They are also required to report annually on both of these efforts. The report on waste reduction and recycling covers 26 state departments and offices, 18 units of the state university system, and 58 community colleges. The report on purchases of recycled products covers the same agencies and also 119 local public school administrative units statewide. Fiscal Year 1993-94 was the first year the reports were required.

PURCHASES OF MATERIALS AND SUPPLIES WITH RECYCLED CONTENT

Purchases of Paper and Paper Products with Recycled Content

Paper and paper products containing some recycled content constituted 36 percent of the reported purchases of paper and paper products by state agencies in FY 1993-94. By group, the percentage for departments and offices was 46 percent; for universities, 38 percent; for community colleges, 32 percent; and for local school administrative units, 31 percent.

State agency purchases greatly exceeded the statutory goal of 10 percent of purchases of paper and paper products having recycled content in FY 1993-94. They also exceeded Governor Jim Hunt's goal of 25 percent for FY 1993-94 stated in Executive Order #8.

Correction Enterprises of the Department of Correction operates a duplicating center at Central Prison in Raleigh and a printing plant in Nash County, both used by state agencies. Approximately 90 percent of the material printed at Central Prison's duplicating center in FY 1993-94, was printed on recycled paper. At least 50 percent of the materials printed at the Nash County print plant in FY 1993-94 were printed on recycled paper.

In addition to printing by Correction Enterprises and internal state agency print shops, some state materials are printed by private firms. State departments and offices reported more than $1 million in external print jobs specifying the use of recycled paper. Universities together reported approximately $775,000 in such print jobs; community colleges together reported about $150,000; and local school administrative units reported nearly $80,000.

Purchases of Other (Non-Paper) Products with Recycled Content

State agencies also reported buying an estimated $2.4 million worth of non-paper items made from recycled materials in FY 1993-94. Reported quantities are probably less than actual quantities because many agencies were not aware of the reporting requirement until late in the

fiscal year and thus did not keep pertinent records. Many agencies reported that they were not always aware of whether items they purchased contained recycled content.

In addition to the products with recycled content reported here, the Department of Transportation uses many recycled products in highway construction and maintenance, including: crumb rubber from used tires in asphalt joint sealer; recycled plastic traffic barricades and fence posts; rubber ballast collars made from used tires; and recycled glass beads used in highway paint produced by the Department of Correction. These items and others are described in a separate annual report published by the Department of Transportation.

SOURCE REDUCTION, RECYCLING, COMPOSTING, AND DISPOSAL OF SOLID WASTE

Educating State Employees and the Public about Waste Reduction and Recycling

State departments and offices, universities, and community colleges also reported on their waste reduction educational efforts in FY 1993-94. Their responses were as follows:

- **Visible support of upper management:** Twenty of the 26 departments said their agency's head (e.g., Secretary, Commissioner, etc.) had communicated the importance of waste reduction and recycling to employees through written memoranda, discussion at meetings, or speeches. Twelve of the 18 units of the university system said that their agency head (e.g., Chancellor) had done this, and 37 of the 58 community college presidents were reported to have done so.

- **Use of network of recycling coordinators:** All 26 departments and offices reported having a lead recycling coordinator. Nineteen have an internal network of assistant recycling coordinators. Eighteen departments reported that they regularly communicate about waste reduction and recycling with all agency employees.

- All 18 units of the state university system reported having a lead recycling coordinator; nine have established a network of assistant recycling coordinators. Eleven reported that they regularly communicate about waste reduction and recycling with all employees.

- Of the 58 community colleges, 42 reported having a lead recycling coordinator. Thirteen have established a network of assistant recycling coordinators within the agency. Eighteen of the 58 reported that they regularly communicate about waste reduction and recycling with all employees.

Waste reduction/recycling education for the public: State agencies that routinely host the general public (for example, state parks, highway rest areas, correctional facilities, and college campuses) are directed by Executive Order #8 to implement appropriate recycling collection programs at these facilities. Educational programs for the public as well as employees are needed to ensure their success. Four of the 26 departments reported having educational

programs directed at the public visiting its facilities (not all 26 departments and offices routinely host members of the public). Six of 18 units of the university systems and five of 58 community colleges reported educational programs directed at members of the public.

State Agency Source Reduction of Waste

The following summarizes the number of agencies reporting the use of five specific methods of reducing waste at the source:

Duplex printing or photocopying: Reported by 25 of the 26 departments and offices, 16 of 18 units of the state university system, and 48 of the 58 community colleges.

Using backs of old printed matter for note pads, scratch paper, or draft copies: Reported by 23 of the 26 departments and offices, 15 of 18 units of the state university system, and 46 of the 58 community colleges.

Circulating or posting memos instead of distributing multiple copies: Reported by 23 of the 26 departments and offices, 12 of 18 units of the state university system, and 35 of the 58 community colleges.

Replacing paper correspondence with electronic communications: Reported by 20 of the 26 departments and offices, 11 of 18 units of the state university system, and 45 of the 58 community colleges.

Buying supplies in bulk to reduce individual packaging: Reported by 19 of the 26 departments and offices, 12 of 18 units of the state university system, and 44 of the 58 community colleges.

Many other source reduction methods were noted by agencies, including:

- Using durable rather than disposable cups, plate, and utensils;
- Reusing manila file folders;
- Collecting foam packaging "peanuts" for internal reuse or donation;
- Using shredded confidential paper in packaging;
- Distributing "junk mail elimination" information;
- Cleaning and reusing plastic pails or bottles;
- Reducing sample size and extraction volume in laboratories, and introducing microanalytic techniques where available; and
- Reusing excess cloth for cleaning rags, instead of disposable paper towels;

Communication with employees about source reduction: Sixteen of the 26 departments and offices, 10 of 18 units of the state university system, and 20 of the 58 community colleges reported providing information to employees on reducing waste at the source.

State Agency Recycling and Composting

Raleigh-area state offices:

Office paper

Recycling of office paper at state offices in Raleigh has grown significantly in the past few years. The Department of Administration contracted for collection of high-grade recyclable office paper from about 140 state-owned and leased buildings in Raleigh for the first time in FY 1991-92. Prior to the formal recycling contract, many state offices had already begun informal office paper recycling programs.

State agencies in Raleigh nearly doubled the amount of office paper they recycled over a 2-year period achieving a 91 percent increase from FY 1991-92 to FY 1993-94. Tonnage increased from 575 in FY 1991-92 to 1,102 in FY 1993-94.

Much of waste office paper generated by state government is confidential material such as old tax records, employment records, medical records, and motor vehicle records. To ensure that these materials are recycled but remain confidential and meet state and federal requirements for their destruction, the State Surplus Property Agency (SSPA) runs a shredding and baling operation for confidential waste office paper from state agencies. Once the confidential paper has been shredded and packed into bales, it is sold to a paper recycler. Prior to opening the SSPA recycling center, the Department of Administration recycled 73 tons of confidential state records at a roofing felt manufacturing plant from October 1991 through August 1992.

Aluminum cans

Virtually all state agency locations in the capital area provide for recycling of aluminum cans, either by employees to fund projects such as charitable contributions, or by the contracted recycling firm. Records (first records available) provided under the new contract that took effect September 1, 1994 , show aluminum can collections by the contractor averaging about 1400 pounds per month. This figure does not include cans collected by other programs.

Corrugated Cardboard

Effective July 1, 1993, Wake County and the city of Raleigh enacted ordinances severely restricting the disposal of corrugated cardboard in their landfills. Many state and Wake County agencies recycled cardboard before the ordinance took effect. State agencies in Raleigh now recycle their cardboard either by placing it in separate "dumpsters" on site or by delivering it directly to a paper recycling firm or local drop-off site. Additionally, the Division of Facility Management (Department of Administration), since September 1992, has collected corrugated cardboard from small buildings in the downtown Raleigh state government complex. The

division made special efforts to ensure that large volumes of corrugated cardboard resulting from the delivery of furniture to the new Revenue and Education Buildings in late 1992 and early 1993 were recycled rather than landfilled.

The Division of Facility Management and other state agencies delivered 47 tons of corrugated cardboard to a local paper recycler in FY 1992-93, and 71 tons in FY 1993-94. The recyclers then delivered the cardboard to a local paper dealer. This figure does not include cardboard that is picked up by contracted recycling collection firms - at the least, another 39 tons are collected in this manner.

Newspaper

Newspaper recycling bins provided by The News and Observer Recycling Program have been in place for several years at a number of the larger state buildings in Raleigh. The News and Observer estimates that together the buildings generated about nine tons per month in FY 1993-94. At many state offices in Raleigh not served by The News and Observer Recycling Program, individual state employees collect and recycle newspapers voluntarily, taking them to local recycling drop-off centers or putting them in their home curbside recycling bins.

Telephone Books

State agencies in Raleigh participate in the annual Wake County telephone book recycling drive. The state provides sites for the county to place telephone book recycling containers on state property in downtown Raleigh and at the state fairgrounds. Quantities of phone books collected at the downtown complex sites increased 8 percent in 1994 over 1993, while collections in Wake County as a whole decreased 14 percent for the same period. Phone books collected from the sites in the downtown state complex accounted for 15 percent of the entire county's collection in 1994.

Wooden Pallets

Wooden pallets discarded by state agencies in downtown Raleigh are taken by the Division of Facility Management to the Federal Surplus Property Agency, which burns the whole pallets in a large stove during the winter months to heat its warehouse. Other agencies in Raleigh report using a variety of methods to reuse or recycle their wooden pallets. These include the Department of Agriculture's Agronomic Laboratory, which reuses pallets in-house or donates them to North Carolina State University; and the Administrative Office of the Courts, which repairs and reuses some pallets in its warehouse, donates usable excess pallets to a reuse operation, and splits those that cannot be repaired for use as kindling.

Yard Waste and Food Waste

The Governor's Executive Mansion installed a backyard composting system donated by the Durham non-profit agency, Sunshares, in May 1993. Yard waste from the grounds and kitchen scraps are composted, and the compost is used in the mansion's gardens. North Carolina is one of only a handful of states whose executive residence has backyard composting.

Yard waste from other state building grounds in downtown Raleigh is composted by the Division of Facility Management. The finished compost is used in landscaping on state building grounds.

The State Fairgrounds in Raleigh, operated by the Department of Agriculture, has a site for the collection of animal bedding and manure from the fairgrounds horse complex. The city of Raleigh also places leaves collected from city residents at this site. The composted material is available free of charge to individuals, agencies, and businesses.

Other Recyclable Materials

Other materials, such as glass and plastic beverage containers, steel food cans, plastic bags, and glossy paper from magazines and catalogs, are voluntarily recycled by individual employees. Recycling programs for all Raleigh-area state agencies for many of these materials will be developed as appropriate and economically feasible.

Many individual state agencies in Raleigh currently recycle materials that are unique or that their operations generate in large quantity. Some of these include: obsolete aluminum rabies tags recycled by the Division of Epidemiology (DEHNR); steel food cans recycled by the Department of Human Resources from the snack bar on the Dorothea Dix campus; obsolete glossy state travel guides recycled by the Division of Travel and Tourism (Department of Commerce).

STATE AGENCY OPERATIONS OUTSIDE RALEIGH

Many functions are performed by state agencies throughout the state in addition to those that are predominantly office-oriented. State parks, correctional facilities, historic sites, psychiatric hospitals, and highway construction and maintenance operations are examples of the diverse services provided by state agencies. Data about waste reduction efforts at these facilities is available in the full state agency report.

State Universities

During FY 1993-94, the 16 state universities, UNC Hospitals in Chapel Hill, and the North Carolina School of Science and Mathematics in Durham (18 total institutions) recycled or composted 7,118 tons of material.

Community Colleges

North Carolina's 58 community colleges reported diverting 827 tons of materials from disposal through recycling or composting programs in FY 1993-94.

Other Information on State Agency Waste Reduction

The Office of Waste Reduction provides more detail on waste reduction and buy-recycled efforts of state agencies in the full state agency report. For a copy, call (919) 571-4100.

APPENDIX A-1: PUBLIC MUNICIPAL SOLID WASTE LANDFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	PUBLIC FACILITIES	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY 93-94	STATUS FY 93-94	LINED LANDFILL
4103	GREENSBORO LF (GUILFORD CO)	322,946.00	327,574.00	283,000.00	285,068.45	OPEN	NO
9201	WAKE CO (WILDERS GROVE) LF	276,652.00	258,796.00	267,984.00	268,428.00	OPEN	NO
3402	WINSTON SALEM LF (FORSYTH CO)	229,531.00	210,246.46	216,125.79	258,632.45	OPEN	NO
3201	DURHAM LF (DURHAM CO)	217,020.00	208,360.00	194,281.00	206,575.00	OPEN	NO
2601	ANN ST LF (CUMBERLAND CO)	174,445.00	160,880.67	179,920.67	178,479.98	OPEN	NO
1803	CATAWBA CO LF	131,201.00	129,948.00	136,459.00	144,450.00	OPEN	NO
3606	GASTON CO LF	149,198.00	153,105.00	161,864.00	130,097.00	OPEN	NO
7401	PITT CO LF	142,110.00	124,008.00	119,270.00	125,313.00	OPEN	NO
9801	WILSON CO LF	108,637.00	117,112.00	121,419.00	123,875.12	OPEN	NO
6801	ORANGE CO REGIONAL LF	95,123.00	121,318.00	125,452.00	121,345.00	OPEN	NO
9209	WAKE CO LF	156,958.00	150,967.70	122,444.10	119,382.59	OPEN	NO
6013	NORTH MECKLENBURG LF	0.00	0.00	0.00	110,881.33	OPEN	NO
9203	FELTONSVILLE LF (WAKE CO)	89,035.00	92,433.74	100,764.82	97,259.43	OPEN	NO
8003	ROWAN CO LF	87,159.00	85,708.00	88,639.00	97,180.00	OPEN	YES
8201	SAMPSON CO LF	36,000.00	33,234.59	34,975.86	97,003.97	OPEN	YES
1101	BUNCOMBE CO LF	192,476.00	141,928.01	143,267.00	96,753.33	OPEN	NO
6201	MONTGOMERY CO LF	18,096.00	28,800.00	42,542.43	94,875.75	OPEN	NO
9601	WAYNE CO	111,083.00	97,386.32	101,716.09	92,544.75	OPEN	NO
2401	COLUMBUS CO LF	35,880.00	44,536.31	45,361.11	88,446.90	OPEN	NO
4903	IREDELL CO. SANITARY LF	0.00	0.00	0.00	85,180.65	OPEN	YES
9001	UNION CO LF	105,570.00	71,787.37	79,465.89	84,001.19	OPEN	NO
4104	HIGH POINT (GUILFORD CO.)	0.00	0.00	0.00	83,750.71	OPEN	YES
6504	NEW HANOVER CO LF	123,538.00	80,575.58	83,273.11	82,189.00	OPEN	YES
6401	NASH CO LF	78,495.00	79,402.87	78,454.78	81,645.51	OPEN	NO
7803	ROBESON CO	84,066.00	91,048.50	80,676.70	80,588.00	OPEN	NO
7901	ROCKINGHAM CO LF	60,155.00	37,377.46	60,661.85	77,891.04	OPEN	NO
8103	CENTRAL LF (RUTHERFORD CO)	48,208.00	52,047.64	64,894.31	77,057.00	OPEN	NO
6705	ONSLOW CO LF	74,195.00	63,530.27	69,992.56	76,450.22	OPEN	NO
1007	BRUNSWICK CO LF	70,836.00	76,560.00	80,477.00	76,005.31	OPEN	NO
7601	RANDOLPH CO LF	74,700.00	75,533.00	77,660.00	74,677.00	OPEN	NO
5101	JOHNSTON CO LF	72,048.00	70,045.00	68,578.00	74,151.00	OPEN	NO
3301	EDGECOMBE CO LF	64,079.00	71,037.00	78,894.52	73,759.15	OPEN	NO
1203	BURKE CO LF	54,509.50	64,619.00	68,081.55	72,669.35	OPEN	NO
5403	LENOIR CO LF	60,347.00	67,323.66	74,062.00	71,568.70	OPEN	NO

APPENDIX A-1: PUBLIC MUNICIPAL SOLID WASTE LANDFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	PUBLIC FACILITIES	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY 93-94	STATUS FY 93-94	LINED LANDFILL
2504	CRSWMA INTERIM REGIONAL LF	0.00	0.00	0.00	69,184.92	OPEN	YES
1401	CALDWELL CO LF	45,866.00	62,112.59	66,951.53	68,029.87	OPEN	NO
2301	CLEVELAND CO LF	74,096.00	64,749.87	67,888.77	65,878.77	OPEN	NO
1302	CABARRUS CO LF	59,832.00	59,335.70	57,641.70	61,247.98	OPEN	NO
4501	HENDERSON CO LF	89,488.00	77,763.00	77,501.00	56,091.00	OPEN	NO
4302	HARNETT CO LF	59,804.00	54,770.00	49,985.00	55,254.25	OPEN	NO
8401	ALBEMARLE LF (STANLY)	62,328.00	67,498.00	69,503.00	54,627.00	OPEN	NO
8602	SURRY CO LF	49,296.00	45,907.00	51,518.00	52,260.00	OPEN	NO
8301	SCOTLAND CO LF	46,800.00	43,041.84	45,668.00	50,062.00	OPEN	NO
4204	HALIFAX CO LF	60,000.00	52,309.79	52,036.12	49,887.82	OPEN	NO
3901	OXFORD LF (GRANVILLE CO)	32,246.00	36,341.03	39,190.64	46,242.50	OPEN	NO
9101	VANCE CO LF	46,954.00	40,053.06	38,242.34	43,603.47	OPEN	NO
5503	LINCOLN CO LF	51,450.00	42,297.00	44,194.64	40,873.00	OPEN	YES
104	AUSTIN QUARTER SWM FACILITY	0.00	0.00	0.00	39,935.30	OPEN	YES
9704	WILKES CO. MSWLF	0.00	0.00	0.00	32,924.56	OPEN	YES
2902	DAVIDSON CO LF	117,211.00	132,258.00	121,503.00	31,388.89	INACTIVE	NO
4901	IREDELL CO LF	148,500.00	110,357.00	124,625.00	31,226.80	INACTIVE	NO
9502	WATAUGA CO LF	32,206.00	32,881.82	35,208.00	27,438.50	INACTIVE	NO
6301	MOORE CO LF	72,690.00	70,706.43	58,114.30	27,225.61	INACTIVE	NO
5601	MCDOWELL CO LF	28,900.00	27,460.96	30,279.63	26,484.07	INACTIVE	NO
6001	MECKLENBURG CO LF	221,124.00	150,603.00	0.00	25,246.00	OPEN	NO
7301	ROXBORO LF (PERSON CO)	42,996.00	22,528.99	25,251.59	23,281.29	INACTIVE	NO
7002	PASQUOTANK CO LF	34,478.00	30,004.99	31,638.80	22,915.18	INACTIVE	NO
1602	CARTERET CO LF	105,358.00	84,433.00	78,281.00	22,808.00	INACTIVE	NO
101	ALAMANCE CO LF	98,552.00	89,089.64	76,632.91	22,611.02	INACTIVE	NO
4407	HAYWOOD CO. WHITE OAK LF	0.00	0.00	0.00	22,451.00	OPEN	YES
3501	FRANKLIN CO LF	25,881.00	27,887.46	32,477.41	22,325.72	INACTIVE	NO
8603	ELKIN AREA LF (SURRY CO)	32,760.00	26,726.00	21,604.00	22,191.00	OPEN	NO
201	ALEXANDER CO LF	28,880.00	25,182.00	20,712.00	21,477.00	OPEN	NO
901	BLADEN CO	47,110.00	24,810.00	28,330.00	20,944.18	INACTIVE	NO
2802	EAST LAKE LF (DARE CO)	48,613.00	50,101.00	52,052.36	20,851.53	INACTIVE	NO
5002	JACKSON CO LF	16,833.00	16,703.00	19,309.07	20,033.57	OPEN	NO
2503	CRAVEN CO LF	97,232.00	77,108.17	68,675.15	19,658.86	INACTIVE	NO
4101	HIGH POINT LF (GUILFORD CO)	118,968.00	118,118.30	126,083.78	19,335.44	INACTIVE	NO

APPENDIX A-1: PUBLIC MUNICIPAL SOLID WASTE LANDFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	PUBLIC FACILITIES	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY 93-94	STATUS FY 93-94	LINED LANDFILL
8807	TRANSYLVANIA CO LF	0.00	3,220.00	16,384.00	18,874.00	OPEN	YES
2001	CHEROKEE CO LF	15,840.00	15,926.00	17,610.69	18,374.00	OPEN	NO
1	YANCEY/MITCHELL CO LF	31,296.00	30,915.00	21,072.00	18,259.54	INACTIVE	NO
702	BEAUFORT CO LF	37,200.00	38,748.17	44,531.19	18,175.96	INACTIVE	NO
501	ASHE CO LF	16,389.00	17,756.20	18,000.17	17,946.35	OPEN	YES
3902	GRANVILLE CO (BUTNER) LF	14,090.00	17,915.14	19,320.50	17,585.40	OPEN	NO
4404	CANTON LF (HAYWOOD CO)	95,735.00	13,957.00	34,592.00	17,470.05	INACTIVE	NO
5703	MACON CO. LANDFILL	0.00	3,648.70	16,645.53	17,108.79	OPEN	YES
5301	LEE CO LF	45,981.00	46,750.83	43,398.70	13,548.46	INACTIVE	NO
4403	HAYWOOD CO LF	40,560.00	39,240.00	50,878.47	12,434.28	INACTIVE	NO
4601	HERTFORD CO LF	12,475.00	14,269.00	14,819.00	11,531.30	INACTIVE	NO
401	ANSON CO LF	14,831.00	13,942.30	15,702.29	10,786.60	INACTIVE	NO
7101	PENDER CO LF	18,133.00	17,875.79	17,277.29	10,606.33	INACTIVE	NO
4002	GREENE CO LF	14,064.00	6,815.28	8,729.64	9,669.16	OPEN	NO
9701	WILKES CO LF	83,832.00	55,722.00	55,832.00	9,584.70	INACTIVE	NO
1901	CHATHAM CO LF	31,910.00	30,552.00	29,805.00	9,372.66	INACTIVE	NO
3001	DAVIE CO LF	19,070.00	15,109.98	18,284.35	9,174.70	INACTIVE	NO
3101	DUPLIN CO LF	48,900.00	31,571.92	29,913.64	8,745.48	INACTIVE	NO
7201	PERQUIMANS CHOWAN GATES REG LF	24,508.00	24,700.00	26,410.31	8,547.00	INACTIVE	NO
5901	MARTIN CO LF	25,956.00	30,086.00	30,690.00	8,398.51	INACTIVE	NO
9902	YADKIN CO LF	25,800.00	20,487.33	22,529.86	8,214.95	INACTIVE	NO
8501	STOKES CO LF	16,896.00	16,784.00	16,671.26	7,633.04	INACTIVE	NO
4303	ANDERSON CREEK LF (HARNETT CO)	10,355.00	13,691.00	11,841.00	7,586.19	CLOSED	NO
5803	MADISON CO. LF	0.00	0.00	0.00	7,411.37	OPEN	YES
302	ALLEGHANY CO LF	17,060.00	13,995.00	7,684.00	6,615.35	INACTIVE	NO
9301	WARREN CO LF	13,490.00	10,968.00	8,976.00	6,571.00	INACTIVE	NO
7502	POLK CO LF	9,318.00	8,808.86	7,515.49	6,062.57	INACTIVE	NO
801	BERTIE CO LF	12,600.00	17,255.30	16,864.00	5,944.10	INACTIVE	NO
1701	CASWELL CO LF	5,807.60	5,102.43	4,818.11	5,554.57	INACTIVE	NO
8701	SWAIN CO LF	4,663.00	5,521.30	6,152.27	4,859.24	INACTIVE	NO
7702	RICHMOND CO LF	47,662.00	60,103.48	36,885.79	4,855.66	INACTIVE	NO
2701	CURRITUCK CO LF	14,569.00	13,721.00	15,001.00	4,589.00	INACTIVE	NO
9402	WASHINGTON CO LF	11,773.00	13,233.05	14,735.51	4,225.78	INACTIVE	NO
3801	GRAHAM CO LF	4,710.00	4,422.96	4,741.00	3,566.00	INACTIVE	NO

APPENDIX A-1: PUBLIC MUNICIPAL SOLID WASTE LANDFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	PUBLIC FACILITIES	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY 93-94	STATUS FY 93-94	LINED LANDFILL
601	AVERY CO LF	16,060.00	10,800.00	2,830.00	3,560.00	INACTIVE	NO
5201	JONES CO LF	3,648.00	4,360.00	2,878.00	2,734.45	INACTIVE	NO
6601	NORTHAMPTON CO LF	12,384.00	18,890.00	14,435.18	2,715.23	INACTIVE	NO
5802	MADISON CO LF	12,090.00	11,154.00	10,404.59	2,706.34	INACTIVE	NO
5704	MACON CO. LANDFILL	0.00	0.00	0.00	2,625.46	OPEN	NO
4701	HOKE CO LF	20,306.00	17,515.04	19,150.05	2,149.76	INACTIVE	NO
6902	PAMLICO CO LF	11,083.00	10,600.00	11,895.54	2,044.42	INACTIVE	NO
2201	CLAY CO LF	4,720.00	3,965.60	3,425.00	1,806.65	INACTIVE	NO
5702	HIGHLANDS LF (MACON CO)	7,365.00	4,267.04	3,655.53	1,299.51	INACTIVE	NO
2904	THOMASVILLE LF (DAVIDSON CO)	7,502.00	0.00	0.00	0.00	CLOSED	NO
5701	MACON CO LF (FRANKLIN)	28,215.00	9,531.32	1,011.49	0.00	INACTIVE	NO
8102	CLIFFSIDE SOUTH (RUTHERFORD CO) LF	12,051.00	31,228.58	3,184.21	0.00	INACTIVE	NO
8803	TRANSYLVANIA CO LF	26,740.00	25,620.00	0.00	0.00	INACTIVE	NO
9702	ROARING RIVER LF (WILKES CO)	9,146.00	1,637.00	6,501.00	0.00	INACTIVE	NO
	TOTAL	6,497,532.10	5,972,752.39	5,845,439.53	5,515,695.89		

APPENDIX A-2: PRIVATE MUNICIPAL SOLID WASTE LANDFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	FACILITY	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY 93-94	STATUS	LINED LANDFILL
1304	CHARLOTTE MTR SPEEDWAY	359,918.00	404,978.70	493,962.61	536,526.51	OPEN	YES
3406	PIEDMONT LF & RECYCLING CTR	128,148.00	142,067.36	146,847.90	350,508.77	OPEN	YES
803	EAST CAROLINA REGIONAL LANDFILL	0.00	0.00	0.00	154,583.16	OPEN	YES
9214	HOLLY SPRINGS DISPOSAL, INC.	0.00	0.00	0.00	87,176.52	OPEN	NO
6703	CAMP LEJEUNE SANITARY LANDFILL	59,403.00	83,823.43	83,823.43	46,532.51	OPEN	NO
2602	FORT BRAGG SANITARY LANDFILL	80,000.00	39,996.00	36,000.00	34,954.00	OPEN	NO
5001	WESTERN CAROLINA UNIVERSITY LF	612.00	430.45	402.42	108.34	INACTIVE	NO
9204	SORRELLS SANITARY LANDFILL	DNR	37,530.00	50,138.00	DNR	INACTIVE	NO
	TOTAL	628,081.00	708,825.94	811,174.36	1,210,389.81		
	DNR = DID NOT REPORT						

APPENDIX A-3: SCRAP TIRE MONOFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	FACILITY	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY 93-94
1303	U S TIRE RECYCLING PARTNERS, LP	15,444.00	17,094.25	17,873.23	45,410.47
4304	CENTRAL CAROLINA TIRE RECYCLING	0.00	2,764.61	4,824.43	24,255.61
	TOTAL TONS	15,444.00	19,858.86	22,697.66	69,666.08

APPENDIX A-4: INCINERATION FACILITIES, DESCENDING ORDER, FY 1993-94

PERMIT	FACILITY	NET TONS FY 90-91	NET TONS FY 91-92	NET TONS FY 92-93	GROSS TONS FY 93-94	ASH TONS FY 93-94	NET TONS FY 93-94	STATUS
6505	NEW HANOVER CO WTE FACILITY	16,975.00	64,002.68	62,104.40	81,793.00	28,420.00	53,373.00	OPEN
6010	NORTHEAST WTE FACILITY	55,663.00	54,136.00	50,585.00	72,496.00	19,739.00	52,757.00	OPEN
6506	TOWN OF WRIGHTSVILLE BEACH	4,590.40	3,805.70	2,217.20	0.00	0.00	0.00	CLOSED
	TOTAL TONS	60,253.40	121,944.38	114,906.60	154,289.00	48,159.00	106,130.00	

APPENDIX A-5: PRIVATE INDUSTRIAL LANDFILLS, DESCENDING ORDER, FY 1993-94

PERMIT	FACILITY	TONS FY 90-91	TONS FY 91-92	TONS FY 92-93	TONS FY93-94
7302	ROXBORO S E PLANT	DNR	528,486.00	632,421.90	476,730.86
1804	MARSHALL STEAM STATION LF	DNR	329,457.00	344,543.80	400,874.68
4406	CHAMPION INT'L CORP LF NO. 6	DNR	389,689.00	379,899.00	328,233.00
8503	BELEWS CREEK ASH LF	DNR	242,268.00	164,675.00	191,070.00
3605	FMC CORPORATION LF	DNR	184,462.00	154,923.00	166,444.00
2302	CLEVELAND CONTAINER SERVICE	DNR	67,155.00	73,918.00	124,516.00
9401	WEYERHAEUSER PAPER CO	DNR	99,732.30	119,283.00	108,960.00
2402	FEDERAL PAPER BOARD COMPANY, INC	139,375.00	194,929.00	268,341.00	75,116.00
3405	R J REYNOLDS TOBACCO CO LF	68,019.00	59,576.71	48,997.79	47,683.72
1102	BASF CORPORATION	23,400.00	25,726.00	20,652.00	45,500.00
5404	E I DUPONT CO - KINSTON SITE	6,442.30	8,227.00	57,011.31	37,737.74
4203	CHAMPION INT'L CORP	31,698.00	17,839.10	21,768.80	29,568.10
1006	E I DUPONT	14,147.00	20,767.85	23,852.30	22,078.32
8801	ECUSTA PAPER LF (SLUDGE)	13,337.00	10,999.70	10,134.90	11,475.80
2502	WEYERHAEUSER COMPANY	10,252.00	6,633.00	8,249.00	9,979.00
8805	ECUSTA PAPER LF	DNR	7,522.10	7,026.00	6,817.10
5603	COLLINS & AIKMAN SANITARY LF	DNR	6,846.70	6,440.00	6,618.00
9703	ABITIBI PRICE CORP	3,846.00	3,999.00	4,288.00	4,034.40
4503	CRANSTON PRINT WORKS	DNR	DNR	0.00	1,875.00
1001	BRUNSWICK PLANT SANITARY LF	446.00	194.00	323.00	1,279.53
6603	GEORGIA-PACIFIC	709.00	530.40	816.80	824.06
802	R J REYNOLDS TOBACCO CO, AVOCA D	225.20	766.30	702.60	605.00
7602	EVEREADY BATTERY COMPANY, INC	DNR	612.70	337.80	402.00
8806	DUPONT BREVARD PLANT	DNR	490.20	412.00	376.60
9210	SHEARON HARRIS LF	350.00	176.00	162.33	172.51
6004	MCGUIRE SITE LF	101.00	90.80	463.20	23.35
	TOTAL TONS	312,347.50	2,207,175.86	2,349,642.53	2,098,994.77
DNR = DID NOT REPORT					

APPENDIX A-6: TRANSFER STATIONS, DESCENDING ORDER, FY 1993-94

PERMIT	TRANSFER STATION	TONS	DISPOSAL DESTINATION AND PERMIT NUMBER	DESTINATION LINED
1104	WASTE MANAGMENT OF ASHEVILLE	70,662.00	PALMETTO LANDFILL, SPARTANBURG, SC	YES
3608	WASTE MANAGEMENT OF CAROLINAS	62,861.00	PALMETTO LANDFILL, SPARTANBURG, SC	YES
6302	UWHARRIE ENV INC/MOORE CTY TS	25,619.81	EAST CAROLINA (#803)	YES
		15,326.19	MONTGOMERY CO. LANDFILL(#6201)	NO
7703	RICHMOND COUNTY TRANSFER STATION	36,589.59	MONTGOMERY CO LANDFILL (#6201)	NO
5304	ARS, INC. TRANSFER STATION	32,750.71	PIEDMONT LANDFILL (#3406)	YES
1604	CARTERET COUNTY TRANSFER STATION	31,611.15	CRSWMA INTERIM REGIONAL LF(#2504)	YES
6508	WASTE MANAGEMENT OF WILMINGTON	23,614.00	SAMPSON COUNTY DISPOSAL, INC (#8201)	YES
1903	ARS, INC. TRANSFER STATION	20,766.86	PIEDMONT LANDFILL (#3406)	YES
9211	TOWN OF CARY TRANSFER STATION	14,891.98	FELTONSVILLE, SO. WAKE COUNTY LF (#9203)	NO
7902	CITY OF REIDSVILLE TRANS. FACILITY	10,555.35	ROCKINGHAM COUNTY LANDFILL (#7901)	NO
7903	CITY OF EDEN TRANSFER STATION	9,880.00	ROCKINGHAM COUNTY LANDFILL (#7901)	NO
3002	DAVIE COUNTY TRANSFER STATION	8,778.90	WINSTON-SALEM LANDFILL (#3402)	NO
7103	PENDER CO. TRANSFER STATION	3,911.70	PENDER COUNTY (# 7101)	NO
		2,360.59	BFI IN SAMPSON CO.(# 8201)	YES
0904	BLADEN COUNTY TRANSFER STATION	5,011.02	ARS IN COLUMBUS COUNTY (#2401)	NO
6903	PAMLICO COUNTY TRANSFER STATION	3,322.94	CRSWMA INTERIM REGIONAL LANDFILL (#2504)	YES
9903	YADKIN COUNTY TRANSFER FACILITY	1,655.85	CMS DEVELOPMENT CORP. LANDFILL V (#1304)	YES
0303	ALLEGHANY COUNTY TRANSFER FACILITY	1,584.69	PIEDMONT LANDFILL (#3406)	YES
4305	HARNETT COUNTY TRANSFER STATION	325.50	HARNETT COUNTYLANDFILL (#4302)	NO
PERMIT-PENDING OR TEMPORARY TRANSFER STATIONS		**TONS**	**DISPOSAL DESTINATION AND PERMIT NUMBER**	**DESTINATION LINED**
	ALAMANCE COUNTY	27,879.09	PIEDMONT LANDFILL (#3406)	YES
		838.62	CENTRAL CAROLINA TIRE (#4304)	N/A
	ALBEMARLE REG. SWM AUTH-CURRITUCK	7,827.63	EAST CAROLINA LANDFILL (#803)	YES
	ALBEMARLE REG. SWM AUTH-PERQUIMANS	11,367.26	EAST CAROLINA LANDFILL (#803)	YES
	ALBEMARLE REGIONAL SWM AUTH-DARE	24,465.58	EAST CAROLINA LANDFILL (#803)	YES
	ANSON COUNTY	3,638.19	MONTGOMERY CO. LANDFILL (#6201)	NO
	AVERY COUNTY	9,006.00	CMS LANDFILL V (#1304)	YES
	BEAUFORT COUNTY	32,989.83	EAST CAROLINA LANDFILL (#803)	YES
	DUPLIN COUNTY	19,189.38	SAMPSON COUNTY DISPOSAL, INC (#8201)	YES
	FRANKLIN COUNTY	5,869.80	PIEDMONT LANDFILL (#3406)	YES
	HOKE COUNTY	11,088.08	ARS COLUMBUS CO. (#2401)	NO
	MCDOWELL COUNTY	6,242.41	BURKE COUNTY LANDFILL (#1203)	NO
	PASQUOTANK COUNTY	7,366.94	EAST CAROLINA LANDFILL (#803)	YES
	PERSON COUNTY	4,500.14	PIEDMONT LANDFILL (#3406)	YES
	POLK COUNTY	786.00	PALMETTO, SPARTANBURG, SC	YES

APPENDIX A-6: TRANSFER STATIONS, DESCENDING ORDER, FY 1993-94

PERMIT-PENDING OR TEMPORARY TRANSFER STATIONS		TONS	DISPOSAL DESTINATION AND PERMIT NUMBER	DESTINATION LINED
	TOWN OF EDENTON	3,736.15	EAST CAROLINA LANDFILL (#803)	YES
	WARREN COUNTY	1,598.43	EAST CAROLINA LANDFILL (#803)	YES
	YANCEY/MITCHELL COUNTY	5,173.14	PALMETTO, SPARTANBURG, SC	YES
	DAVIDSON COUNTY	80,525.47	CMS LANDFILL V (#1304)	YES
TOTAL TONS TRANSFERRED		646,167.97		

APPENDIX B-1: COUNTY WASTE REDUCTION, DESCENDING ORDER, FY 1993-94

COUNTY	% WASTE REDUCTION FY 93-94	COUNTY	% WASTE REDUCTION FY 93-94	COUNTY	% WASTE REDUCTION FY 93-94
NORTHAMPTON	61.18%	RUTHERFORD	13.74%	ANSON	1.65%
TYRRELL	47.67%	BURKE	12.76%	MARTIN	1.35%
CRAVEN*	45.82%	HARNETT	12.55%	VANCE	0.83%
YADKIN	44.64%	WAYNE	12.44%	IREDELL	0.30%
CLAY	42.69%	CHATHAM*	12.17%	SURRY	-0.59%
MADISON	39.91%	FORSYTH*	12.16%	LINCOLN	-0.71%
ALLEGHANY	39.56%	ORANGE	11.66%	SAMPSON	-0.88%
CARTERET	39.43%	HAYWOOD	11.59%	GRAHAM	-0.90%
TRANSYLVANIA	38.36%	JONES	10.69%	CHEROKEE	-1.33%
DUPLIN*	38.22%	WATAUGA	10.64%	GASTON	-1.91%
PAMLICO	37.54%	CLEVELAND	10.49%	WILSON	-1.93%
HOKE	36.53%	WASHINGTON	10.34%	ASHE	-1.96%
GATES	32.04%	GUILFORD	10.33%	UNION	-2.92%
YANCEY	30.85%	NEW HANOVER*	9.92%	CALDWELL	-3.05%
RICHMOND	30.06%	CHOWAN	9.66%	BERTIE	-3.19%
MACON	29.24%	PITT	9.58%	BLADEN	-3.31%
STOKES	28.83%	HALIFAX	9.51%	EDGECOMBE	-4.74%
POLK	28.24%	CURRITUCK	9.12%	LENOIR	-5.45%
WILKES	27.11%	ROBESON	8.98%	WARREN	-6.53%
ALAMANCE*	24.88%	BRUNSWICK	8.87%	JACKSON	-6.54%
CATAWBA*	22.17%	BUNCOMBE*	8.15%	SCOTLAND	-8.81%
MITCHELL	20.70%	DAVIE	7.64%	CAMDEN	-11.58%
ONSLOW	20.09%	MONTGOMERY	7.48%	ROCKINGHAM	-12.00%
DARE	19.32%	NASH	6.89%	PERSON	-12.91%
PENDER	19.23%	CABARRUS	6.47%	AVERY	-13.40%
ALEXANDER	18.23%	LEE	5.62%	ROWAN	-13.99%
HYDE	17.53%	MOORE	4.06%	PERQUIMANS	-14.21%
STANLY	17.43%	CUMBERLAND	4.04%	GRANVILLE	-14.32%
PASQUOTANK*	16.14%	JOHNSTON	3.81%	SWAIN	-16.89%
DAVIDSON	15.86%	HERTFORD	3.12%	BEAUFORT	-23.51%
DURHAM*	15.15%	FRANKLIN	2.86%	CASWELL	-35.39%
HENDERSON	14.78%	RANDOLPH	2.21%	GREENE	-37.16%
WAKE*	14.31%	MECKLENBURG*	1.96%	COLUMBUS	-50.69%
*county used alternative base year				MCDOWELL	-58.85%

APPENDIX B-2: COUNTY WASTE REDUCTION, ALPHABETICAL ORDER, FY 1993-94

COUNTY	POPULATION	MSW TONS	MSW TONS	MSW	MSW TONS	MSW TONS	BASE YEAR	PER CAPITA	PER CAPITA	% WASTE
	FY 93-94	DISPOSED	DISPOSED	MANAGED	DISPOSED	DISPOSED	PER CAPITA	RATE	RATE	REDUCTION
	Jul-93	FY 90-91	FY 91-92	FY 91-92	FY 92-93	FY 93-94	FY 91-92	FY 92-93	FY 93-94	FY 93-94**
ALAMANCE*	112,523	99,742.00	90,510.91	99,301.89	77,599.29	93,141.66	0.91	0.71	*	*
ALEXANDER	29,042	8,880.00	25,182.00	25,716.32	20,712.00	21,477.00	0.90	0.74	0.74	18.23%
ALLEGHANY	9,526	17,060.00	14,064.73	14,130.83	7,730.65	8,344.81	1.45	0.78	0.88	39.56%
ANSON	23,862	14,831.00	13,942.30	14,229.30	15,703.82	14,428.79	0.61	0.67	0.60	1.65%
ASHE	22,486	16,389.00	17,883.94	18,089.13	18,056.01	18,481.43	0.81	0.80	0.82	-1.96%
AVERY	15,025	16,060.00	10,947.65	11,130.09	2,952.16	12,688.37	0.74	0.20	0.84	-13.40%
BEAUFORT	42,758	40,118.00	41,104.54	41,796.03	47,546.61	52,044.49	0.99	1.11	1.22	-23.51%
BERTIE	20,412	12,600.00	17,255.30	17,371.98	16,864.00	18,155.55	0.86	0.82	0.89	-3.19%
BLADEN	29,423	47,110.00	24,823.83	25,048.21	28,330.00	26,195.87	0.86	0.99	0.89	-3.31%
BRUNSWICK	56,896	70,836.00	76,560.00	78,123.11	80,805.94	76,830.54	1.48	1.48	1.35	8.87%
BUNCOMBE*	182,267	192,476.00	142,041.61	159,040.21	152,762.69	152,397.96	0.90	0.85	*	*
BURKE	78,513	54,507.00	65,366.52	78,005.51	68,540.36	69,574.69	1.02	0.89	0.89	12.76%
CABARRUS	104,785	88,078.00	88,784.55	95,215.19	83,841.32	92,507.75	0.94	0.81	0.88	6.47%
CALDWELL	72,310	45,866.00	62,642.56	65,531.52	67,461.78	68,831.52	0.92	0.94	0.95	-3.05%
CAMDEN	6,005	2,397.00	1,768.46	1,850.16	1,991.60	2,070.54	0.31	0.33	0.34	-11.58%
CARTERET	56,046	105,358.00	84,516.70	86,894.30	78,481.53	54,908.51	1.62	1.42	0.98	39.43%
CASWELL	21,211	5,810.00	5,102.43	5,136.12	4,818.11	7,081.54	0.25	0.23	0.33	-35.39%
CATAWBA*	122,627	131,201.00	129,948.00	151,559.31	136,462.83	144,538.66	1.26	1.12	*	*
CHATHAM*	41,049	33,100.00	31,209.91	33,235.13	30,109.23	31,919.95	0.84	0.74	*	*
CHEROKEE	21,232	15,841.00	15,960.17	16,020.17	17,623.89	16,708.00	0.78	0.85	0.79	-1.33%
CHOWAN	13,824	12,254.00	12,353.00	13,691.72	13,182.67	12,349.10	0.99	0.94	0.89	9.66%
CLAY	7,528	4,720.00	3,965.60	4,172.34	3,425.00	2,467.65	0.57	0.48	0.33	42.69%
CLEVELAND	87,188	74,096.00	65,533.73	73,137.50	68,606.32	66,913.66	0.86	0.80	0.77	10.49%
COLUMBUS	50,198	35,880.00	44,536.31	45,199.16	45,361.11	68,512.34	0.91	0.90	1.36	-50.69%
CRAVEN*	83,964	97,402.00	77,355.31	86,549.01	69,274.99	54,861.07	1.05	0.83	*	*
CUMBERLAND	292,517	255,639.00	203,144.90	227,301.67	218,485.71	227,883.25	0.81	0.77	0.78	4.04%
CURRITUCK	14,755	14,569.00	13,721.00	13,792.48	15,001.00	13,358.78	1.00	1.03	0.91	9.12%
DARE	24,003	46,770.00	48,446.08	51,299.83	50,260.74	43,207.43	2.23	2.16	1.80	19.32%
DAVIDSON	130,709	125,903.00	133,646.84	139,616.85	122,370.71	118,453.76	1.08	0.93	0.91	15.86%
DAVIE	28,775	19,070.00	15,231.34	19,348.40	18,380.80	18,108.54	0.68	0.64	0.63	7.64%
DUPLIN*	41,426	48,900.00	32,213.65	33,309.90	30,709.73	31,306.58	0.82	0.75	*	*
DURHAM*	189,171	218,210.00	210,104.06	218,971.80	195,038.13	209,860.73	1.17	1.04	*	*
EDGECOMBE	56,771	64,079.00	71,037.00	71,471.38	78,894.52	74,322.38	1.25	1.39	1.31	-4.74%
FORSYTH*	271,680	278,242.00	278,824.06	304,289.69	286,079.05	320,279.19	1.14	1.06	*	*
FRANKLIN	39,407	25,881.00	27,887.46	28,701.81	32,477.41	29,113.80	0.76	0.84	0.74	2.86%
GASTON	176,856	149,198.00	154,581.05	165,099.79	163,093.42	168,278.11	0.93	0.92	0.95	-1.91%

APPENDIX B-2: COUNTY WASTE REDUCTION, ALPHABETICAL ORDER, FY 1993-94

COUNTY	POPULATION	MSW TONS	MSW TONS	MSW	MSW TONS	MSW TONS	BASE YEAR	PER CAPITA	PER CAPITA	% WASTE
	FY 93-94	DISPOSED	DISPOSED	MANAGED	DISPOSED	DISPOSED	PER CAPITA	RATE	RATE	REDUCTION
	Jul-93	FY 90-91	FY 91-92	FY 91-92	FY 92-93	FY 93-94	FY 91-92	FY 92-93	FY 93-94	FY 93-94**
GATES	9,515	5,392.00	5,430.00	5,896.67	5,832.71	4,058.43	0.63	0.61	0.43	32.04%
GRAHAM	7,372	4,710.00	4,422.96	4,508.08	4,741.00	4,631.00	0.62	0.67	0.63	-0.90%
GRANVILLE	40,221	46,336.00	54,259.99	54,547.90	58,759.72	63,980.07	1.39	1.48	1.59	-14.32%
GREENE	15,903	15,254.00	7,339.34	7,427.74	9,342.85	10,422.02	0.48	0.58	0.66	-37.16%
GUILFORD	360,551	453,446.00	464,235.29	471,540.90	452,645.06	435,861.01	1.35	1.28	1.21	10.33%
HALIFAX	56,969	60,000.00	52,352.39	54,906.78	52,265.76	50,407.88	0.98	0.92	0.88	9.51%
HARNETT	72,559	71,349.00	68,857.51	69,073.39	62,479.25	64,193.35	1.01	0.88	0.88	12.55%
HAYWOOD	48,912	136,295.00	53,197.00	57,841.80	85,470.47	52,355.33	1.21	1.77	1.07	11.59%
HENDERSON	73,356	89,488.00	78,014.26	81,497.83	77,761.09	71,569.86	1.14	1.08	0.98	14.78%
HERTFORD	22,373	12,475.00	14,269.00	14,288.00	14,819.00	13,691.24	0.63	0.67	0.61	3.12%
HOKE	24,442	20,306.00	17,515.04	18,331.15	19,173.39	12,424.99	0.80	0.81	0.51	36.53%
HYDE	5,391	3,043.00	2,675.55	2,761.59	2,850.50	2,218.23	0.50	0.53	0.41	17.53%
IREDELL	98,452	152,340.00	110,967.87	114,539.18	124,812.55	116,650.27	1.19	1.29	1.18	0.30%
JACKSON	27,828	17,445.00	17,179.24	18,660.87	19,711.49	20,189.21	0.68	0.72	0.73	-6.54%
JOHNSTON	88,520	72,048.00	70,607.64	74,169.34	69,416.75	75,205.59	0.88	0.80	0.85	3.81%
JONES	9,439	3,648.00	4,360.00	4,360.00	2,878.00	3,932.28	0.47	0.30	0.42	10.69%
LEE	43,877	45,981.00	46,902.98	48,341.02	45,474.19	47,838.07	1.16	1.05	1.09	5.62%
LENOIR	58,665	60,347.00	67,323.66	67,692.88	74,556.23	72,578.21	1.17	1.28	1.24	-5.45%
LINCOLN	53,075	52,640.00	43,979.51	44,442.34	45,067.93	46,610.00	0.87	0.87	0.88	-0.71%
MACON	36,238	35,580.00	17,447.06	19,738.31	21,312.55	21,033.76	0.82	0.86	0.58	29.24%
MADISON	24,982	12,090.00	11,258.61	11,676.23	10,548.13	10,269.47	0.68	0.61	0.41	39.91%
MARTIN	17,243	25,956.00	30,087.39	30,111.58	30,690.00	20,300.58	1.19	1.19	1.18	1.35%
MCDOWELL	25,482	28,900.00	27,460.96	29,179.96	30,279.63	33,038.60	0.82	0.84	1.30	-58.85%
MECKLENBURG*	547,982	650,910.00	601,055.45	677,573.24	617,277.17	747,434.81	1.29	1.15	*	*
MITCHELL	14,510	15,648.00	15,606.00	15,768.10	11,567.00	12,745.33	1.11	0.80	0.88	20.70%
MONTGOMERY	23,342	18,096.00	28,800.00	28,873.00	21,588.14	26,561.77	1.23	0.92	1.14	7.48%
MOORE	62,467	72,690.00	70,814.60	74,061.56	58,488.88	73,877.63	1.23	0.95	1.18	4.06%
NASH	80,554	78,495.00	79,402.87	84,593.77	78,454.78	81,695.17	1.09	0.99	1.01	6.89%
NEW HANOVER*	130,590	159,849.00	149,582.43	157,646.89	151,075.83	165,651.48	1.28	1.18	*	*
NORTHAMPTON	20,491	12,384.00	18,945.30	19,527.80	14,515.70	7,461.99	0.94	0.70	0.36	61.18%
ONSLOW	150,713	133,598.00	147,867.58	158,344.22	154,526.10	124,749.30	1.04	1.07	0.83	20.09%
ORANGE	101,599	95,123.00	122,053.92	131,067.45	125,766.70	122,147.09	1.36	1.26	1.20	11.66%
PAMLICO	11,577	6,795.00	7,223.00	8,541.24	8,196.50	5,390.22	0.75	0.72	0.47	37.54%
PASQUOTANK*	32,684	32,081.00	28,236.53	30,150.34	29,647.20	27,507.88	0.97	0.93	*	*
PENDER	32,568	18,133.00	17,895.86	18,187.76	17,444.49	15,833.43	0.60	0.56	0.49	19.23%
PERQUIMANS	10,565	6,862.00	6,917.00	7,519.55	7,394.93	8,785.66	0.73	0.71	0.83	-14.21%

APPENDIX B-2: COUNTY WASTE REDUCTION, ALPHABETICAL ORDER, FY 1993-94

COUNTY	POPULATION	MSW TONS	MSW TONS	MSW	MSW TONS	MSW TONS	BASE YEAR	PER CAPITA	PER CAPITA	% WASTE
	FY 93-94	DISPOSED	DISPOSED	MANAGED	DISPOSED	DISPOSED	PER CAPITA	RATE	RATE	REDUCTION
	Jul-93	FY 90-91	FY 91-92	FY 91-92	FY 92-93	FY 93-94	FY 91-92	FY 92-93	FY 93-94	FY 93-94**
PERSON	30,763	42,996.00	22,528.99	24,249.07	25,251.59	27,816.48	0.80	0.82	0.90	-12.91%
PITT	115,120	143,300.00	124,372.19	132,896.09	120,058.98	125,864.94	1.21	1.06	1.09	9.58%
POLK	15,127	9,318.00	8,808.86	9,327.33	7,515.49	6,884.75	0.63	0.50	0.46	28.24%
RANDOLPH	112,684	74,700.00	75,720.11	78,663.37	77,711.28	80,297.26	0.73	0.71	0.71	2.21%
RICHMOND	44,782	47,662.00	60,606.28	60,752.03	58,619.57	42,434.05	1.35	1.30	0.95	30.06%
ROBESON	108,557	85,584.00	98,123.17	104,700.17	88,563.88	98,287.51	0.99	0.83	0.91	8.98%
ROCKINGHAM	86,897	81,947.00	65,416.57	71,480.71	75,228.09	80,752.35	0.83	0.87	0.93	-12.00%
ROWAN	114,731	90,131.00	86,180.41	90,081.47	89,479.30	104,974.78	0.80	0.79	0.91	-13.99%
RUTHERFORD	57,919	60,259.00	83,631.84	89,175.34	68,322.46	77,716.87	1.56	1.18	1.34	13.74%
SAMPSON	49,352	36,000.00	33,234.59	33,545.35	32,492.71	34,821.71	0.70	0.67	0.71	-0.88%
SCOTLAND	34,063	45,282.00	37,136.51	39,867.42	38,645.81	43,191.56	1.17	1.13	1.27	-8.81%
STANLY	52,740	62,328.00	67,940.50	69,288.07	70,276.73	57,644.01	1.32	1.33	1.09	17.43%
STOKES	39,033	18,086.00	17,691.72	17,976.32	18,354.91	13,182.17	0.47	0.48	0.34	28.83%
SURRY	63,265	82,056.00	72,633.00	73,595.30	73,187.82	75,074.52	1.18	1.17	1.19	-0.59%
SWAIN	11,299	4,663.00	5,521.30	5,650.66	6,152.27	6,668.64	0.50	0.55	0.59	-16.89%
TRANSYLVANIA	26,816	27,930.00	28,841.91	30,072.05	16,482.27	19,161.63	1.16	0.63	0.71	38.36%
TYRRELL	3,764	1,768.00	1,739.71	2,984.83	1,742.86	1,561.61	0.79	0.45	0.41	47.67%
UNION	90,848	105,570.00	72,046.54	77,842.49	79,870.19	84,243.75	0.90	0.91	0.93	-2.92%
VANCE	39,839	46,954.00	40,053.06	43,266.86	38,242.34	43,724.35	1.11	0.98	1.10	0.83%
WAKE*	479,271	523,880.00	539,817.04	569,621.89	542,427.42	575,618.80	1.29	1.18	*	*
WARREN	17,601	13,490.00	10,968.00	10,978.00	8,976.00	11,878.43	0.63	0.51	0.67	-6.53%
WASHINGTON	13,776	10,005.00	11,493.34	11,699.36	12,992.65	10,415.26	0.84	0.93	0.76	10.34%
WATAUGA	38,703	32,206.00	33,065.54	36,755.38	35,360.04	34,265.17	0.99	0.94	0.89	10.64%
WAYNE	108,364	111,167.00	97,852.09	106,149.38	102,716.65	94,724.72	1.00	0.96	0.87	12.44%
WILKES	61,086	92,978.00	57,629.50	58,817.60	62,581.61	43,375.52	0.97	1.04	0.71	27.11%
WILSON	67,116	108,637.00	117,122.46	120,870.35	121,443.14	124,457.17	1.82	1.82	1.85	-1.93%
YADKIN	32,107	25,800.00	20,508.45	20,778.78	22,529.86	11,906.31	0.67	0.71	0.37	44.64%
YANCEY	15,695	15,648.00	15,465.38	15,576.12	9,725.43	10,955.65	1.01	0.62	0.70	30.85%
						-				
TOTAL	6,949,095	7,161,455.00	6,822,890.35	7,257,428.09	6,890,818.15	7,056,805.18	1.08	1.01	1.02	5.69%

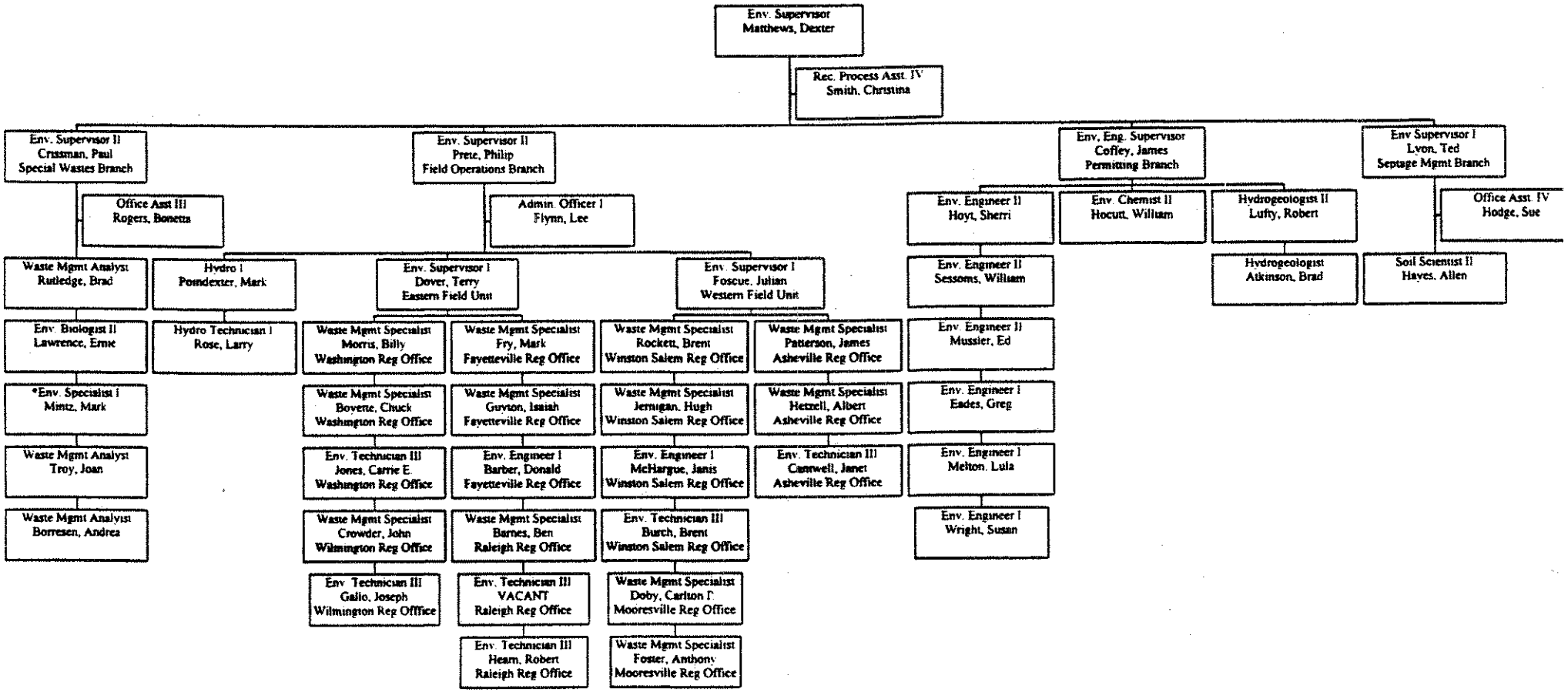
*see list of counties using alternative base year

**Waste reduction formula: (base year per capita minus current year per capita) divided by base year per capita

7,620,672.73

APPENDIX B-2 cont.: COUNTIES USING APPROVED ALTERNATIVE BASE YEARS, FY 1993-94

COUNTY	BASE YEAR POPULATION	POPULATION FY 93-94	ALTERNATIVE BASE YEAR TONNAGE	MSW TONS DISPOSED FY90-91	MSW TONS DISPOSED FY91-92	MSW TONS DISPOSED FY92-93	MSW TONS DISPOSED FY93-94	ALTERNATIVE BASE YEAR PER CAPITA	DISPOSAL RATE FY 93-94	% WASTE REDUCTION FY 93-94
ALAMANCE (FY89-90)	106,956	112,523	117,861.83	99,742.00	90,510.91	77,599.29	93,141.66	1.10	0.83	24.88%
BUNCOMBE (FY88-89)	173,198	182,267	157,660.00	192,476.00	142,041.61	152,762.69	152,397.96	0.91	0.84	8.15%
CATAWBA (FY89-90)	118,427	122,627	179,351.00	131,201.00	129,948.00	136,462.83	144,538.66	1.51	1.18	22.17%
CHATHAM (90-91)	38,759	41,049	34,315.00	33,100.00	31,209.00	30,109.23	31,919.95	0.89	0.78	12.17%
CRAVEN (FY90-91)	81,715	83,964	98,536.00	97,402.00	77,355.31	69,274.99	54,861.07	1.21	0.65	45.82%
DUPLIN (FY90-91)	39,976	41,426	48,900.00	48,900.00	32,213.65	30,709.73	31,306.58	1.22	0.76	38.22%
DURHAM (FY88-89)	171,483	189,171	224,196.00	218,210.00	210,104.06	195,038.13	209,860.73	1.31	1.11	15.15%
FORSYTH (FY88-89)	266,353	271,680	357,474.00	278,242.00	278,824.06	286,079.05	320,279.19	1.34	1.18	12.16%
MECKLENBURG (89-90)	499,711	547,982	695,214.00	650,910.00	601,055.45	617,277.17	747,434.81	1.39	1.36	1.96%
NEW HANOVER (88-89)	116,954	130,590	168,504.00	159,849.00	149,582.43	151,075.83	165,651.48	1.41	1.27	9.92%
PASQUOTANK (FY90-91	31,368	32,684	32,081.00	32,081.00	28,236.53	29,647.20	28,031.72	1.02	0.86	16.14%
WAKE (FY 88-89)	388,502	479,271	544,520.00	523,880.00	539,817.04	542,427.42	575,618.80	1.40	1.20	14.31%
TOTAL	1,644,900	2,235,234	2,114,092.83	1,942,113.00	1,771,081.01	1,776,036.14	2,555,042.61	1.29	1.14	



*Solid Waste Trust Fund

Department of Environment, Health, and Natural Resources

Office of Waste Reduction

April 10, 1995

Fund 1615