

# North Carolina Recycling Coordinators Training Course



# 1996 Participants Manual

Presented by...  
The NC Division of Pollution  
Prevention and Environmental Assistance  
Department of Environment, Health, and  
Natural Resources  
James B. Hunt Jr., Governor  
Johnathan B. Howes, Secretary





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**Welcome**

**Session 1            The NC Picture**

Solid waste legislation and policy, integrated waste management, and the role of waste reduction

**Session 2            Program Planning**

Setting goals, determining target materials and sources, program planning, estimating recovery, implementing strategies, and evaluating programs

**Session 3            Source Reduction**

Strategies for reducing the residential and non-residential waste stream at the source

**Session 4            Yard Waste**

Regulations, composition of yard waste, collection and processing options, product marketing, and distribution strategies

**Session 5            Program Costs and Financing**

Full cost determination, program cost considerations, and financing mechanism

**Session 6            Markets**

The importance of markets, evaluating market options, market development, and recycled product procurement

*Daily Evaluation*

November 20

**Session 7            Residential Recovery**

Recovery requirements, evaluating recovery options, and related issues

**Session 8            Processing**

Processing requirements, evaluating options, equipment and facility design, and mixed waste processing

**Session 9            Education**

Planning public education campaigns and promotion and education methods

**Session 10          Working With the Private Sector**

Opportunities for private sector involvement, guidelines for selecting vendors, and private sector roles

**Session 11          Local Policy**

Evaluating options and issues associated with mandatory participation ordinances, disposal bans, flow control, and other policy measures

*Daily Evaluation*

November 21

**Session 12          How to Conduct a Commercial Solid Waste Audit**

Participants will learn to assess the commercial waste stream through classroom instruction along with a site visit at Cooper Tools in Apex, N.C.

**Charlotte Hilton, at University Place  
Charlotte, N.C.  
December 2 - 5**

December 2      Recycling Facility Tour. FCR, Inc.

December 3

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### ***Douglas R. Bonds***

Doug Bonds has been employed by the East Carolina Vocational Center (ECVC) for the past 23 years and has been involved with recycling initiatives with ECVC since 1974. Doug has developed a system to recover white office and computer paper for Pitt County, worked with Camp Le Jeune on the early stages of its recycling program, and was instrumental in developing the contractual arrangements with Pitt County and ECVC to run a materials recovery facility. Currently, Doug oversees the marketing and quality aspects of the ECVC facility.

Doug is a graduate of East Carolina University.

### ***Sandi Childs***

Sandi Childs is currently the Eastern Regional Director for the National Association for Plastic Container Recovery (NAPCOR). Sandi works to increase the supply of PET bottles by providing promotional materials and incentives to communities.

Formerly, Sandi served as recycling manager for Southeastern Container, Inc., in Enka, N.C. She provided technical, marketing, educational, and promotional assistance to enable communities to recycle PET plastic soft drink bottles. She worked with Coca-Cola™ bottlers and communities across the southeast from Virginia to Mississippi. Sandi purchased recovered plastic bottles from community recycling centers for Southeastern Container's warehouse, where they were baled and resold to end users. Previously, she worked as solid waste program planner for the Land-of-Sky Regional Council in Asheville. Sandi is the current vice-president, a past president, and one of the original founders of the North Carolina Recycling Association. She also served for four years on the Board of Directors of the National Recycling Coalition (NRC).

Sandi has an M.S. in Environmental Management and Protection from the University of North Carolina-Chapel Hill and a B.S. in Human Ecology from Ramapo College of New Jersey.

### ***Beth Graves***

Beth Graves is a Waste Management Analyst with the N.C. Division of Pollution Protection and Environmental Assistance (DPPEA). Beth is responsible for providing technical assistance to local governments and businesses on waste reduction and waste management programs and for research and materials development support. Currently, Beth is a Board Member of the North Carolina Recycling Association and serves on the steering committee of the N.C. Composting and Organics Recycling Council (NCCORC). Prior to joining DPPEA Beth worked for SunShares in Durham on research into mixed paper and wastewater sludge composting.

Beth holds a B.A. in Economics from Duke University.

### ***Kim Henley***

Kim Henley has worked for the past two years at the North Carolina Recycling Association (NCRA), a non-profit organization established to conserve resources through recycling and waste reduction. She coordinates the NCRA's annual conference and exhibition; assists in the development, logistics and coordination of this Recycling Coordinators Training Course; and is managing editor of publications. Prior to joining NCRA's staff, Kim worked in the hospitality industry for 13 years.

Kim has a B.A. in Journalism from the University of North Carolina-Chapel Hill.

***Scott B. Mouw***

Scott Mouw is Chief of the Community and Business Assistance Section of the Division of Pollution Prevention and Environmental Assistance (DPPEA). Previously he was the Technical Assistance Supervisor for the Solid Waste Reduction Program of DPPEA providing waste reduction technical assistance to local governments, businesses, and industries. He also oversees the activities of North Carolina's Recycling Business Assistance Center (RBAC). He is a former member of the North Carolina Recycling Association's Board of Directors and sits on the Advisory Board for the Southeast Waste Exchange. Previously, Scott was the Solid Waste Manager for Franklin County, N.C., where he supervised of the disposal, collection, and waste reduction programs. He was the county representative on the Regional Solid Waste Committee and administered an industrial compost demonstration project.

Scott has a M.A. and a M.P. from the University of North Carolina-Chapel Hill and a B.A. from the University of Illinois.

***Norma Murphy***

Norma Murphy is an Environmental Chemist with the Outreach and Training Section of the Division of Pollution Prevention and Environmental Assistance. She provides technical training on waste reduction to representatives of industry, state/local governments, and commercial facilities. Prior to joining DPPEA, Norma worked for the Division of Air Quality for three years in the Toxics Protection Unit and Ambient Monitoring Section. Before coming to state government, she was an EPA contractor for the Office of Air Quality Planning and Standards.

Norma has a BS in chemistry from Meredith College. She is a member of CAPCA and the Sierra Club.

***Larry Parks***

Larry Parks is a planner for the Centralina Council of Governments in Charlotte, N.C. He is responsible for planning community development block grants and technical assistance to local governments in an eight-county region. In addition, Larry was a private building contractor in Granite Quarry; vice president of the Willion J. Ash Cooperation in Denver; assistant vice president of Property Management for Stuart R. Scott & Associates, Colorado Springs; and vice president for EDI Real Estate Services for Environmental Developers, Ind., Aurora, Colorado.

Larry has a B.A. in Business Administration from Pfeiffer College and has completed graduate level courses at Winthrop College, Rock Hill, S.C.

***Ron Pridgeon***

Ron Pridgeon joined the N.C. DPPEA as an Environmental Engineer in 1991. His primary responsibilities include training and technical assistance to North Carolina industries in pollution prevention and environmental project management. He has prior experience with Masonite Corporation where he worked in industrial engineering and environmental project management.

Ron has a B.S. in Industrial Engineering from North Carolina State University.

***Philip J. Prete***

Philip J. Prete is the Head of the Field Operations Branch of the Division of Waste Management's Solid Waste Section in DEHNR. As such, he oversees statewide programs for compliance monitoring, enforcement, groundwater monitoring, and remediation at solid waste management facilities; control and enforcement of illegal dumping, and response to citizen complaints. Prior to joining the Section, Phil was founder and President of Prete Wilmot Associates, Ind., a solid waste management and recycling consulting firm based in Durham. Prior to forming Prete Wilmot Associates, he was Principal Scientist with Hazen and Sawyer, P.C., a Raleigh-based, environmental engineering and science firm



where he provided solid waste management planning and implementation assistance. He was also the first Waste Reduction and Recycling Officer at the University of North Carolina at Chapel Hill.

Phil is a Registered Environmental Professional (R.E.P.) He has a M.S. in Public Health from the Department of Environmental Sciences and Engineering at the University of North Carolina, at Chapel Hill and a M.S. in Biology with a concentration in Ecology from North Texas State University. Phil is a founding Director and has chaired the policy committee of the North Carolina Recycling Association. He is a member of the National and North Carolina Associations of Environmental Professionals, the National Recycling Coalition, and the Solid Waste Association of North America.

### ***Will Sagar***

For the past 7 years Will Sagar has been with Transylvania County as the Solid Waste Director, and has worked to implement a unit pricing program for rural waste collection. This program is almost two years old and has resulted in significant waste reduction. Will has also constructed North Carolina's third county-operated, lined landfill. Along with serving on several committees, including the Rural Council and the Policy Committee of the North Carolina Recycling Association (NCRA), Will served for four years as a board member and was President of the NCRA in 1995-1996. He has also served as an officer for the Western North Carolina Solid Waste Association and is a member of the Solid Waste Association of North America.

Will graduated from the University of North Carolina-Chapel Hill where he majored in Economics and Mathematics.

### ***Barbara Satler***

Barbara Satler is a Waste Management Analyst at the N.C. Division of Pollution Prevention and Environmental Assistance (DPPEA) where she is responsible for training and outreach activities. Barb has coordinated, revised, and managed the Recycling Coordinators Training Course for the past 4 years. Before joining DPPEA, she was the curbside recycling coordinator for the Town of Cary at SunShares in Durham and coordinated the education and training of over 650 volunteers in Cary's recycling block leader program. That program received a Take Pride in America award in 1991. Barbara recently served as Secretary of the Board of Directors for the North Carolina Recycling Association and is an active member of the N.C. Household Hazardous Waste Council. Barbara is also a member of the National Recycling Coalition and serves on a HHW task force with the Southern States Energy Board.

Barbara has a B.A. in Graphic Design from Meredith College.

### ***Cary S. Saul***

Cary Saul serves as Assistant Director of the Mecklenburg County Engineering and Building Standards Department in Charlotte, N.C. Cary is responsible for the county's Solid Waste Management programs. He is a member of the Solid Waste Association of North America, the American Public Works Association, the National Recycling Coalition, and the North Carolina Recycling Association.

Cary has a M.S. in Environmental Engineering from Duke University and a B.A. in Biology from Pfeiffer College.

### ***Michael Shore***

Michael Shore works as an analyst for the N.C. Division of Pollution Prevention and Environmental Assistance where he concentrates on integrating economic issues with waste reduction and recycling efforts. He has previously taught environmental management courses at a college in the Czech Republic and has served as the recycling coordinator in Chatham County, North Carolina.

Michael has a M.A. in Environmental Science & Engineering from the University of North Carolina at Chapel Hill.



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## The North Carolina Picture

### Session Preview

In this session, participants will be given a brief overview of the regulatory framework for waste reduction and recycling in North Carolina and of their organizations' roles and responsibilities in helping North Carolina achieve its 40-percent waste reduction goal by 2001.

This session will also introduce participants to the state agencies involved in implementing NC solid waste law and identify the roles and programs of each agency. Appropriate telephone numbers and contacts are provided for future reference.

Participants will also be introduced to the concept of integrated solid waste management and the critical role waste reduction plays in an integrated system.

### Overview of State Solid Waste Reduction Efforts

Where is North Carolina headed in its efforts to reduce the solid waste stream by 40 percent by the year 2001? What has the State as a whole, as well as State government, accomplished since the Solid Waste Management Act of 1989 (Senate Bill 111) was enacted? What are the major provisions in North Carolina Solid Waste Law? Where will legislative changes since 1989 take us?

### State Legislation, Roles, and Local Impact

In 1989, the North Carolina General Assembly adopted SB (Senate Bill) 111, an "Act to Improve the Management of Solid Waste," which dramatically changed the course of solid waste management in the State. The Act set goals and policies, established new programs, banned certain materials from landfills and incinerators, and mandated planning and reporting requirements. The Act was significantly amended by HB 1109 in 1991 and in 1996 by HB 859. Further, the State adopted solid waste disposal rules and regulations that are consistent with US Environmental Protection Agency's (EPA's) "Subtitle D" regulations, as required by the Federal Resource Conservation and Recovery Act (RCRA).

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**Highlights of NC Statutory Requirements**

● **Solid Waste Management Hierarchy (G.S. 130A-309.04 (a))**

1. Waste Reduction at the Source
2. Recycling and Reuse
3. Composting
4. Incineration with Energy Recovery
5. Incineration for Volume Reduction
6. Landfill Disposal

● **Waste Reduction Goals (G.S. 130A-309.04(c))**

**State goal:** 40 percent on a per-capita basis by June 30, 2001

**Local goals:** Good faith effort to achieve state's 40% goal

Shall develop a goal for waste reduction by June 30, 2001

Shall develop a goal for further waste reduction by 2006

● **Solid Waste Management Reporting**

- 1) Local Government Annual Reports (G.S. 130A-309.09 A (d)): Counties and municipalities are required to report to the state on solid waste management activities by **September 1** each year.
- 2) Solid Waste Management Facility Reports (G.S. 130-A- 309.09 A (d)): All solid waste *disposal* facilities (i.e., MSW landfills and incinerators) are required to report to the state their disposal tonnages by **August 1** of each year.
- 3) Private Facility Reports (G.S. 130A- 309.09D (b)): All owners or operators of privately owned solid waste management facilities are required to report to the state by **August 1** of each year.

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- 4) State Agency Recycled Products Purchasing (G.S. 143-58.2(f)): All State departments, institutions (state universities, hospitals, etc.), agencies, community colleges, and local school administrative units are required to report to the state by **October 1** of each year the amounts and types of materials and supplies purchased with recycled content.
  
- 5) State Agency Waste Reduction Reports (Executive Order No. 8)\*: All State agencies, departments, institutions (state universities, hospitals, etc.), and community colleges are required to report to the state on their solid waste reduction activities by **October 1** of each year.

\* Note that this reporting requirement is not mandated by statute (i.e., through legislation) but is mandated by Executive Order of the Governor.

- **Solid Waste Management Planning**

State Planning (G.S. 130A-309.06)

The State must prepare a statewide solid waste management plan by May 1, 1991, and update it every three years; the most recent plan was completed in February 1992.

Local Planning (G.S. 130A-309.09A (b))

**Counties** must prepare county solid waste management plans consistent with the State plan.

**Municipalities** must cooperate with preparation of county plans or prepare their own plan.

**Industries that operate their own industrial waste disposal facility on-site** are required to prepare a 10-year waste management plan.

**Individual businesses, industries, and institutions that do not have an on-site disposal facility currently** are not required to develop solid waste management plans by State law. Waste generated and managed by these organizations, however, will be considered under the umbrella of a city or county plan.

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### Management of Discarded White Goods GS. 130A-309.81 (c)

Counties must establish written procedures for the management of white goods. Plans for this procedure have been submitted to the Division of Solid Waste Management.

#### ● Disposal Bans

State law requires that the following items are *banned from disposal in landfills*:

<u>Item and Statute</u>	<u>Date of Implementation</u>
● Used Oil (G.S. 130A - 309.15. (a)(3))	October 1, 1990
● White Goods (Appliances) (G.S. 130A - 309.10 (f)(4).)	January 1, 1991
● Yard Trash (G.S. 130A - 309.10.(f)(3))	January 1, 1993
● Antifreeze (ethylene glycol) (G.S. 130A - 309.10(f)(5))	July 1, 1994
● Aluminum cans (G.S. 130A - 309.10.(f)(6))	July 1, 1994
● Scrap (whole) Tires (GS. 130A-309.51)	March 1, 1990
● Lead-Acid Batteries (GS. 130A-309.70)	January 1, 1991

State law requires that the following items are *banned from disposal in MSW incinerators*:

<u>Item and Statute</u>	<u>Date of Implementation</u>
● Antifreeze (ethylene glycol) ( G.S. 130A - 309.10 (f1)(1))	July 1, 1994
● Aluminum cans (G.S. 130A - 309.10 (f1)(2))	July 1, 1994
● Steel cans, unless the steel is recoverable at the end of the incineration process (G.S. 130A - 309.10 (f1)(3))	July 1, 1994
● White goods (.appliances) (G.S. - 130A 309.10 (f1)(4))	July 1, 1994
● Lead-Acid Batteries (GS. 130A-309.70)	January 1, 1991

Current North Carolina Solid Waste Management Rule 15A NCAC 13B.0103 (c) prohibits waste that may pose a threat to the environment or the public health, as determined by the Division, from disposal at a solid waste disposal sites. Examples of wastes excluded from North Carolina landfills through Waste Determinations and Rules include petroleum-contaminated soils; free liquids as defined in EPA paint filter test; polychlorinated biphenyl (PCB)wastes of 50 ppm or greater content; and paint overspray waste.

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### Product Bans and Labeling Requirements:

State law (G.S. 130A-309.10) requires that certain products meet the following statutory requirements:

- **Plastic bags:** As of January 1, 1991, must be recyclable.
- **Expanded polystyrene food containers:** Must be recyclable.
- **Rigid Plastic containers:** Must be labeled according to resin types as of July 1, 1991. (G.S.130A-309.10.(e)) "The numbers and letters shall be as follows:
  - (1) For polyethylene terephthalate, the letters "PETE" and the number 1.
  - (2) For high density polyethylene, the letters "HDPE" and the number 2.
  - (3) For vinyl, the letter "V" and the number 3.
  - (4) For low density polyethylene, the letters "LDPE" and the number 4.
  - (5) For polypropylene, the letters "PP" and the number 5.
  - (6) For polystyrene, the letters "PS" and the number 6.
  - (7) For any other, including multi-material containers, the letters "OTHER" and the number 7.

## Solid Waste Reduction Roles of State Agencies

### NC Department of Environment, Health, and Natural Resources

#### *Division of Waste Management*

The Division of Solid Waste Management comprise three sections: the Hazardous Waste Section, the Superfund Section, and the Solid Waste Section.

The Solid Waste Section (SWS) is a regulatory agency and, as such, is responsible for all permitting, enforcement, compliance, and other regulatory functions concerning State solid waste law. The SWS has a total staff of 48 including 22 staff members located in DEHNR's seven regional field offices across the state (See SWS Field map at the end of this section). Its main components are the Permitting Branch, the Field Operations Branch, the Land Application and Composting Branch, and the Special Wastes Branch (See SWS Organizational Chart at the end of this section). For more information, call the SWS at (919) 733-0692.

The SWS is responsible for all solid waste rulemaking and enforcement activity as required by statute and submits proposed rules for adoption to the NC Commission for Health Services.

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To carry out its responsibilities, the SWS is divided into four branches.

**Permitting Branch:** The Permitting Branch has two primary functions:

- 1) To provide a statewide permitting program for all solid waste management facilities to ensure that these facilities are sited, designed, and constructed in accordance with the rules; and
- 2) To provide a waste characterization and management program to ensure the proper management of solid waste, primarily industrial waste, including proper beneficial reuse and structural fill activities.

**Special Wastes Branch:** The key responsibility of the Special Wastes Branch is to develop guidelines and regulations for special wastes and to provide program development and statewide assessment of program implementation regarding comprehensive solid waste management programs. The Branch has planning, reporting, and regulatory development responsibilities in special waste management.

**Land Application and Composting Branch:** Key responsibilities of the Land Application and Composting Branch are to develop and implement programs for the management of septage, land application, and composting of solid waste. The branch provides septage hauler registration, septage land application site permits, siting of septage, technical assistance in preparation of applications, review and approval of compost demonstration projects, registration of yard waste processing projects, and development of rules regarding land application and composting.

**Field Operations Branch:** The key responsibility of the Field Operations Branch is to ensure compliance with statutes, rules, and permit conditions. The branch inspects and initiates enforcement actions for noncompliance and against unpermitted, illegal dump sites. A significant function of the Branch is to respond to citizen complaints regarding alleged illegal solid waste disposal activities, to conduct investigations, and to initiate action to halt illegal activities and accomplish compliance. As a major tool to aid in achieving compliance and maximizing the use of existing disposal capacity, this branch provides technical assistance in all aspect of integrated solid waste management including planning and implementing waste reduction and recycling, and composting programs; operational



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assistance and training; and implementing sound solid waste management practices in general.

The Field Operations Branch's eastern and western field units have responsibility to implement field evaluations for compliance with the solid waste management rules while providing direct communication and assistance to local governments, industries, private citizens, and technical consultants.

In addition, the Field Operations Branch maintains a central office unit responsible for monitoring field activities to assess consistency in response, tracking compliance and enforcement activities, establishing policies and priorities, and coordinating all compliance and enforcement actions. In addition to these primary functions, the central office is responsible for overseeing, special tax treatment of recycling and resource recovery equipment and facilities, groundwater assessment and remediation guidance, monitoring and enforcement, and financial assurance compliance.

#### *Division of Pollution Prevention and Environmental Assistance*

On July 1, 1996, the Office of Waste Reduction was given divisional status and changed its name to **The Division of Pollution Prevention and Environmental Assistance (DPPEA)**. DPPEA is a **non-regulatory** agency that provides free technical assistance, education, and training on methods to eliminate, reduce or recycle wastes before they become pollutants or require disposal. The DPPEA comprises five main programs: the Community and Business Assistance Section (CBAS), the Industrial Section, the Outreach and Training Program, the Office of Small Business Ombudsman (OSBO), and the Environmental Permit Information Center (EPIC) (see organizational chart at the end of this section). All programs are involved in solid waste issues. For more information, call DPPEA at (919) 715-6500 or 1-800-763-0136.

One of the goals of the **DPPEA** is to help North Carolina achieve its 40-percent solid waste reduction goal by 2001 by building a strong recycling infrastructure and encouraging the development of new recycling markets.

**The Community and Business Assistance Section** comprises two main branches: the Technical Assistance Branch (TAB) and the Recycling Business Assistance Center (RBAC). The TAB provides on-site technical assistance to communities and businesses on solid waste reduction and recycling issues. In addition to sponsoring

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workshops and training courses, the TAB also produces a variety of publications including fact sheets, technical manuals, and directories.

The **RBAC** provides marketing assistance for recyclable materials, locates markets for recyclable materials, works with companies to utilize recycled materials in lieu of virgin materials, assists existing recycling facilities to expand capacity and locate supplies of recyclable materials, and supports and works in conjunction with the Department of Commerce in the recruitment of recycling industries.

Created in 1983, the **Industrial Section** (formerly known as the Pollution Prevention Program) was one of the first state programs of its kind in the country. The Industrial Section addresses waste in all media (air, water, and land) including air emissions, waterborne pollutants, toxic chemicals, and hazardous and solid waste. This program provides businesses and industries with free, non-regulatory technical assistance, often through intensive site visits and detailed reports that recommend ways the facility can reduce or eliminate the waste it generates.

The **Outreach and Training Program** coordinates the development and presentation of training and workshops for OWR. Training is provided on a wide range of topics from general information about waste reduction to technical presentations on industry- or process-specific techniques and technologies.

The **Office of Small Business Ombudsman (OSBO)** provides confidential environmental assistance to small business on air quality and related state and federal requirements. Services include permit assistance; on-site technical assistance; a toll-free hotline; and publication of fact sheets, checklists, and other guides to help businesses understand the environmental rules that affect them. This office is an advocate for small business in the regulatory process and sponsors compliance workshops and training.

Within the OSBO is the **Environmental Permit Information Center (EPIC)**. EPIC works with customers to determine the environmental permits they may need and provide the specific contacts in the appropriate permitting agencies. EPIC will also provide information packets tailored to individual requests.

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#### **Solid Waste Management Roles of Other State Agencies**

##### **NC Department of Administration (DOA) (919) 733-9571**

- **Division of Auxiliary Services:** Manages recycling operations at State Surplus Property for confidential paper shredding and recycling.

**Division of Purchase and Contract:** Collaborates with DPPEA and others offices on recycled product procurement and actively supports North Carolina's Buy-Recycled Campaign; has specific requirements under 1993 recycled product procurement legislation (Senate Bill 58 - 1993 Legislative Session).

- **Division of Facility Management:** Oversees the state contract for Raleigh area office paper and aluminum can recycling program as well as recycling of corrugated cardboard, wooden pallets, and other materials for the state government complex in downtown Raleigh.

##### **NC Department of Commerce (DOC) (919) 733-4692**

Collaborates with OWR on recycling market development through the NC Recycling Business Assistance Center (RBAC).

##### **NC Department of Public Instruction (DPI) (919) 733-3813**

Responsible for developing recycling guidelines for the NC public school system.

##### **NC Department of Transportation (DOT) (919) 733-9150**

Has specific responsibilities related to compost utilization in highway construction. Initiated a Recycling and Solid Waste Utilization Task Force to examine the use of recycled products and solid waste materials in highway projects; also conducted numerous demonstration projects utilizing rubberized asphalt, plastic lumber, ash in concrete, and other commodities in DOT construction projects.

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#### State Funding for Solid Waste Management

- **Solid Waste Management Trust Fund** was created by the passage of the Solid Waste Management Act of 1989 (SB 111) and is funded by a fee on the sale of new tires, a tax on the sale of new white goods, and a tax on virgin newsprint. The purpose of the Trust Fund is to provide 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.

Solid Waste Reduction Assistance Grants cover all facets of recycling and waste reduction; for example, expansion of recycling programs to increase capability to accept more materials for recycling and development of regional processing centers and community education programs. Included at the end of this session is an NC DPPEA (formerly Office of Waste Reduction) "OWRalert" that identifies the grantees from the 1995 Recycling Assistance Grants cycle. The Recycling Assistance Grants cycle is generally in the Spring of each year, and grant awards are made in June.

Research and Education Projects are undertaken in partnership with universities, other state agencies, non-profit organizations, and individuals to research, develop and disseminate vital information in the areas of recycling and waste reduction education and research.

- **DPPEA Challenge Grants** help North Carolina industries and businesses develop and implement innovative programs that will eliminate, prevent, and/or reduce the generation of waste. This waste can be in any media: wastewater discharges, air emissions, toxic and/or hazardous waste, and industrial solid waste. Financial assistance in the form of matching grants up to \$20,000 is offered to industries, businesses, and trade associations. Since 1985, the Industrial Section (formerly the Pollution Prevention Program) has funded over 108 projects through this public/private partnership for a total combined investment in the environment of nearly \$1 million.
- **Solid Waste Revolving Loan Program** was established to provide low-interest loans to qualified local governments for eligible solid waste management projects (see 15A, NCAC 13B Section 1000). To date, the N.C. General Assembly has not provided funding for this program.

## —Session 1—

### **The North Carolina Picture**

- **NC Scrap Tire Disposal Account** provides funds for cost overruns for county scrap tire management programs and funds for clean up of illegal scrap tire sites.
- **NC White Goods Management Account** provides grants to counties for white goods management programs. Eligible activities include cost overruns for existing programs, capital expenses for development of an infrastructure for recycling scrap metal, and expenses for clean up of illegally dumped white goods.

### **State Incentives for Waste Reduction**

- **Recycling Tax Credit for Recycling and Resource Recovery Facilities** (G.S. 130A - 294 (a) (3)) is available to businesses and industries that purchase or construct facilities or equipment used exclusively for recycling or resource recovery. Special treatment may be available for the following types of taxes:
  - \* Real and personal property tax
  - \* Corporate state income tax
  - \* Franchise tax on domestic and foreign corporations

The Recycling Tax Credit program is administered by the NC Division of Solid Waste Management. For more information, call Lee Flynn at (919) 733-0692.

# —————Session 1—————

## The North Carolina Picture

### **Integrated Solid Waste Management: An Overview**

The Measurement Standards and Reporting Guidelines of the National Recycling Coalition define integrated solid waste management as “the complimentary use of waste management practices to safely and effectively handle the municipal solid waste stream with the least adverse impact on human health and the environment.”

More simply, integrated solid waste management occurs by approaching solid waste management as a *system* and integrating all waste management options through a simple formula:

- 1. Reduce the amount of waste generated and thus eliminate the need for managing the waste in the first place; then**
- 2. Recycle/Reuse/Compost everything possible; then**
- 3. Recover energy from the remaining combustible materials where feasible; then**
- 4. Bury the remaining non-combustibles and ash in an environmentally controlled landfill if they cannot be used.**

The formula can be modified to suit the special needs of the community or organization responsible for managing the waste stream, taking into consideration available resources and social and political considerations. Historically, this formula has not been used. But as true costs of traditional solid waste management practices become known, decision-makers are looking for cost effective and environmentally sound alternatives to take the place of disposal options alone.

This conceptual change is the essence of integrated solid waste management. Care must be taken to plan waste management options as parts of a complex, interrelated system. Changing one component of the system generally causes a change in one of the other components in the system. For example:

- Recycling can substantially reduce the need for disposal capacity but generally requires changes in collection procedures.
- A reduction in the amount of waste generated will reduce landfill or incinerator needs but may also reduce revenues of recycling businesses, non-profit organizations, and local governments that rely on the revenues for program support.

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### The North Carolina Picture

- Incineration will greatly reduce the volume of waste needing land disposal, but the residue ash may need expensive disposal as a hazardous waste.

### Integrated Solid Waste Management and the Solid Waste Management Hierarchy Established by N.C. Law

Are integrated solid waste management and North Carolina's hierarchy of solid waste management the same? Not necessarily!

- A waste management hierarchy refers to a policy decision to prioritize various waste management techniques according to criteria related to environmental and human health protection and resource conservation. The North Carolina General Assembly established the hierarchy as a standard of conduct for the entire state. However, local situations may render certain options unfeasible (e.g., most communities will not rely on MSW incineration as a waste management option because of the cost), and localities will alter their solid waste management *systems* accordingly.
- Many agree that integrated waste management implies the application of a hierarchy. It also implies integration of programs and infrastructure within the overall solid waste management department as well as across departmental lines as dictated by use of funding, personal, and other resources.

### The Role of Waste Reduction in Integrated Solid Waste Management

Waste reduction is defined in the NC State Recycling and Solid Waste Management Plan as any treatment or diversionary action which keeps material out of the solid waste stream destined for disposal.

The NC Solid Waste Management Act gives preference to waste reduction occurring at the source ("source reduction") or through reuse, recycling, and composting over incineration and landfilling technologies. The Act also establishes a statewide goal of 40-percent solid waste reduction by June 30, 2001.

While local governments are the primary target of expressed goals and mandates in the law, every generator of solid waste (i.e., every household, school, church, hospital, business, industry, community, etc.) plays an important role in helping the city/county in which they are located to meet the state's 40-percent reduction goal. Consequently, a change in a solid waste

## **Session 1**

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management practice in one area almost always affects the solid waste situation in another (neighboring) area. For example, a significant reduction in solid waste by a major generator resulting from implementation of an aggressive source reduction or recycling program can greatly influence a city's or county's progress toward meeting its waste reduction goals.

### **Wrap-Up**

To make certain that all aspects of solid waste management are integrated, a local program coordinator should determine the effects of each proposed solid waste management program component on the existing system and on other elements of the proposed waste management strategy. The next several sessions will address these various aspects of waste reduction in greater detail.





# Major Provisions of North Carolina Solid Waste Management Legislation

## North Carolina Solid Waste Management Hierarchy

*G.S. 130A-309.04(a)*

1. Waste Reduction at the Source
2. Recycling and Reuse
3. Composting
4. Incineration with Energy Recovery
5. Incineration without Energy Recovery
6. Disposal in Landfills

## Waste Reduction Goal

*G.S. 130A-309.04(c)*

- 40% reduction in waste disposed on a per-capita basis by June 30, 2001.

## Solid Waste Management Reporting

*G.S. 130A-309.09(d)*

- Counties and municipalities are required to report on solid waste management activities by September 1 of each year.

*G.S. 130A-309D*

- Private solid waste management facilities must report on waste management practices by August 1 of each year.

## Solid Waste Management Planning

*G.S. 130A-309.07*

- State must prepare State Solid Waste Management Plan by May 1, 1991, and update it every three years (final plan completed in February 1992).

*G.S. 130A-309.09(a)*

- Each local government must prepare a ten-year solid waste management plan that is consistent with the State plan and that makes a "good faith effort" to achieve the State's 40-percent reduction goal. The plan must be developed with public participation that includes at least one public hearing. Local governments may join to write a regional or multi-jurisdictional plan. Plan updates are required every three years.

## Funding for State and Local Solid Waste Management Programs

*G.S. 130A-309.12*

- **Solid Waste Management Trust Fund.** The Fund is financed through a 2% fee on the sale of new tires in the State, a \$5- to \$10-fee on new white goods, and a tax on virgin newsprint. The majority of the revenues is given to NC counties to pay for scrap tire and white goods management. Five percent (5%) of tire and white goods fees and all the virgin newsprint tax money go to the Solid Waste Management Trust Fund. These moneys are used to fund technical assistance projects, educational activities, and the Solid Waste Reduction Assistance Grants program, which provides funding for local waste reduction and recycling programs.

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## Full Cost Determination

G.S. 130A-309.8

- All local governments shall annually determine the full cost of solid waste management within their service area for the preceding year and develop a system to provide that information to the public (*implementation of this provision will follow the development of rules by the State*).

## Disposal Bans for Landfills and Incinerators

G.S. 130A-309.10(f)

- **Whole Tires** as of March 1, 1990, banned in landfills.
- **Used Oil** as of October 1, 1990, banned in landfills.
- **Yard Waste** as of January 1, 1993, banned in landfills.
- **Aluminum Cans** as of July 1, 1994, banned in landfills or incinerators.
- **White Goods** as of January 1, 1991, banned in landfills and no incineration after July 1, 1994.
- **Antifreeze** as of July 1, 1994, banned in landfills and incinerators.
- **Lead Acid Batteries** as of January 1, 1991, banned in landfills or incinerators. (*see also G.S. 130A-309.70*)

## Responsibilities Regarding Local Material Disposal Bans and Mandatory Recycling.

- Units of local government, MSW disposal facility operators, and generators of MSW shall not knowingly dispose any type of waste material that was generated within the geographic boundaries of a local government that, in turn, has either 1) prohibited that specific waste material from disposal or 2) required that specific material to be recycled.

## Packaging/Labeling Requirements

G.S. 130A-309.10

- **Plastic bags** must be recyclable. It is the State's goal that 25% of plastic bags are to be recycled.
- **Plastic Containers** must be labeled according to resin type as of July 1, 1991.
- **Expanded Polystyrene Food Product Containers** must be recyclable as of October 1, 1991.

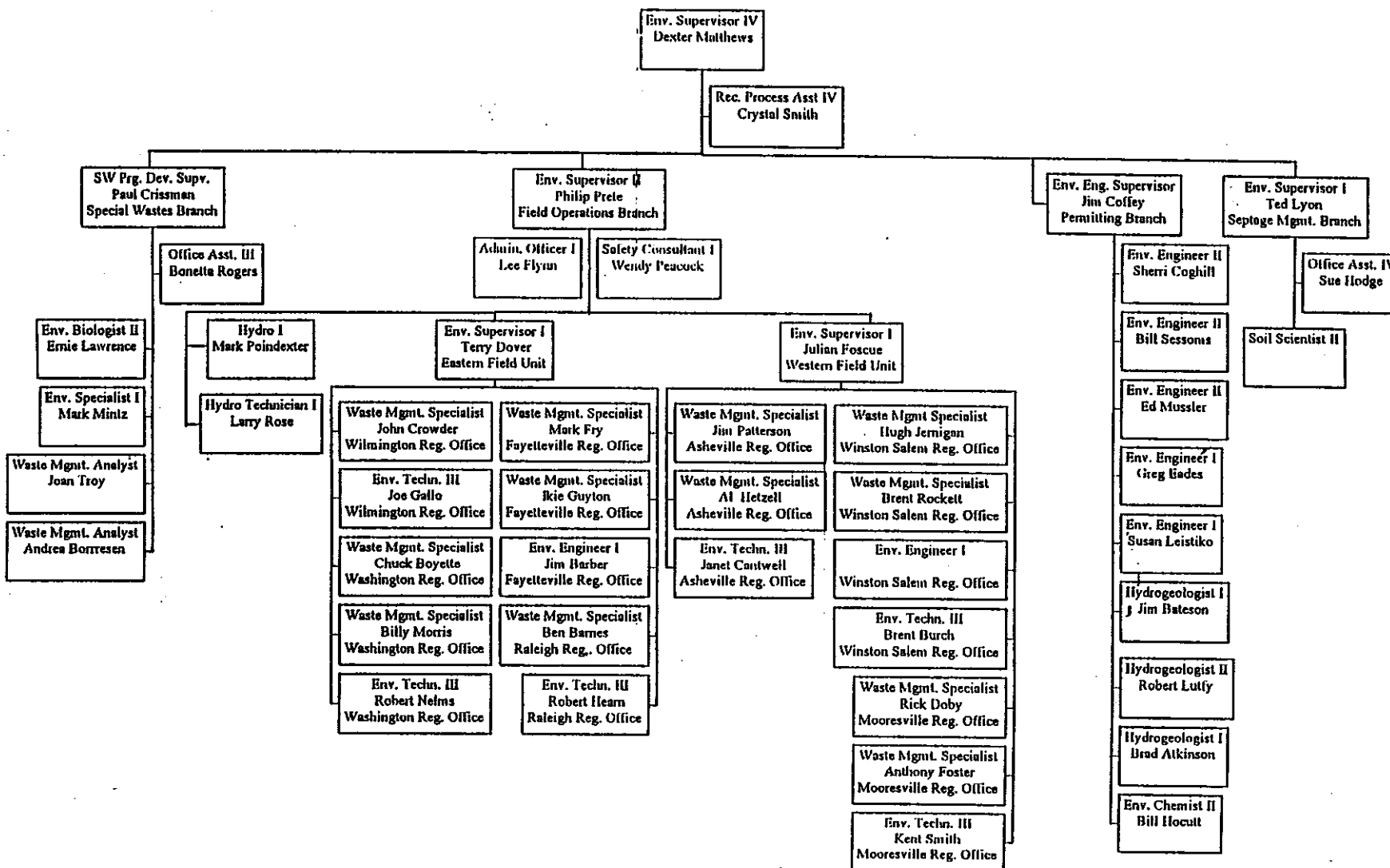
## State Agency Requirements

G.S. 130A-309.14

- All State agencies must establish recycling programs for at least high-grade office paper and corrugated cardboard by January 1, 1992.
- The Department of Environment, Health, and Natural Resources will assess markets for recyclable materials in the State by March 1, 1994, and every other year thereafter.
- All State departments, institutions, agencies, community colleges, and local school administrative units shall, where economically practical, purchase and use, or require the purchase and use of products with recycled content.
- The Department of Transportation, the Department of Administration, and all local governments are required to procure compost products where economically feasible.



*The North Carolina Division of Pollution Prevention and Environmental Assistance provides free, non-regulatory technical assistance and education on methods to eliminate, reduce, or recycle wastes before they become pollutants or require disposal. Telephone DPPEA at (919) 715-6500 or 800-763-0136 or e-mail [nowaste@pwr.ehnr.state.nc.us](mailto:nowaste@pwr.ehnr.state.nc.us) for assistance with issues in this Fact Sheet or any of your waste reduction concerns.*







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**Hydro. Technician:** Larry Rose

**Safety Coordinator:** Wendy Peacock

**Compliance Officer:** Lee C. Flynn

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**WESTERN DISTRICT ENGINEER:** Vacant, Winston-Salem Regional Office

**EASTERN DISTRICT SUPERVISOR:** Terry F. Dover, Fayetteville Regional Office

**EASTERN DISTRICT ENGINEER:** Jim Barber, Fayetteville Regional Office

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Avery, Buncombe, Burke

**Cherokee, Clay, Graham**

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**Haywood, Henderson**

Polk, Rutherford, Yancey

**Jackson, Macon, Madison**

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Cabarrus, Mecklenburg

Alexander, Catawba

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Union

Iredell, Lincoln

**ENVIRONMENTAL TECHNICIAN:** Kent Smith

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Rockingham, Stokes

Wilkes, Yadkin

Watauga

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Ikie Guyton

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Lee, Montgomery, Moore, Orange, Wake

Richmond, Robeson, Sampson, Scotland

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### **WASTE MANAGEMENT SPECIALIST:** Ben Barnes

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### **WASTE MANAGEMENT SPECIALISTS:**

Chuck Boyette

Billy Morris\*

Bertie, Camden, Chowan, Currituck, Dare

Beaufort, Craven, Greene

Gates, Hertford, Hyde, Martin, Pasquotank

Jones, Lenoir, Pamlico, Pitt, Wayne

Perquimans, Tyrrell, Washington

### **ENVIRONMENTAL TECHNICIAN:** Bobby Nelms\*

Beaufort, Craven, Edgecombe, Greene, Jones, Lenoir, Nash, Pamlico, Pitt, Wayne, Wilson

**\*Also handle the Coastal Regional Solid Waste Authority in Carteret County**

## **WILMINGTON REGIONAL OFFICE**

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### **WASTE MANAGEMENT SPECIALIST:** John Crowder

Brunswick, Carteret, Duplin, New Hanover, Onslow, Pender

### **ENVIRONMENTAL TECHNICIAN:** Joe Gallo

Brunswick, Carteret, Columbus, Duplin, New Hanover, Onslow, Pender, Sampson

## **Solid Waste Section Policy Memorandums**

- Policy Memorandum #1: Permit Applications for Sanitary Landfills (Superseded by Rules)
- Policy Memorandum #2: Disposal of Asbestos in Sanitary Landfills (Reference new NESAP 40CFR 61 Standards)
- Policy Memorandum #3: Method for Treatment of Laboratory Cultures
- Policy Memorandum #4: Copy of Memo from Mildred A. Kerbaugh, Laboratory Section to William Meyer dated March 26, 1985
- Policy Memorandum #5: Disposal of Spent Aluminum Phosphide Fumigant in Sanitary Landfills
- Policy Memorandum #6: Sanitary Landfill Permitting Procedures (Superseded by Rules)
- Policy Memorandum #7: Five-Year Interim Permitting Procedures (Superseded by Rules)
- Policy Memorandum #8: Memo from State Clearinghouse dated August 5, 1987, subject: Procedures for Complying with the State Environmental Policy Act (G.S. 113A)
- Policy Memorandum #9: Remaining Landfill Capacity (Reference Rules)
- Policy Memorandum #10: North Carolina Scrap Tire Disposal Act (Note: Reference changes in 1991 HB 1109)
- Policy Memorandum #11: Meeting the 25% Recycling Goal in SB 111
- Policy Memorandum #12: None Issued
- Policy Memorandum #13: Plastic Bag Labeling Requirements
- Policy Memorandum #14: Yard Waste Facility Requirements (Revised August 5, 1991)
- Policy Memorandum #15: Permanent Household Hazardous Waste Collection Sites at Permitted Solid Waste Management Facilities
- Policy Memorandum #16: Management of Construction, Demolition, Land Clearing, Inert, and Yard Trash Debris
- Policy Memorandum #17: Airport Safety Criteria, August 27, 1991
- Policy Memorandum #17A: Additional Airport Safety Criteria, January 15, 1992
- Policy Memorandum #18: Interim Permitting Policy for Municipal Solid Waste Landfills

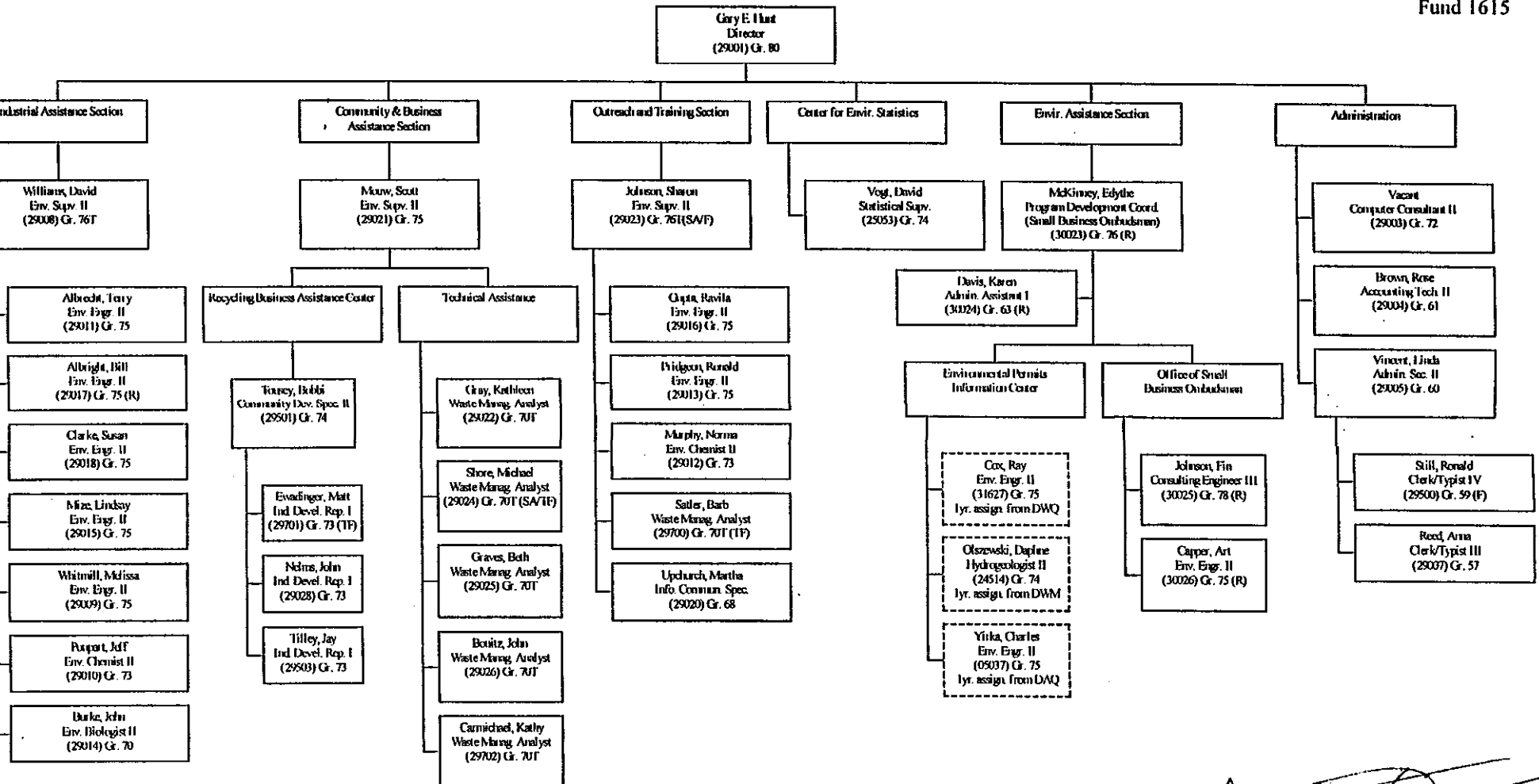




Department of Environment, Health, and Natural Resources  
 Division of Pollution Prevention & Environmental Assistance

August 7, 1996

Fund 1615



(F) - EPA Funds  
 (SA/F) - Split Funded (Approp./EPA)  
 (R) - Receipts (Air Quality)  
 (TF) - Solid Waste Trust Fund  
 (SA/TF) - Split Funded (Approp./SWTF)

*Gary E. Hunt*  
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 Gary E. Hunt, Director



## ATTACHMENT A

### 1996 Solid Waste Reduction Assistance Grant Recipients

RECIPIENT	COUNTY	PROJECT DESCRIPTION	GRANT AMOUNT
Martin County/ Martin Enterprises	Martin	Expand corrugated cardboard program and initiate office paper recycling.	\$20,000
Step Iredell Clean	Iredell	Develop business recycling program through hosting "Recycling Expo" and providing recyclables marketing assistance.	\$14,520
Town of Farmville	Pitt	Purchase horizontal baler for business office paper recycling program.	\$20,000
Burke County	Burke	Develop multi-media "Consumer Source Reduction Education Centers" at county convenience centers by using "how-to" displays and literature racks.	\$11,604
Emerstone Christian Center	Gaston	Purchase vehicle for collection of recyclable paper in multi-family units and in the business community.	\$20,000
Town of Kill Devil Hills	Dare	Upgrade current recycling drop-off program by purchasing roll-off containers to expand amount and number of materials collected.	\$18,504
Buncombe County	Buncombe	Increase paper recycling in County government offices. Focus on cost/benefit of adding recycling in buildings versus disposal only.	\$20,000
Scrap Exchange	Durham	Collect and distribute industrial discards from businesses for reuse in educational programs promoting environmental awareness and the arts.	\$18,600
Alleghany County	Alleghany	Expand current collection and processing of recyclables.	\$20,000
New Hanover County	New Hanover	Expand existing household battery recycling program. Provide outreach to businesses on proper battery management.	\$ 7,811
Emerie Regional Solid Waste Authority	Dare, Hyde, Tyrrell, Chowan, Perquimans, Gates, and Currituck	Purchase computer equipment to facilitate tracking of data from its solid waste management programs.	\$ 4,000
Craven County	Craven	Purchase computer equipment and software for tracking solid waste management programs.	\$ 2,800
Stanly County	Stanly	Purchase computer equipment and software to track the county's recycling tonnages and for publication of a county waste reduction newsletter.	\$ 2,759

## ATTACHMENT B

### 1996 Paper Waste Reduction Assistance Grants

<b>RECIPIENT</b>	<b>AWARD AMOUNT</b>	<b>PROJECT DESCRIPTION</b>
McDowell County	\$25,000.00	McDowell County will establish a cardboard baling center at its transfer station to process materials collected at county staffed convenience centers and other locations.
Waste Industries	\$19,600.00	Waste Industries will purchase equipment to support expanded collection programs for soft and hard cover books and mixed files. Waste Industries will also conduct supporting promotion programs.
Cherokee County	\$25,000.00	Cherokee County will implement a paper waste reduction program for county schools, households, businesses and industries. The project will be supported by a comprehensive education/promotion campaign.
The Recycling Group	\$25,000.00	The Recycling Group, Inc., will install shredding and baling machinery to support an expanded collection program for textile cones and tubes and corrugated cardboard.
BFI	\$15,548.00	BFI and Alamance County will conduct a joint project to initiate a rural commingled paper recycling program supported by an intensive educational campaign aimed at schools and rural residents.
Pasquotank County	\$25,000.00	Pasquotank County will purchase equipment to support a large-scale expansion of its paper recycling program. The equipment will enhance the efficiency of the collection and processing operations.
Madison County	\$20,480.31	Madison County will expand and improve recycling programs for office paper, mixed paper, and corrugated cardboard at county schools, businesses, and staffed convenience centers.

## ATTACHMENT C

### 1996 Regional Aggregation Demonstration Projects

<b>GRANTEE</b>	<b>AMOUNT</b>	<b>GRANT DESCRIPTION</b>
Polymer Reclaim & Exchange	\$60,000	Polymer Reclaim & Exchange will expand its vinyl siding recycling program to services to contractors and local governments statewide.
& B Top Soil Mine, Inc	\$40,000	B&B Top Soil Mines will expand its operations that convert stumps, brush and yard waste into organic soils to serve the Triangle region.

## ATTACHMENT D

### 1996 Food Waste Reduction Assistance Grants

<b>RECIPIENT</b>	<b>AMOUNT</b>	<b>GRANT DESCRIPTION</b>
North Carolina Harvest, Inc.	\$10,000	Purchase of truck to expand produce recovery effort from the Charlotte Regional Farmer's Market and area food brokers.
Inter-Faith Food Shuttle	\$10,000	Purchase of truck to expand food collection from NC State Farmer's Market and local donors.
Good Shepherd House	\$10,000	Purchase and installation of commercial, walk-in cooler for donated food from area restaurants, grocery stores, and institutions.
University Honors Program/UNC-Charlotte	\$5,130.80	Refrigeration and upgrading of van for food collection from campus cafeteria.

## Recycling Market Development

While many of OWR's programs are designed to provide assistance in waste prevention and promote efficient materials recovery programs for recycling, OWR's efforts in recycling market *development* are quite different. Through the Recycling Business Assistance Center (RBAC), the OWR encourages the establishment of new industrial capacity for the consumption of secondary materials to make new products. This effort includes assisting existing North Carolina recycling facilities to expand capacity, encouraging companies to substitute recyclable materials in place of virgin (raw) materials, recruiting new recycling industries to the state, and assisting in expanding the supply infrastructure necessary to ensure adequate feedstock. Additionally, this program encourages the purchase of recycled-content products through its "Buy-Recycled" Campaign.



- ***Recycling Business Assistance Center (RBAC)***

In February 1994, OWR submitted a proposal on behalf of DEHNR and the Department of Commerce for an EPA grant to develop a Recycling and Reuse Business Assistance Center (RBAC) through EPA's Jobs Through Recycling Initiative.

In July 1994, North Carolina was awarded the 18-month grant along with California, Minnesota, and New York. The RBAC's goals are:

- To provide **TECHNICAL ASSISTANCE** to recycling businesses in sourcing, processing, and remanufacturing secondary materials and marketing their end products.
- To provide **BUSINESS DEVELOPMENT ASSISTANCE** by identifying funding sources, funding demonstration projects, and negotiating cost-sharing arrangements.
- To **DEVELOP POLICIES** which will help determine and overcome the barriers to collection, processing, remanufacturing and reuse of secondary materials.
- To **aggressively market the need to PURCHASE RECYCLED CONTENT PRODUCTS** to potential consumers.
- To promote and provide resources to **DEVELOP, TRANSFER AND APPLY TECHNOLOGIES** that increase the use of recycled materials.
- To **PROMOTE PARTNERSHIPS** among government and industry to stimulate and facilitate the recovery and use of recycled materials.
- To foster the **DEVELOPMENT OF A SUPPLY INFRASTRUCTURE** that is capable of providing industry with clean, readily and available raw materials.
- To **PROMOTE WASTE PREVENTION AND REUSE** within both the public and private sectors to reduce business costs and the consumption of virgin materials.

The implementation of these goals will help (1) expand existing market capacity for recyclable materials, (2) link existing business financing and incentive programs to the recycling community, and (3) support the recycling industry to create jobs and strengthen the state's economy.

### ***Demonstration Projects***

As part of the RBAC grant, four demonstration projects will be awarded. These include:

- 1) A feedstock conversion project demonstrating how a business can replace virgin feedstock with recycled material.
- 2) A capacity expansion project to increase the amount of feedstock needed in production. Such expansion would result in increased capacity available to existing public and private recycling collection operations, while at the same time solidifying the market position of these "home grown" North Carolina companies.
- 3) An industrial recruitment project to identify and locate in North Carolina a company utilizing recycled feedstock.
- 4) A regional aggregation project to "bridge the gap" between end users or intermediate processors and local supply of materials to decrease transportation and/or processing costs.

5)

The RBAC is currently spearheading a project to recruit or assist in a start up of a gypsum wallboard recycler to North Carolina, in part because of the large quantity of waste gypsum board generated by the manufactured home industry in North Carolina. Such a facility could employ up to 150 people and process 50,000 tons of material per year. RBAC has provided both business development and technical assistance in the development of this project.

### ***Training Workshops***

As part of the grant, five separate training courses/educational seminars will be conducted to better acquaint economic development professionals on recycling, recycling market development, and solid waste management issues and solid waste professionals on economic development issues. Three of the five are targeted to economic development professionals, one is targeted to solid waste professionals, and one is targeted to senior level decision makers in both fields.

The solid waste professionals training was conducted on April 3, 1995 by the UNC Small Business and Technology Development Center in conjunction with the Fifth Annual North Carolina Recycling Association (NCRA) Conference and Trade Show in Greensboro, NC. The workshop, entitled *f*Seventeen Trees and Beyond: Recycling as an Economic Development Strategy," was attended by 54 participants.



## ***Recycling Industry and Recycled Materials in North Carolina Assessment***

The passage of legislation in the 1993 session of the General Assembly shifted the responsibility for preparing a biennial report that assesses the recycling industry and recycling materials in the state from the Department of Commerce to DEHNR. To meet this mandate and to provide a foundation for its expanded market development program, OWR issued a Request for Proposals in March 1994 and awarded the contract to SCS Engineers in September, 1994.

Through the contract, a detailed assessment of the current and potential future supply of various recyclable materials generated in the state was conducted and the results to determine the potential for successful recycling of each material. The analysis, in which both short- and long-term trends will be identified, included:

- Materials identified as best matching supply and demand,
- Materials that could be efficiently collected in significant quantities (supply) but have problematic market availability (demand), and
- Materials showing promising demand trends but having undergone limited collection efforts to date.

This ***Markets Assessment Report*** is being utilized to select commodities for more intensive work including the development of commodity work plans. To date, four commodities have been selected (plastic, paper, organics and construction and demolition wastes) as those which have the greatest potential impact on reaching North Carolina's waste reduction goals.

## ***Electronic Bulletin Board***

A computerized information system is currently being developed that will allow OWR staff to locate market-related information more quickly and efficiently. In the near future, OWR expects this information and other waste reduction information to be available to the public via the Internet.

## ***RBAC Publications***

- ***Recycling Works*** Newsletter - This newsletter is now being published with a goal of publicizing the economic potential of collecting and reusing recyclable commodities. The newsletter currently has a circulation of 2000.
- ***North Carolina Recycling Business Study*** - This study documents employment, capital demands, and technical assistance needs in the recycling industry.
- ***The Impact of Recycling On Jobs in North Carolina*** - This report presents major findings from a study that researched the impacts of recycling on employment in North Carolina.

- ***Buy-Recycled Campaign***

North Carolina's Buy-Recycled campaign was initiated in July 1992 when the Governor's Office, the North Carolina Department of Administration, Department of Commerce, DEHNR, and the Department of Transportation hosted the state's first Buy-Recycled Conference. Of the approximately 300 attendees, 32 were vendors of recycled products. The purpose of the campaign is to encourage the purchase of recycled products by public agencies and private businesses as well as by individual consumers. The campaign is an important part of OWR's market development program as it encourages increased demand for recycled-content products and, thereby, encourages further investment by companies that consume recyclable materials. In support of this campaign, OWR has implemented the following projects:



- 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 (PSA's) to promote the purchase of recycled products. Press kits were mailed to media outlets on March 1, 1994.. This project ended in February 1995.
- Buy-Recycled Workshops. In conjunction with the North Carolina Department of Administration's Division of Purchase and Contract, OWR presented a series of four workshops across the state in September 1994 entitled "Buying Recycled in North Carolina." The workshops were designed to dispel information about recycled-content products, explain the process of routinely purchasing recycled-content products, discuss purchasing options, and provide tips on purchasing for waste prevention.
- Buy-Recycled Presentation. As an additional forum for education various audiences about the importance of buying recycled products, the Buy-Recycled Campaign annually targets purchasing agents, local recycling coordinators, and other through professional networks. During FY94-95, several Buy-Recycled presentations were given to numerous groups statewide.
- Buy-Recycled Publications - The publication *Buying Recycled Products Through North Carolina State Term Contracts* was updated during 1995.



# Challenge Grants for Pollution Prevention

The North Carolina Pollution Prevention Program is again challenging North Carolina industries and businesses to identify and apply pollution prevention techniques. To help accomplish this challenge, financial assistance in the form of matching grants UP TO \$15,000 is being offered to industries, businesses, and trade associations. Since 1985, the Pollution Prevention Program has funded over 100 projects through this public/private partnership for a total combined investment in the environment of nearly \$2 million.

## Challenge Grants Purpose

The purpose of the Challenge Grants program is to help North Carolina's industries and businesses develop and implement innovative programs that will eliminate, prevent, and/or reduce the generation of waste. This waste can be in any media: wastewater discharges, air emissions, toxic and/or hazardous waste, and industrial solid waste.

## General Eligibility

Projects that address waste reduction through source reduction or recycling are eligible for a Challenge Grant. Also, projects involving utilization of post-use recovered materials as feedstock in place of virgin materials will be considered. Projects NOT eligible include those that address pretreatment, treatment, or disposal; product development as part of entrepreneurial endeavors or new business development; and development of any proprietary systems or products.

Proposed projects will be accepted for review from industries, businesses, and trade associations. Trade associations are defined as organizations that represent a specific group of North Carolina industries. Industries and businesses at which the projects are conducted must be located within North Carolina.

No preference will be given to waste type; all waste types will be considered equally. Preference will be given to source reduction activities and innovative projects that can be easily applied by other industries or businesses. Small businesses with less than 100 employees are especially encouraged to apply. Proven technologies and techniques will not be considered with as much favor as innovative technologies unless a new application for a proven technology is demonstrated.

## Eligible Projects

Proposed projects must address the feasibility of applying specific methods or technologies to prevent pollution and/or reduce waste generation. Projects can range from in-depth studies and pilot-plant demonstrations to full-scale implementations. Examples of previously funded projects include:

- Evaluation of alternative uses of cotton cleaning waste.
- Replacement of solvent degreasing operations with aqueous cleaning operations.
- Development of employee training programs to reduce pollutant loadings to the POTW.
- In-plant comparison of various types of HVLP spray guns for use in the furniture industry.

## • Funding and Schedule

Approved projects will receive grants up to \$15,000. Grant money must be matched on a dollar-for-dollar basis. Each proposal should provide a breakdown of project costs and indicate matching contributions as cash inputs or in-kind contributions such as staff salary, equipment, laboratory analysis, or consultant time.

*NO FUNDING* will be available for work completed prior to issuance of the contract. Additionally, no advance payment will be made. Payments will be available only after receipts are submitted, and 10 percent of the total grant will be withheld until the final project report is submitted. Projects must be completed and final reports submitted by May 1, 1995.

**PROPOSALS MUST BE POSTMARKED NO LATER THAN JULY 1, 1994.**

The PPP will acknowledge receipt of all proposals by letter, and all applicants will be notified by mail as to acceptance or rejection. Proposals will be reviewed by and grant announcements will be made in September 1994.

## • Grant Proposal Form and Content

Grant proposals should be brief and concise. The actual proposal, excluding cover letter and attached summary form, should be no longer than 4 pages. One original copy, suitable for reproduction, should be *mailed* to PPP at the address below. *FAXED proposals will not receive consideration.* To facilitate uniform review, proposals should be prepared in the following format:

### a. Cover Letter

**Transmittal Letter.** This letter outlines compliance with eligibility requirements, summarizes project, states total cost, and is signed by a responsible agent.

### b. Grant Proposal

**Introductory Statement.** This statement provides an overview of the specific nature of pollutant/waste problem and need for improvement.

**Proposed Project.** This section presents a description of the proposed project, lists the proposed steps/tasks for completion, and includes a concise statement of expected results and benefits of project.

**Project Costs and Schedule.** This section presents (1) total project cost, (2) a breakdown by item/activity of costs supported by the Challenge Grant and costs covered by sponsor, and (3) schedule for completion.

### c. Project Summary Form. The completed form is submitted with the proposal.

⇒ NOTE: Project Summary Form alone will NOT BE ADEQUATE for grant application.

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Please direct questions about Challenge Grants for Pollution Prevention and applications to:

Program Manager  
Pollution Prevention Program  
Office of Waste Reduction  
3825 Barrett Drive, 3rd Floor  
Raleigh, N.C. 27609  
Telephone: (919) 571-4100





## **Session 2**

# **Planning for Waste Reduction**

### **Session Preview**

This session provides participants with essential information required to begin the process of planning for their waste reduction and recycling programs or for enhancement of existing programs.

This session is intended to provide general planning guidance that should not be construed as specific guidance for preparing county waste management plans as required by the NC Solid Waste Management Act.

### **Importance of Waste Management Planning**

#### **Operational Issues**

Waste reduction programs affect many aspects of existing programs and infrastructure. An assessment of those impacts is critical when coordinators integrate new and existing programs. An underlying objective should be to make best use of existing equipment and financial and human resources.

As solid waste management grows in sophistication, more options have become available to manage waste. Successful programs require the development and integration of a number of program components:

- Education of the Public
- Financing
- Staff development and training
- Policy development to support program objectives
- Collection
- Processing
- Marketing
- Data collection/recordkeeping
- Program evaluation and modification

## —————Session 2—————

# Planning for Waste Reduction

### Legislative Issues

Local governments are required by the North Carolina Solid Waste Management Act to prepare comprehensive, 10-year, solid waste management plans that (1) are consistent with the state plan, (2) make a good faith effort to achieve the state's goal to reduce municipal solid waste by 40 percent by the year 2001, and (3) follow the waste management hierarchy defined in the legislation. Every county and municipality is required to participate in the planning process, and public participation is a mandatory part of the process. Plans must be complete by July 1, 1997.

### Planning Requirements

- Consider the use of facilities and other resources for solid waste management that may be available through private enterprise.
- Evaluate the solid waste stream in the geographic area covered by the plan.
- Present the goal for the reduction of municipal solid waste on a per-capita basis by June 30, 2001.
- Present the goal for further reduction of municipal solid waste by June 30, 2006.
- Present the design for achieving the solid waste reduction goals established by the plan.
- Assess current programs and describe intended actions with respect to reduction at the source, collection, recycling and reuse, composting and mulching, incineration with energy recovery, incineration without energy recovery, transfer outside the geographic area covered by the plan, and disposal.
- Assess current programs and describe intended actions with respect to education of the community and through the schools, management of special wastes, prevention of illegal disposal and management of litter, and purchase of recycled materials and products manufactured with recycled materials.
- Describe and assess the full cost of solid waste management including cost of collections, disposal, waste reduction, and other programs



## —————Session 2—————

# Planning for Waste Reduction

### Steps for Developing a Waste Reduction Plan

#### 1. Establish Goals and Objectives.

<p><u>Goals</u></p> <ol style="list-style-type: none"><li>1. Specify direction and desired outcome.</li><li>2. Mimic community's philosophy and values.</li><li>3. Impart explicit purpose to programs.</li></ol> <p><u>Objectives</u></p> <ol style="list-style-type: none"><li>1. Provide means for measuring progress toward goals.</li><li>2. Provide step-by-step information.</li><li>3. Set milestones for gauging advancement.</li></ol>
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#### Goals and Objectives Should Be Reassessed Periodically:

- To evaluate program success
- To modify program to get on track toward goals:
  - Re-state goals and objectives
  - Phase out or eliminate components not working
  - Expand successful components

Goals and objectives should be generated and prioritized as a result of public or employee participation. Failure to do so will result in resistance, opposition, or apathy.

#### 2. Evaluate the Waste Stream

To plan solid waste management programs and facilities, the amount and composition of waste generated within the subject service area must be determined. The *Waste Stream Characterization Guidance Document*, which was developed as part of the North Carolina Recycling and Waste Management Plan, was mailed to local government managers in September 1992. This guidance document was prepared to help local governments determine the kind of waste characterization data they need and the way they can gather it.

## —————Session 2—————

# Planning for Waste Reduction

### Uses for Waste Stream Characterization Data

- **To determine the amount** of waste being generated from each source sector.
- **To target materials** for source reduction and recycling programs.
- **To determine the mix of technologies/programs necessary** for an integrated system for a particular area (i.e., county or region).
- **To identify opportunities** for source reduction.
- **To monitor impact** of source reduction and recycling programs on waste generation.
- **To monitor changes in waste generation habits** brought about by changing community demographics.
- **To educate the public** about the waste stream.
- **To determine BTU values** for waste destined for waste-to-energy facilities.
- **To size facilities.**
- **To project landfill capacity trends.**

### Waste Stream Characterization Options

A variety of options is available to develop estimates of waste stream quantities and characteristics. These options range in level of effort and cost from conducting demographic research to performing full-scale, multi-season weighing and sorting programs. The option to select will depend on:

- the level of information (accuracy, detail) that is needed.
- the cost and level of effort that the planner is prepared to expend.

**The Key:** Gather useful, accurate, and appropriate data as needed to facilitate the planning process.

### Data Collection Criteria for Local Governments

The following points should be kept in mind when a data collection protocol is being designed to ensure the quality and consistency of waste characterization data collected.

- The quantity of waste received at waste disposal facilities represents only a fraction of the total generated.

## —————Session 2—————

# Planning for Waste Reduction

- Much of the waste generated may be destined for private industrial, municipal solid waste, or demolition landfills.
- Waste generation patterns are often seasonal.
- To quantify waste generation in a small geographic area can be difficult because of the migration of waste into or out of the area. A more accurate picture can often be generated by aggregating the data from a larger area.

### Benefits of a regional approach to waste characterization:

- Ensures efficient use of resources
- Avoids redundancy
- Provides consistent results
- Facilitates regional management planning

### Evaluation Options

The quality of the data gathered is determined by the resources expended. To gather information on a limited budget:

- Estimate generation rates on the basis of demographics and readily available per-capita or per-employee data.
- Conduct hauler surveys in order to examine waste sources and destinations.
- Implement visual observation programs to get an estimate of waste composition and volume from incoming trucks.

**The Key:** Determine information needs first; tailor waste characterization to actual needs.

In planning situations in which a full waste characterization is warranted, consistent methodology should be developed along the following guidelines:

1. Use the largest number of samples feasible.
2. Evaluate residential waste stream separate from the commercial and industrial waste stream.

## —————Session 2—————

# Planning for Waste Reduction

3. Focus evaluation of non-residential waste on source of generation as much as practical.
4. Categorize waste consistent with those identified in Volume I of the State Plan.
5. Conduct sampling seasonally.

### Projecting the Future Waste Picture

Identify and track factors that affect waste generation and management practices within the service area including:

- Population and demographics
- Seasonal factors
- Economic conditions
- Major industries and institutions
- Tourism

According to the North Carolina Recycling and Solid Waste Management Plan, an estimated 68 percent of North Carolina's total waste stream comes from non-residential sources - construction, commercial, institutional, and industrial facilities. This portion of the waste stream presents tremendous opportunities for recycling and waste reduction programs because of the relatively high volumes of materials, and in some cases high-value materials, that may already be segregated at the point of generation within the facility. While the responsibility for planning waste reduction and recycling programs in these sectors should be placed with management of the individual facility or company, local government planners can provide significant guidance, networking, and assistance.

### Evaluating the Commercial/Industrial Waste Stream

- Evaluate waste streams at the point of generation.
- Think in terms of opportunities for source reduction.
- Evaluate equipment and labor requirements to handle materials differently.
- Involve workers.

## — Session 2 —

# Planning for Waste Reduction

### Factors That Affect the Commercial/Industrial Waste Picture

- Work force and operating shifts
- Seasonal factors
- Economic conditions
- Volume of sales

### **3. Compile an Inventory of Existing Activities/Resources**

Inventory programs and resources currently available. This inventory should include resources and infrastructure provided by government programs as well as by private programs.

Look at currently available:

- Equipment
- Money
- People
- Space

Also evaluate other local government and private programs.

Information should be collected and evaluated on all solid waste management practices.

### **4. Assess Program and Resource Needs**

Based on assessment of existing resources and programs, the program coordinator determines the resources needed to meet state and local solid waste reduction goals and objectives.

## —————Session 2—————

# Planning for Waste Reduction

### Needs to be assessed include:

- **Program needs, for example:**
  - Expanded residential and non-residential source reduction and recycling to meet or exceed the 40-percent state reduction goal.
  - Program for evaluating and addressing illegal dumping.
- **Resource needs including:**
  - Equipment
  - Funding
  - Personnel
- **Understanding and commitment of management**
- **Policy needs**

### **5. Evaluate Program Component Options**

Factors other than economics should be taken into consideration before a decision is made on the program components to be selected; for example, environmental and health risks and benefits.

### Components of a multi-faceted system for a local government:

- Curbside recyclables collection for single family households.
- Central collection at multi-family housing.
- Intermediate processing center for handling, processing, storing, and marketing materials.
- Composting facility for yard waste.
- Education program for residential backyard composting.
- Dump-and-sort operation for recovering recyclables from commercial loads.
- Landfill for residue disposal.
- Business and industry waste reduction assistance program.

## —————Session 2—————

# Planning for Waste Reduction

Opportunities for commercial or industrial waste reduction:

- Increase efficiency of process operations.
- Increase use of durable and reusable materials.
- Minimize waste from grounds maintenance by mulching or composting.
- Decrease use of toxic materials and production of toxic by-products.
- Establish recycling loops within manufacturing operations.
- Educate employees and the community.
- Segregate and collect for marketing high-volume, high value materials.
- Alter procurement practices to increase purchase of recyclable, recycled, less toxic, and more durable goods.

If evaluation of options is based on an objective evaluation of needs, the selected system should address all the needs

### 6. Integrate Waste Reduction System

After the options are evaluated, a series of appropriate program components are selected to make up the basis for the comprehensive waste reduction system.

System selection should be based on a set of criteria that should include, at a minimum:

- Waste reduction and diversion potential.
- Proven track record.
- Ease of implementation.
- Cost (or cost savings).
- Existing system (programs and equipment).
- Public or employee sentiment.
- Environmental and health risks and benefits.
- Markets accessibility.
- Storage capacity.
- Constraints (space, equipment, budget, etc.).

## —————Session 2—————

# Planning for Waste Reduction

- The following is an example of a system option for local government:

*Curbside recyclables collection for all single family households; central collection at multi-family housing; municipally operated composting facility for yard waste; residential backyard composting encouraged; dump-and-sort operation for recovering recyclables from commercial loads; landfill for residue disposal.*

- The following is an example of a system option for a public school:

*Segregation, collection, and vendor pick up of steel cans, aluminum pans and foil, styrofoam, and plastics from the cafeteria; educational composting project for cafeteria food and mixed paper waste; staff, faculty, and student participation in separation and collection of office paper, writing paper, and aluminum cans; donation of obsolete books and unclaimed clothing from the lost and found; and utilization of both sides of all paper. The key is in the educational value of the program.*

*Think System!*

### 7. Develop Implementation Strategy

An implementation strategy provides a clear course of direction and a timeline, which, if followed and appropriate resources are allocated, should move the community toward the original goals and objectives.

**An implementation strategy is made up of the following segments:**

- Top-down commitment, and bottom-up support.
- Specific actions with assignments.
- Implementation schedule.
- Program budget, including annual capital and operating costs.

In a truly integrated approach, a recycling or waste reduction program implementation strategy will be merged with strategies for other program areas in the department for administration, funding, and efficient use of resources.



## **Session 2**

# **Planning for Waste Reduction**

### **Guidance Resources**

- **Model Plan**
- **Draft Planning Rules**
- **State Plan**
- **Guidance Documents**
- **Resource Planning Guide**

## —————Session 2—————

### Planning for Waste Reduction

#### Example Recycling Implementation Strategy for Local Government

Options, Phase 1, FY 96-97		Diversion rate
Multi-Material Curbside Collection	Implement Service to 20,000 Households	0.03%
Compost/Mulch Production	Implement pilot leaf collection/composting	1.20%
<b>Options, Phase 2, FY 97-98</b>		
Expand curbside to include multi-family	Include dwellings with 1 to 4 units	3.50%
Compost/Mulch Production	Expand pilot to full scale with addition of grass and brush clippings	10.70%
<b>Total Annual Diversion by Year 2</b>		<b>15.43%</b>

#### Example Recycling Implementation Strategy for Manufacturer

Options, Phase 1, FY 96-97		Diversion rate
Packaging Reduction	Switch to reusable pallets and shipping containers	7.00%
Landscaping Waste Minimization	Chip branches, compost leaves, leave grass clippings on ground, reduce fertilization and watering	1.50%
<b>Options, Phase 2, FY 97-98</b>		
Waste Exchange	Find market for spent solvents, acids, dyes	3.00%
Materials Processing	Bale and sell plastic films, scrap corrugated, steel banding	12.25%
<b>Total Annual Diversion by year 2</b>		<b>23.75%</b>

## —————Session 2—————

# Planning for Waste Reduction

### 8. Develop Protocol for Program Evaluation and Plan Updating

#### Plan Updating

The plan should be reviewed continuously to detect changes needed in response to changes in any aspect of the solid waste system. Certain changes should be used to trigger modifications in the plan to address new or anticipated conditions. Examples of conditions which may trigger plan review and revision could include, but are not limited to, the following:

- Changes in disposal capacity availability
- Changes in the waste stream
- Environmental problems
- Legislative or regulatory changes
- Change in relative costs of options
- Significant region or private developments
- Growth/decline in population or industry
- Market availability

#### To evaluate and fine-tune program:

- Establish evaluation criteria.
- Identify monitoring methods.
- Establish monitoring program.
- Analyze results.
- Make program adjustments in time for budget cycle.

## Wrap Up

Research and planning go hand-in-hand in most disciplines. It is perhaps even more critical in waste management planning. Methods, technologies, and policy are changing constantly. Share what you learn - *your successes and mistakes* - with your peers, and look to them for advice, ideas, and collaboration. Involve employees/public from start.

**WHAT HAVE YOU LEARNED FROM THIS SESSION THAT YOU THINK MAY HELP STRENGTHEN YOUR PROGRAM'S DIRECTION AND SUCCESS?**

## —————Session II—————

# Planning for Waste Reduction

## Exercise: City of Edville



### Demographics

**Population:** 53,000, although a decline is expected by the year 2010.

**Manufacturing base:** Strong, employing approximately 7 percent of the work force. Produces textiles, tobacco products, tires, glass, fiberboard, food products, and other durable and non-durable goods.

**Remaining work force:** 63 percent are employed by government and non-manufacturing businesses, primarily service, wholesale, and retail trade enterprises.

### Current Solid Waste Activities

- Three hundred and ten (310) tons of solid waste per day or 113,168 tons per year landfilled.  
(11.7 pounds per capita per day. see figure E - 1)
- Garbage and trash are collected once per week.
- Bulky items are collected monthly.
- Loose leaves are collected seasonally.
- For businesses that do not require bulk containers, the City will provide collection service on a contract basis.
- To conserve landfill space, the City recently purchased a skid-mounted rotary shredder.
- Edville is designing an expansion for the municipal landfill.
- The total capacity of the expansion is estimated at 2.6 million yd<sup>3</sup>, which size will be capable of receiving approximately 2 million tons.
- The landfill is expected to last 8 years.

### Recycling Activities

**Office recycling.** The City has initiated the collection of computer paper, aluminum cans and glass containers from some City offices and is in the process of expanding the program to additional sites.

## —————Session II—————

# Planning for Waste Reduction

**Pilot curbside recycling.** A pilot curbside program for the collection of aluminum cans and glass containers started in one neighborhood and has recently added four more neighborhoods. The number of households currently served is 985.

**Drop-Off recycling.** Goodwill Industries operates five sites for glass and aluminum cans.

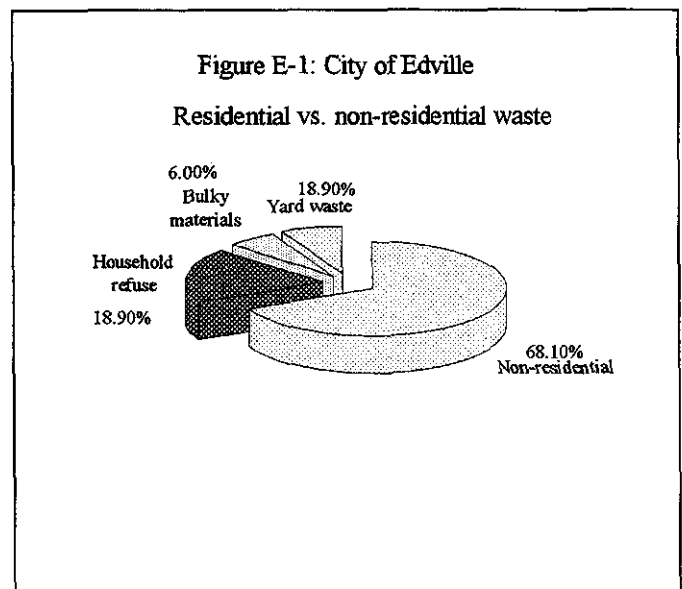
**Restaurant recycling.** Goodwill also collects glass and aluminum from selected Edville taverns.

**Other.** White goods and used motor oil are collected by the Public Works department.

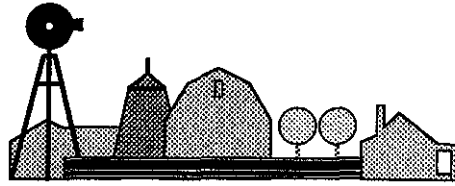
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**Given the demographics and the current solid waste and recycling activities in Edville, how would you proceed to accomplish the following goals and objectives?**

1. Establish the framework for effective long-range programs.
2. Optimize the use of the City's landfill.
3. Manage waste in a fashion that balances cost-effectiveness with conservation of resources and protection of the environment.
4. Involve the private sector in implementing waste management services wherever practical.
5. Provide the public with desired services at the appropriate service levels.
6. Take a creative approach, as opposed to traditional.
7. Participate in regional efforts.
8. Comply with regulations of the State.
9. Meet State's reduction goals.



————— **Session II** —————  
**Planning for Waste Reduction**



## St. Charles County

### Demographics

**Population:** 6,740, and population is projected to grow slightly to 8,700 by 2010. St. Charles is a rural county.

<b>Employment:</b> Federal, State and local government -	35%
Agriculture -	28%
Manufacturing	17%
Wholesale and retail trade -	11%
Services -	9%

### Current Solid Waste Activities:

- Approximately 12 tons of solid waste per day are generated in the County. (*about 3.6 pounds per capita per day. See figure C-1*)
- Landfill Development Corporation (LDC) operates a regional municipal solid waste landfill located in St. Charles County.
- LDC has provided funds for the development of a recycling plan.
- LDC operates two convenience centers in the County for residential waste and recyclables collection, with a third center planned.
- LDC is under contract to remove refuse from the convenience centers at no charge to the County and haul it to the landfill.
- Illegal dumping and littering have been identified as a problem of serious concern.
- An illegal tire pile, which has been in existence for about 20 years, contains an estimated 2 million tires.
- The County has recently closed an illegal stump dump.

### Recycling Activities

- The recycling drop-off centers collect aluminum, bi-metal and steel food and beverage containers, three colors of glass, PETE (#1) and HDPE (#2), and newspaper. Materials are collected in compartmentalized roll-offs by LDC, who also markets the materials after collection.
- LDC collects aluminum cans, glass, and mixed office paper in two County office buildings.

## —————Session II—————

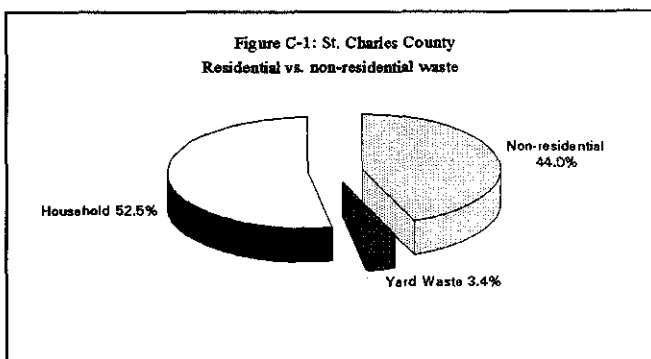
# Planning for Waste Reduction

- The four county schools are targeted for expansion of the office recycling program.
- The County and LDC have agreed to explore the possibility of locating a materials recovery facility (MRF) in the county. LDC has agreed to cooperate in locating a suitable site for the MRF as well as assist with efforts to bring in end users of processed materials.
- As a member of the Regional Waste Management Authority, St. Charles County is relying on the Authority for comprehensive solid waste management planning.

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**Given the demographics and current solid waste and recycling activities in St. Charles County, how would you proceed to accomplish the following goals and objectives?**

1. Minimize costs to the county.
2. Provide opportunities to increase participation by residents.
3. Provide a model for other rural communities in the Region.
4. Benefit other communities in the region where appropriate.
5. Address illegal dumping problems.
6. Enhance public - private partnerships.







## Session 3

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# Reducing Waste at the Source

### Session Preview

The hierarchy of preferred management methods for solid waste as established in Senate Bill 111 in "Act To Improve the Management of Solid Waste in North Carolina" places source reduction at the top of the list. While the other components are important for an effective integrated solid waste management plan, reduction of waste at its source should be applied before other techniques are attempted. Source reduction will reduce the amount of waste that is then recycled, reused, composted, incinerated, or landfilled.

### Introduction to Source Reduction

Throughout this manual, **source reduction** is defined as "a reduction in the amount and/or toxicity of waste before it is generated, or waste prevention." This definition is consistent with that used in the NC Solid Waste Management Plan.

According to waste management data from NC local governments for FY 1994-1995, approximately 5.9 pounds of solid waste is produced daily by each person in North Carolina.

Below are examples of source reduction:

- Purchasing in bulk quantities
- Minimizing packaging materials
- Grasscycling
- Backyard composting
- Vermicomposting
- Purchasing non-toxic (or at least less toxic) materials
- Enviroshopping
- Purchasing sturdier, more durable or repairable goods

Here are examples of what source reduction is not:

- Recycling
- Buying products with recycled content
- Municipal composting
- Household hazardous waste collection
- Beverage container deposits and return systems, as accomplished through "bottle bills" in the United States

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## Session 3

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# Reducing Waste at the Source

## Benefits of Source Reduction

- Saves money; for example, purchasing fewer materials, disposing of less waste.
- Conserves natural resources.
- Prolongs landfill life.
- Decreases toxicity of materials in waste stream.
- Prevents or reduces air and/or water pollution.
- Promotes good public relations.

## Source Reduction in Non-Residential Sectors

The commercial, industrial, and institutional sectors generate a large portion of the waste stream, often well over half. Therefore, through implementation of aggressive source reduction programs, these sectors have the potential to significantly decrease the quantity of waste generated for disposal.

Source reduction activities implemented in the non-residential sector can generally be grouped into the following categories:

### Product Redesign

Product redesign involves a reduction in the amount of waste created during the production of goods. This effort may involve using less toxic materials and chemicals in the production of the product, utilizing “scrap” material as a part of the product, or “lightweighting” the product so that fewer materials are used in its production.

### Packaging Redesign

Prioritizing packaging design goals helps to minimize packaging waste. Goal setting includes questions such as “Are all the currently used packaging materials or elements needed? If so, could they be reduced in size or replaced by less bulky materials?” Also, goals should address reusability or recyclability of packaging materials, as in the following examples:

- A reduction in the amount of waste the consumer will discard from the product.  
Example: Coffee packaged in the brick pack results in an 85-percent source reduction over the conventional tin can; however, tin cans may be recyclable in some communities, and tin cans may be reused.

The Coalition of Northeastern Governors (CONEG) Source Reduction Task Force published a hierarchy for preferred packaging practices as follows:

#### 1. No Packaging

The need for any packaging should be evaluated in product research and development stages and prior to its introduction in the market.

## Session 3

### Reducing Waste at the Source

2. **Minimal Packaging**  
Alternative methods of product and packaging design should be pursued to minimize the packaging material required.
3. **Consumable Packaging**  
Manufacturers should consider consumable packaging that is eliminated in the process of using the product; for example, *(M.U. I'm going to get back to Beth so she can clarify this)*
4. **Returnable Packaging**  
Manufacturers should consider packaging that is returned to a business or industry for reuse and redistribution.
5. **Refillable/Reusable Packaging**  
Manufacturers should consider refillable/reusable packaging that can be refilled by a customer or consumer from bulk or larger size containers. For example, consumers could refill the small liquid soap dispensers in restrooms from a bulk container.
6. **Recyclable Packaging/Recycled Material in Packaging**  
A package is considered recyclable if there is an economically viable and widely available collection, processing, and marketing system for the material. Recyclability is maximized when a package is made of a homogeneous material or of materials that do not require separation prior to recycling. Labels, closures, and seals should be made of material similar to the primary package.

#### Purchasing Procedures

Changes in material procurement can significantly affect the amount of material generated for disposal since purchasing decisions control the quantity and type of material brought into the facility. Such changes may include bulk quantity purchases or requests that suppliers eliminate excess packaging. Additional examples of source reduction activities through purchasing are presented in the handout provided with this chapter.

#### Inventory Control

Methods for controlling inventory range from simply changing the ordering procedures to implementing just-in-time (JIT) manufacturing techniques. Improvements in inventory control will significantly affect the three major sources of waste resulting from improper inventory control: excess and obsolete inventory and raw materials no longer used. Source reduction suggestions through inventory control presented in the handout provided with this chapter.

#### Production Process Modifications

- Equipment Changes
- Improved Operational Procedures
- Preventive Maintenance
- Material Changes

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## Session 3

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### **Reducing Waste at the Source**

Specific source reduction techniques through process modifications presented in the handout provided with this chapter.

#### **Housekeeping Practices**

Good housekeeping practices are important in prevention of needless waste generation. These activities include proper storage of chemicals and upkeep of a clean, even surface in transportation areas. Additional suggestions presented in the handout provided with this chapter.

#### **Employee Training and Awareness Programs**

Employee training is critical to successful implementation and maintenance of source reduction activities. A program should be established to train employees when they begin employment and at periodic intervals thereafter. In addition, an employee incentive program encourages participation in the source reduction efforts and generates new ideas.

### **Local Governments and the Non-Residential Sectors**

Local governments can select a variety of approaches to enlist the support and active participation of businesses, industries, and institutions in source reduction activities. The size of the community, the level of local government's involvement in commercial waste handling, and the extent of collective involvement local government seeks will determine the most effective media for conveying the source reduction message.

#### **Approaches to Source Reduction/Recycling Participation**

Local governments can encourage source reduction and recycling in the non-residential sectors through the approaches listed below:

- Establish awards programs.
- Develop and present workshops/seminars.
- Offer to speak at facility workshops.
- Offer a grants program.
- Establish task forces with representatives from the commercial/industrial sectors as well as from government.
- Generate news releases.
- Offer to conduct a waste assessment to evaluate source reduction and recycling program options.
- Provide informational pamphlets, fact sheets, etc.
- Survey businesses, etc., to determine the components of the local waste stream and sites that need the most assistance.
- Institute programs specifically targeted to source reduction activities.
- Develop a **blue ribbon team** of businesses that practice source reduction. Once developed, the blue ribbon team will provide standards and **technical assistance** for other businesses in the community that wish to initiate a source reduction program.

## **Session 3**

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### **Reducing Waste at the Source**

- **Develop a letter or pledge** for businesses to sign to show support for source reduction and recycling; attach literature on source reduction.
- **Help a business conduct a source reduction assessment** to identify opportunities to decrease waste at the company.
- **Require members to develop and submit a source reduction plan.**
- **Present participants with a plaque** that will demonstrate to customers that they are working to reduce waste.
- **Consider coordinating waste reduction with local permitting.**  
If a business or industry needs a permit to proceed with development or to discharge air or wastewater, the local government could require a source reduction plan or evidence of waste reduction practices from the business or industry as a condition of the permit. For example, the Charlotte Mecklenburg Utility Department - System Protection Division requires a site visit by the NC Division of Pollution Prevention and Environmental Assistance (DPPEA) to prospective licensees. DPPEA provides free, non-regulatory technical assistance to businesses and industries on waste reduction.
- **Assist retailers by providing guidance for in-store education** or by drafting letters to suppliers that detail community concern for packaging.

### **Source Reduction in the Residential Sector**

Source reduction activities in the residential sector can involve the following components.

#### **Toxicity Reduction**

Toxicity reduction in the home can be achieved by reductions in the amount and use of hazardous products. The following are suggestions for reducing household hazardous materials and selecting less toxic products.

- **Use non-hazardous or less hazardous products** to accomplish the task at hand.  
Example: Marigolds instead of pesticides in the garden to ward off certain pests.
- **Investigate alternatives to household products** that contain hazardous substances.  
Example: Use water-based paint instead of oil-based paint.
- **Use the least amount possible** of a product with hazardous components.
- **Follow directions for handling and storage** of products with hazardous components.

## Session 3

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# Reducing Waste at the Source

### **Backyard Composting/Grasscycling/Vermicomposting**

North Carolina SB 111 (Solid Waste Management Act of 1989) bans yard waste from disposal in sanitary landfills after January 1, 1993. As a result, local governments often offer separate collection of yard waste materials, as discussed in more detail in the chapter on "Yard Waste Management." Yard waste is then delivered to end users, mulched, composted, or taken to a Land Clearing and Inert Debris (LCID) landfill or a Construction and Demolition (C&D) landfill. However, local governments may offer to residents a grasscycling, backyard composting, or vermicomposting program. These type programs eliminate the need for municipal or private collection, processing, and distribution of yard waste.

*Grasscycling* is simply leaving grass clippings where they are generated. Special mulching mowers are available to homeowners. The practice is recommended for established lawns.

*Backyard composting* is the decomposition of organics by microorganisms to create a dark soil-like material. In addition to yard trimmings, backyard composting may include food waste such as fruits and vegetables and coffee grinds. Residents should be informed of the proper management of compost piles.

*Vermicomposting* is a process in which red worms turn yard trimmings and food waste into worm castings. The worms are kept in a bedded container either indoors or outdoors. The process requires little maintenance, is odor free, and is especially convenient for apartment or condominium residents who do not have a suitable place for a compost pile.

Yard trimmings (leaves, branches, and grass clippings) are the second largest material category in the waste stream, with food waste the next largest.

### **Enviroshopping**

Enviroshopping teaches consumers to purchase products and packaging that generate less waste and are less toxic. Consumers are taught the five R's: reduce, reuse, recycle, reject, and respond. Selective purchasing by consumers, or precycling, is the most effective way to decrease household solid waste. Precycling involves the following three decisions about products and packaging.

1. Decide if the product(s) is needed; search for less toxic or less packaged alternatives.
2. Identify alternatives before purchasing new products. For example, rent or borrow the product, or check if it can be made from items around the house.
3. Select products and packaging carefully. Look for product durability, note the kind and amount of packaging used, and select packaging that can be reused or recycled.

## **Local Governments and the Residential Sector**

Local governments can encourage source reduction activities and programs through a variety of methods. The following are several suggestions for developing and maintaining a source reduction program.

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# **Reducing Waste at the Source**

### **Education/Promotion**

To increase the cost-effectiveness of the educational program and the impact of the message, public awareness and educational activities concerning source reduction should be integrated with activities that promote recycling.

Below are topics for educational materials:

- Costs and difficulties of residential waste disposal.
- Description of the waste problem locally and in the state and county.
- Information on potential local government savings as a result of residential source reduction.
- Suggestions for source reduction at the personal/consumer level such as reduction of junk mail to the home.
- Information on the availability of residential waste exchange services.

Sources for educational information:

- NC Division of Pollution Prevention and Environmental Assistance (DPPEA)
- Trade associations
- NC Recycling Association (NCRA)
- Trade journals
- NC Cooperative Extension Service
- US Environmental Protection Agency (EPA)
- Peers

### **Programs and Activities**

Programs and activities that focus on residential involvement:

- Train volunteer staff to lecture at local events and meetings on methods of implementing source reduction strategies in the home.
- Establish backyard composting education program with 4-H or Cooperative Extension Service.
- Set up displays; offer informational materials; and host/participate in fairs, festivals, and public gatherings.
- Offer seminars and lectures on source reduction for public schools, civic groups, neighborhoods, and other community organizations. For example, in a Wisconsin school, children kept everything they used for one day and then decided how to reuse each item at the end of the day.
- Send a newsletter to each home on a regular basis via a utility bill or other method.

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### **Reducing Waste at the Source**

#### **Encouragement/Incentives**

Incentives keep people interested and participating. This is a short list of some proven ideas:

- Establish awards programs for residential source reduction excellence.
- Encourage retailers such as dry cleaners and coffee shops to offer discounts to residents for returning hangers or on coffee if customers bring their own mugs.
- Implement Pay-As-You-Throw (PAYT) for household solid waste collection to provide a financial incentive for source reduction.
- Practice source reduction in government operations to serve as a model.
- Submit a source reduction demonstration project idea to DPPEA for a Solid Waste Management Trust Fund grant.

#### **Wrap Up**

Residential and non-residential programs based on source reduction as a first priority complimented by reuse and recycling programs will reduce the volume of waste generated for disposal and reduce disposal costs.

**HOW COULD YOU INTEGRATE SOURCE REDUCTION ACTIVITIES INTO YOUR PROGRAMS AT THEIR CURRENT LEVEL OF OPERATIONS?**



## Session 3

### Reducing Waste at the Source

#### Exercise

Determine three materials to be reduced at the source and how the reduction should be achieved for each material. *Example:*

#### In a Restaurant

<u>Materials</u>	<u>Source Reduction Method</u>
<i>Example: aluminum cans</i>	<i>Install tap for beer &amp; soda</i>
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

#### At a Grocery Store

<u>Materials</u>	<u>Source Reduction Method</u>
<i>Example: pallets</i>	<i>Purchase reusable plastic lumber pallets</i>
1. _____	_____
2. _____	_____
3. _____	_____

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#### In a Public School

<u>Materials</u>	<u>Source Reduction Method</u>
<i>Example: paper</i>	<i>Use both sides of paper</i>
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

**Session 3**  
**Reducing Waste at the Source**

**At a Warehouse**

<u>Materials</u>	<u>Source Reduction Method</u>
<i>Example: machinery</i>	<i>Repair worn/damaged equipment</i>
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

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**In an Office**

<u>Materials</u>	<u>Source Reduction Method</u>
<i>Example: paper</i>	<i>Computerize mail (electronic mail service)</i>
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

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**Reducing Waste at the Source**

**At Home**

**Materials**

**Source Reduction Method**

*Example: reusable products*

*Use sponges and rechargeable batteries rather than single use products*

1. \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

3. \_\_\_\_\_

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### Reducing Waste at the Source

Source Reduction Exercise, (cont.)

Common materials found in these places

#### Restaurants

glass containers, steel cans, aluminum cans, food waste, OCC, plastic containers, polystyrene, unusable/outdated equipment, linens

#### Grocery Stores

OCC, excess/spoiled food, high grade paper, paper board, newspaper, plastic bags, paper and plastic food wrap

#### Public Schools

high grade paper, OCC, newsprint, food waste, steel cans, food and beverage cans, polystyrene, old equipment, furniture

#### Warehouse

yard waste, high grade paper, OCC, used oil, shrink wrap, pallets, plastic containers, steel drums, food containers, overruns, off-cuts, unusable equipment

#### Offices

high grade paper, newspaper, OCC, food and beverage containers, mixed paper, vending wastes

#### Residential

appliances, newspaper, magazines, high grade paper, OCC, plastic, glass and aluminum



# Fact Sheet

OFFICE OF WASTE REDUCTION SERVICES

State of Michigan • Departments of Commerce and Natural Resources

## WASTE REDUCTION - GETTING STARTED

*Whether your business has two employees or two thousand, waste reduction is an achievable goal with many associated benefits. Realizing those benefits, however, begins with selecting the waste reduction alternatives that are right for your company.*

### ***Policies and Goals***

Successful waste reduction begins with a **commitment** to reduction policies and goals. Support and direction from top management are critical to the development of company-wide waste reduction policies. Include a waste reduction hierarchy in your policy development. Examine all waste streams for source reduction, reuse and recycling or composting potential — in that order.

- Priority one is source reduction — the elimination of solid and hazardous wastes at their point of generation. This includes reducing the toxicity of waste by eliminating the use of highly toxic chemicals in manufacturing and seeking less chemically-intensive processes for the future. It also includes solid waste reduction options such as production changes to reduce the creation of scrap. Source reduction also includes consideration of the disposal of the products you produce. This includes reducing excess packaging, and improving reusability and recyclability of your products.

***Prevention of waste*** is the ultimate and perhaps most cost-effective waste management strategy.

- Reuse materials whenever possible. This might include using reusable containers rather than those designed for one-time use.
- Recycle or compost to reduce waste and recover valuable materials. These approaches should be considered after source reduction and reuse.

Other important components of a waste minimization policy are:

- Establishment of waste reduction goals. A goal of “zero waste” is something to work toward. A zero waste goal targets all wastes for reduction.
- Making waste reduction part of doing business, just as worker safety and product quality are. This includes involving and educating employees, as well as communicating with suppliers and clients.

### ***Guidance and Review***

Get the backing of top management as waste reduction policies and goals are established, to ensure successful implementation. Also, involve the individuals who will be most affected by operational changes, including maintenance staff, materials handling personnel and purchasing employees. At one Michigan auto parts

manufacturer, a "quality circle team" developed an office paper recycling plan. The program's success led to management support for plant-wide waste reduction efforts. Members of the team included representatives from all areas of the business' operations. The same type of broad employee participation has been critical to success at many firms.

Select a waste task force or committee. This is a vital step for reviewing waste reduction and recycling alternatives; overseeing program development, recommending an action strategy; and monitoring program implementation.

This group should meet on an ongoing basis to identify new ways to reduce waste and develop new programs. Waste is an ever-changing commodity. As new materials such as plastic packaging find their way into your waste basket, you will need to continually identify new ways to handle materials.

### **Program Development**

Planning for waste reduction begins with prioritizing waste streams on the basis of toxicity, volume, cost and ability to segregate materials.

As you develop a reduction plan consider adopting an incremental approach to reduction, where the waste item that is easiest to recycle or reduce is targeted first. For example, corrugated

cardboard is generally easy to separate from other waste for recycling. A thorough waste audit or assessment is always important, however, in order to characterize waste streams and determine volumes and recycling potential of various materials. Other planning approaches could include targeting the highest volume waste material, or the most hazardous waste material.

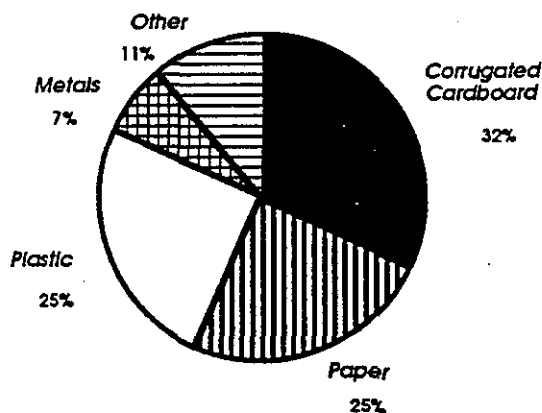
As waste streams are assessed for reduction potential, develop accounting systems that calculate the true cost of disposal and recognize benefits of waste reduction. This means going beyond handling, transportation, treatment and disposal costs. Lost revenue of materials that could have been sold as recyclables should be included in accounting systems, as well as the value of the wasted input material.

Don't overlook opportunities for reducing waste at the point of generation (source reduction). You can increase operating efficiency by substituting materials or changing processes so that fewer waste materials are produced. Examples of source reduction include replacing disposable materials with reusable and recyclable materials or switching to returnable containers.

### **Planning for Implementation**

A company-wide memo describing waste policies and goals will help kick off your waste reduction program. Solicit employee involvement, especially if you are planning a program that will require widespread employee participation, such as an office paper collection program. Often, employee volunteers can serve as "waste basket watchdogs", assisting with new employee orientation, distribution of collection containers and general trouble-shooting. Employee involvement can be encouraged through the use of incentives. Employees might be offered the opportunity to suggest changes that can result in

**SAMPLE WASTE COMPOSITION IN THE WHOLESALE SECTOR**



company savings. A portion of these savings could be passed back to the employee or his or her department.

Employee education and participation is critical to program success. Those who must change how they handle materials will need guidelines and training. Provisions must be made to continue these educational efforts into the future to anticipate personnel turnover.

Develop a weekly or monthly waste report to monitor the success of the program, provide employee feedback, and identify problem areas. Of course, the real proof of success will show up in empty waste dumpsters and reduced disposal costs.

### ✓ **Waste Reduction Planning Checklist**

*As you begin to develop a waste reduction plan for your facility, review the following checklist. It is detailed enough to make sure your main bases are covered, however, you'll want to add some of your own specific ideas.*

#### ✓ **Program Development**

- Develop a written waste reduction policy supported by top management.
- Establish ambitious and measurable waste reduction program goals, such as a reduction of 25 percent within the first year.
- Identify resources for technical assistance, including the local Chamber of Commerce, trade associations, state and local agencies, equipment vendors, consultants and other businesses.
- Designate a waste reduction or recycling coordinator.
- Plan a "brainstorming" session to generate waste reduction ideas.
- Conduct a plant-wide waste assessment.

- Prioritize or rank waste handling procedures, such as source reduction, reuse, on-site recycling, off-site recycling, waste exchange, waste disposal.
- Identify wastes to be targeted for reduction.
- Evaluate alternatives, considering cost, ease of implementation, payback and benefit to environment.
- Identify in-house resources, such as equipment that might be necessary to implement a reduction program.
- Develop a cost-benefit analysis which accounts for all of the costs of waste disposal.
- Use an accounting system that identifies waste handling, treatment, and disposal expenses as direct costs of producing a product.
- Inform employees about your firm's waste reduction goals and how the goals will impact daily operations.
- Determine storage requirements for collected recyclables.
- Project equipment and labor costs.
- Identify markets for recyclable materials.
- Develop an implementation schedule.

#### ✓ **General Planning Tips**

Once a management strategy has been established, you can identify some general waste reduction activities which apply to a variety of waste types and will go a long way towards meeting your waste reduction goals:

- Segregate all waste streams to reduce contamination of recoverable materials.
- Investigate waste exchange programs for both solid and hazardous waste.
- Establish quality assurance/quality control procedures to reduce the generation of rejected products.
- Replace disposable materials with reusable and recyclable materials.

- Investigate the use of returnable and/or recyclable containers and pallets.
- Identify specific waste materials that could be recycled either on-site or off-site.
- Provide employee training for source separation, reuse and any other reduction activities that will require a change in behavior.
- Establish an incentive program which encourages personnel to suggest changes which would reduce waste.
- Explore the use of recovery equipment for reducing hazardous waste in the form of sludges, solvents, acids, degreasers and other wastes.
- Identify potential production changes which would improve efficiency.
- Investigate opportunities for product or ingredient substitution which would reduce the creation of hazardous waste.
- Purchase materials in bulk or larger containers, but purchase only what you need to avoid spoilage or obsolescence.
- Control inventory to reduce waste; rotate stock, using oldest purchases first.
- Invest in products and equipment that are durable, easily repaired, and/or recyclable.
- Ask vendors to minimize unnecessary packaging, use recycled materials, or use returnable packaging.
- Determine if outdated stock can be returned to suppliers for regeneration.
- Don't accept product samples from sales people if there is a chance the samples will become a waste which you pay to dispose.

## ✓ Tips for the Small Business

- Target one material for reduction when getting started.
- Work with neighboring businesses to share balers or dumpsters, and other storage and collection containers.
- Initially focus on waste reduction ideas which require minimal capital investment.
- Involve all employees in planning and implementation.

*Developed by:*

**Resource Recycling Systems, Inc.**

*Funded by:*

**The Clean Michigan Fund  
Michigan Department of  
Natural Resources**

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For more information on the subject of waste reduction for businesses, contact the **Office of Waste Reduction Services**, Michigan Department of Commerce, P.O. Box 30004, Lansing, MI 48909; (517) 335-1178.

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**December 1989 • #8902**





# Fact Sheet

## OFFICE OF WASTE REDUCTION SERVICES

State of Michigan • Departments of Commerce and Natural Resources

### HOW BUSINESS ORGANIZATIONS CAN HELP

*Chambers of Commerce, trade associations, manufacturing associations, business clubs, and other business organizations can play a crucial role in supporting the waste reduction efforts of local businesses.*

**Leadership:** Business groups can provide crucial direction to their members, formulate waste management policies, establish relationships with outside groups, and lobby local government. This may serve to unite a business community, and give it a single strong voice.

**Information & Networking:** Business groups can provide members with the many types of general and location-specific waste reduction information and networking resources which businesses need to fully investigate their waste reduction opportunities.

**Direct Assistance:** Business groups can provide the direct informational and technical assistance businesses frequently require to begin assessing and implementing waste reduction practices.

**Funding:** Business groups can often more readily secure and organize sources of funding from public and private sources than can individual businesses.

More specifically, business organizations can:

- Form a task force to specifically address solid waste management and reduction issues.
- Develop and implement waste reduction programs within the organization and its functions.
- Highlight businesses which have successfully implemented waste reduction practices.
- Organize educational forums and develop educational materials for members concerning the successful design and implementation of waste reduction programs.
- Set up a local "Waste Exchange" or a waste "hotline" to provide basic information and facilitate communication among members.
- Develop the capacity to provide a waste assessment service to members which will inform businesses about their waste reduction opportunities.

- Use newsletters and other regular communications to inform and update members about equipment vendors, waste reduction activities in progress, pending legislation, and success reports.
- Form a recycled products buying club to increase the volume and reduce the costs of purchasing recycled products for members.
- Assist county solid waste planning efforts.

### **EXAMPLES IN MICHIGAN**

Increasingly, Michigan business organizations are taking initiatives in helping their members reduce their waste. Most of these initiatives are to increase the awareness within the business community about relevant environmental issues and regulations. Some are going beyond this educational role to become a forum where members can share with one another how to reduce waste and save money on environmental compliance. A few examples of these efforts are provided below:

#### **Grand Rapids Chamber of Commerce**

The Grand Rapids Chamber of Commerce has organized an Environmental Affairs Committee to update businesses on environmental regulations and legislation, and to formulate positions on legislative and regulatory issues. It sponsors several environmentally-oriented seminars each year, including seminars on waste reduction, and publicizes these special events through the Chamber's newsletter.

#### **Ann Arbor Area Chamber of Commerce**

The Ann Arbor Area Chamber of Commerce has created a Recycling and Solid Waste Task Force in response to waste management issues in the Ann Arbor area. Composed of 20 members from throughout the business community, this voluntary task force focuses on local waste

management issues and how they affect the business community.

The task force also communicates to City Council about the positions of the Chamber, and to Chamber members about the actions and inclinations of city officials. It has prepared information for the Chamber's newsletter.

#### **Michigan Industrial Waste Reduction Partnership, Inc.**

This new non-profit organization is composed of representatives from business, industry, academia, the general public and state government. Formation of the Partnership was recommended by the gubernatorially-appointed Environmental Technology Board as a first step toward the establishment of concerted and coordinated waste reduction research efforts in Michigan. The Partnership will generate a waste reduction research agenda, and identify priority research projects, technical expertise and financial resources. Contact the Office of Waste Reduction Services for further information.

#### **Michigan Manufacturing Association**

*Developed by Resource Recycling Systems, Inc. with a grant from the Clean Michigan Fund, Michigan Department of Natural Resources.*

For more information on the subject of waste reduction for businesses, contact the Office of Waste Reduction Services, Michigan Department of Commerce, P.O. Box 30004, Lansing, MI 48909; (517) 335-1178.

**December 1989 • #8910**

## —————Session 4—————

# Yard Waste Management

### Session Preview

Yard waste (landscaping waste), one of the largest components of the waste stream, presents distinctive challenges to the recycling coordinator. Yard waste that is processed and managed properly presents great marketing potential as a mulch or compost product.

This session introduces the regulatory, technical and marketing issues that are critical to successful management of yard waste.

### Importance of Yard Waste Management in a Waste Reduction Program

The term "yard waste management" is commonly used interchangeably with the term "yard waste composting"; however, while composting is frequently the main component in the management of yard waste, other options are available independent of or in addition to composting. Generally, yard waste and composting are defined as follows:

**Composting:** The controlled decomposition of organic waste by microorganisms, which yields a stable, humus-like, pathogen-free final product and achieves volume reduction of 30 to 75 percent.

**Yard Waste:** Vegetative matter resulting from land-clearing or landscaping, e.g., stumps, limbs, leaves, grass, and untreated wood.

Because yard waste has been banned from disposal in sanitary landfills, yard waste management has assumed prominence in integrated solid waste management strategies. Three significant benefits result from proper yard waste management:

**1. Yard waste management will meet regulatory requirements.**

- SB 111 bans yard waste in sanitary landfills after January 1, 1993. Management of yard waste by composting and mulch production helps meet solid waste disposal reduction goals.

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# Yard Waste Management

### 2. Yard waste management will divert significant waste tonnage from disposal.

- Yard waste is a sizable component of municipal solid waste (MSW), especially in urban and suburban areas; on average, *yard waste comprises an estimated 10 to 25 percent of total MSW in North Carolina.*
- In fiscal year 1994-95, 495,034 tons of yard waste, pallets, and wood waste were diverted from disposal in sanitary landfills in North Carolina.

### 3. Yard waste management is cost effective.

- Many yard waste management strategies can be accomplished with minimal technology and relatively low capital investment.
- Yard waste management strategies can be designed to accommodate specific community/ business needs.
- Local governments and businesses can often utilize existing equipment and personnel to manage yard waste.
- Yard waste management is cost competitive in comparison to disposal options such as incineration or landfilling.
- Yard waste management results in a beneficial end product that can be used by both the public and private sectors.

## Components of Yard Waste Management

The amount of yard wastes that can be diverted from disposal depends on several factors:

- The composition of the yard waste collected.
- The participation rate.
- The degree to which the end products are ultimately utilized.

An critical step in development of a yard waste management system is to assess the **types** and **quantities** of materials that can be incorporated into the system.

## —————Session 4—————

# Yard Waste Management

### Types of Yard Waste

#### **Residential (and non-residential) yard waste**

Residential yard waste is generated in the routine upkeep of home and commercial landscapes and gardens and consists primarily of grass clippings, leaves, and small brush. The waste is generated by homeowners and landscape contractors (and to some extent business owners who maintain grounds) and is highly variable seasonally with respect to composition and volume.

#### **Untreated wood waste**

Untreated wood waste consists of large branches and tree trimmings generated by public utility crews and landscape contractors. Untreated wood waste includes trees, stumps, and other large woody debris generated by land-clearing crews.

#### **Other Materials**

Below are other materials that may be incorporated into a yard waste management program with proper controls:

- Silvicultural wastes.
- Pallets and other industrially generated woody wastes such as mill ends, etc.
- Untreated and unpainted wood wastes.

### Quantities of Yard Waste

Yard waste generation rates, and, to some extent, recovery rates, vary widely according to characteristics such as population density, average lawn/lot size, climate, growing season, and related factors. It is important to estimate the amount of yard waste that may be collected in your program. These estimates can be made in terms of either weight or volume. The following table presents average densities for selected yard waste materials.

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# Yard Waste Management

### Average Densities for Selected Yard Waste Materials

Material	Condition	Typical Density, lbs/yd <sup>3</sup>
Brush and leaves	Loose and dry	100-300
Leaves	Loose and dry	100-260
Leaves	Shredded and dry	250-350
Leaves	Compacted and moist	400-500
Green grass	Loose	300-400
Green grass	Compacted	500-800
Yard waste	As collected	350-930
Yard waste	Shredded	450-600
Compost	Finished, screened	700-1200

*Sources: Yard Waste Management: A Planning Guide for New York State; NC Strategic Recycling Market Development: Technical and Market Development Analysis for Compost Material in North Carolina.*

#### **Terms for Calculating the Quantity of Materials:**

- **"Generation rate"** refers to the amount of yard waste produced; usually expressed in pounds per person or pounds per household.
- **"Recovery rate"** refers to the amount of generated yard waste that is recovered for processing; recovery rate is a function of the collection method, set-out rates, and citizen participation.
- **"Rule-of-Thumb"** estimates of residential yard waste generation rates (per single-family household per year) can be used for preliminary planning purposes; for example:
  - 150 to 500 pounds of leaves
  - 400 to 1000 pounds of grass clippings
  - 300 pounds of wood and brush

## —Session 4—

# Yard Waste Management

**Note:** Accurate estimates are difficult to obtain without historical collection data. The "rule-of-thumb" estimate of per capita residential and commercial yard waste generation in North Carolina is 237 pounds/person/year.

## Management Options

A truly comprehensive waste management approach incorporates more than one component to create an integrated system that is best suited to the community or organization that it serves. When considering a management option, planners should carefully consider the resulting end products and their marketability or usefulness.

Three options for yard waste management are source reduction, centralized composting, and centralized wood waste processing.

### 1. Source Reduction

Source reduction is defined as a group of strategies that reduces the total amount or toxicity of materials entering the waste stream.

- A reduction in the amount of yard waste produced will reduce the need for collection and processing of yard waste and marketing of yard waste products.
- Source reduction represents the least costly management alternative for residential yard waste.
- Since source reduction relies heavily on citizen/staff involvement, it usually requires an intensive public education and promotional effort.

### 2. Centralized Composting

Composting is defined as the decomposition of organic waste by microorganisms which yields a stable, humus-like, pathogen-free final product that is reduced in volume by 30 to 75 percent. A centralized facility may process all or some portion of the yard waste generated in a community.

- Compared to historical practices of yard waste disposal such as landfilling or burning, composting is a more environmentally favorable option.
- Composting generates a product that useful to the general public as well as to commercial and public landscapers and highway departments.
- Composting requires planning efforts that address collection, processing and distribution systems.
- A composting operation can be owned and/or operated by public or private sector.

## —Session 4—

# Yard Waste Management

### 3. Centralized Wood Waste Processing

Some wood waste can be managed in a composting operation, but it usually requires one or more pre-processing steps such as grinding, shredding, chipping, and screening to produce mulch or wood chips. Therefore, a centralized wood waste facility can be an integral component of successful yard waste management.

- While a certain amount of brush is beneficial to the composting process, a high percentage of large woody wastes will retard the composting process.
- Some woody wastes do not require composting prior to beneficial use and are best processed separately.
- Specialized equipment such as chippers and grinders can process stumps and large branches into wood chips for use as mulch or fuel.
- Some woody wastes can be made into firewood.
- Some types of equipment can also process wood from construction and demolition (C&D) projects; however, contaminants such as plastic, glass, and metals, which are frequently mixed in with C&D waste, must be controlled.

### Implementation Strategies

The options for yard waste management should be evaluated for suitability for a specific community. In some cases, a combination of options is suitable; in others a single approach may be effective.

#### 1. Source Reduction Programs

In most programs, source reduction is an effective way to reduce the amount of yard waste entering the municipal waste stream. Therefore, a source reduction program should always be considered when a yard waste management program is being planned. Source reduction options include:

##### **Grasscycling**

Cooperative Extension Specialists encourage residents and businesses to leave their grass clippings on the lawn or mow with a specialized "mulching mower" that eliminates the need to rake or bag grass clippings. On a 7,500 ft<sup>2</sup> lawn, grass clippings left on the lawn could divert 3,000 pounds of clippings in one year. To some extent, leaves can also be mulched rather than raked, bagged, and set out for disposal.



## —————Session 4—————

# Yard Waste Management

### **Backyard Composting**

Residents and businesses can maintain small piles or bins in which yard waste is layered and is eventually decomposed into a soil-like material that can be used in landscaping and gardening. The level of effort required to produce compost varies with the technique used. Cooperative Extension Agents can provide assistance with backyard composting programs.

### **Alternative planting and landscape maintenance**

Alternative planting or xeriscaping is the practice of planting plants and grasses that require less frequent mowing, fertilizing, and watering and generate less vegetative waste; thus, such plants and grasses reduce the amount of yard waste generated for disposal. Residents and businesses could further reduce the amount of yard waste generated by decreasing the size of their "turf"; i.e., by planting ground cover plants that generate less waste.

Source reduction programs for communities usually require intensive public education and promotional efforts. Master Composter programs have been developed with the assistance of Cooperative Extension personnel in North Carolina and across the country. Such programs rely on volunteers who become trained in backyard composting techniques and pass on their knowledge to others.

Although source reduction is an important part of an integrated yard waste management program, it generally cannot replace the need for additional management components.

## **2. Centralized Systems**

Centralized systems are the most common means for local governments to provide yard waste management services to residents. The main components of a centralized yard waste program are recovery, processing, and final product distribution.

### **Recovery**

Efficient operation of a yard waste processing facility relies on effective recovery that is compatible with the overall system. Recovery of yard waste in a community can be accomplished by curbside collection and/or drop-off centers.

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# Yard Waste Management

### **Drop-off centers operated by a local government or private facility:**

- Are designated areas to which homeowners and other generators deliver their yard waste.
- Require a smaller investment, less effort, and fewer personnel than curbside collection.
- May be the only economically feasible option for rural areas of low- or medium-population density or in areas that have no municipal or private waste collection.
- Usually experience lower participation rates because of the extra effort and the burden of transportation that is borne by the resident.
- Must be continuously well publicized to promote participation.
- Can complement a curbside collection program in larger communities as a place for large-quantity generators such as large businesses and landscape contractors to deliver their yard waste materials
- Are a good interim measure until curbside collection can be implemented.
- Can be staffed or unstaffed, although contaminant levels can be controlled only at staffed sites.
- Can also serve as a distribution point for residents to pick up the finished mulch or compost product if processing is performed on site.

### **Curbside Collection**

- Usually results in higher participation rates than drop-off centers because it is more convenient for residents.
- Design varies according to quantity and types of yard waste to be collected and frequency of collection.
- Can utilize existing garbage collection equipment .

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# Yard Waste Management

- Set-out method can be loose or containerized.

Various options to collect yard waste materials under a curbside collection system are listed below. A chart follows that shows system components and costs.

1. **Loose (bulk) collection:** Crews use a vacuum collector or a front-end loader to pick up yard wastes raked to curb by resident:

**A vacuum collector** blows the material into a truck bed; the vacuum collector is generally used only for leaf collection.

**A front-end loader** picks up the material and places it in a dump-truck or other container; the loader operates with standard or, for more efficient operation, specialized "pincer" type buckets.

2. **Containerized collection:** Yard waste materials are put into paper or plastic bags, bins, or other designated containers and placed at the curb. The collector can use standard garbage compactor trucks to pick up the material and take it to the composting site.

Container options include:

### **Plastic or Paper Bags**

- Standard plastic bags are probably the easiest to use as residents are accustomed to their use; however, final disposition of the plastic in the composting process must be considered.
- An advantage of clear plastic bags is that collection crews can monitor them for contaminants.
- Degradable plastic bags are designed to break down through exposure to sunlight, but they do not break down quickly enough to eliminate concern about plastic contamination in the final product.
- Heavy duty paper bags designed for yard waste collection do break down within the time needed to compost the yard waste material; however, the cost may be higher than for plastic bags, and collection crews will have difficulty discovering contaminants.

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## Yard Waste Management

### Yard Waste Recovery Equipment

System	Capacity	Features	Materials	Costs
Vacuum leaf collector, self contained	5-25 yd <sup>3</sup>	Includes vacuum, machine and collection unit	Leaves only (loose collection)	\$15,000 - \$40,000
Vacuum leaf loader	Varies with capacity of collection units	Usually trailer mounted - requires support collection unit	Leaves only (loose collection)	\$10,000 - \$15,000
Mechanical scoop	0.5 - 2.7 yd <sup>3</sup>	Attaches to front end-loader, requires support collection unit	Leaves, brush, and grass clippings - loose collection	\$2,500 - \$12,000
Compactor trucks	20 - 30 yd <sup>3</sup>	May be existing equipment	Leaves, brush, and grass clippings - loose collection	\$60,000 - \$170,000
Dump trucks	4 - 6 yd <sup>3</sup>	May be existing equipment	Leaves, brush, and grass clippings - loose or containerized	\$55,000 - \$90,000
Front-end loaders with standard bucket	2 - 4.5 yd <sup>3</sup>	May be existing equipment	Leaves (loose collection; not particularly efficient)	\$80,000 - \$150,000

#### Other Containers

Plastic bins are popular in many communities for yard waste collection; however, collection crews will have difficulty seeing contaminants in the container. When collecting yard waste in reusable plastic bins, a community can use manual, rear- or side-loading packer trucks, or automated side loaders.

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# Yard Waste Management

Container size is based on expected quantity of yard waste to be collected, with 30- to 90-gallon containers used primarily for single-family residences. Larger containers (up to 400 gallons) can be shared by neighborhoods.

### Processing

Once the organic materials have been collected and/or delivered to a management facility, a number of processes can occur. According to the desired end product, the available space, and the volume of incoming materials, these processes can occur individually, in series, or simultaneously.

#### Pre-Processing

Pre-processing for volume reduction is a critical first step, especially for large volumes of woody materials. Pre-processing usually involves the removal of contaminants, especially those that might cause damage to equipment. Material is then chipped, shredded, or ground into a more manageable size. Equipment for this operation can be stationary or mobile to service more than one location.

Much of the shredded or chipped materials may be marketable and in high demand by the public or commercial enterprises for use as a mulch or fuel without further processing. Materials that are suitable for these applications should be graded (screened) and stockpiled for such use. Woody materials, once they are significantly reduced in size by pre-processing, may also be added to the composting process; however, the total composting time will increase with a higher percentage of woody materials.

#### Composting

Composting can incorporate one or several types of yard waste including leaves, grass clippings, brush, some larger woody wastes (if pre-processed for volume reduction), and some agricultural wastes.

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# Yard Waste Management

### Basic elements of the composting process:

- **Yard wastes are placed in rows (called windrows) for composting.**
- **During composting, volume is reduced by 40 to 75 percent.**
- **Level of technology can vary with land available, labor, capital, and desired end product.**
- **Time required varies (3 months to 3 years) with composition, size of windrows, frequency that waste is turned, and climate.**
- **Grass clippings in a composting operation require more frequent turning and faster composting, and may generate more odors.**
- **Space requirements for a composting operation vary with the level of technology used, generally one acre per 3,000-5,000 yd<sup>3</sup> of yard wastes, not including buffer zone; should have slight slope to allow runoff and collection of rain water.**
- **Finished product is a dark brown substance referred to as humus or compost.**

### **Additional processing**

This option, which is tailored to meet the needs of the end product, may be used to produce a higher quality product after composting. Product finishing usually involves curing (for complete stabilization of the compost), additional shredding, and/or screening for size classification.

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# Yard Waste Management

### Equipment

The following equipment is used in large-scale composting operations.

#### Size reduction equipment:

- High-speed shredders (hammermills)
- Chippers
- Slow-speed shredders
- Tub grinders

#### General operation equipment:

- Mixers
- Water trucks
- Windrow turners
- Other pile turning equipment
- Front-end loaders

#### Finishing equipment:

- Trommel screens
- Flat screens
- Crushers

## Marketing Strategies

The success of a yard waste management program depends on successful development and maintenance of markets for the final product. Businesses may find that they can use all the compost that they produce in their own landscaping. Municipal and private composting sites with limited storage capacity will be especially concerned with rapid product turnaround. Therefore, it is necessary to develop a marketing/distribution plan that is compatible with the other yard waste system components.

## Quality Standards

The quality of the finished product(s) will dictate its end uses. Unscreened compost containing a high percentage of debris or trash will be unattractive to most homeowners and landscapers. A cleaner, more uniform product will be in greater demand and useful in more applications.

Although there are currently no uniform quality standards for compost and mulch products nationwide, North Carolina's Solid Waste Compost Facility Rules do specify minimum quality requirements for yard waste compost or mulch distribution:

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# Yard Waste Management

### 15A NCAC 13B Section .1407: Classification/ Distribution of Solid Waste Compost Products-

*"Compost or mulch that is produced at a Type 1 facility and that contains minimal pathogenic organisms, is free from offensive odor, and contains no sharp particles that would cause injury to persons handling the compost, shall have unrestricted applications and distribution if directions are provided with the compost product."*

If the owner intends to market the product as fertilizer, the applicant must register with and meet any applicable requirements of the North Carolina Department of Agriculture, Fertilizer Section.

#### **General product quality parameters:**

- Manmade Inerts
- Pathogen Reduction
- Metal Concentration

### **Major Compost User Groups**

#### **Bulk uses include:**

- Public works such as building grounds, parks, cemeteries, schools.
- Landfill cover, to the extent acceptable according to regulations.
- Highway maintenance.
- Commercial landscaping.
- Golf courses.
- Nurseries and greenhouses.
- Disturbed land reclamation.
- Turfgrass farms.
- Organic farms.

#### **Retail/wholesale users include:**

- Soil processors.
- Homeowners.
- Lawn and garden centers.



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# Yard Waste Management

### Alternative energy uses:

- Wood chips are frequently in demand for industrial boilers.
- Firewood.

### Composting Methods and Facility Requirements

<b>Compost Level:</b>	<b>Low Level</b>	<b>Medium Level</b>	<b>High Level</b>
<b>Process requirements</b>	Add water, turn windrows, primarily manage yard wastes	Pre-screen impurities, shredding option, control moisture, turn windrows	Pre-screen impurities, pre-shred, monitor moisture, turn and shred windrows, post-screen impurities, composition analysis, final grinding
<b>Composting and curing time</b>	24 - 36 months	10 - 20 months	Less than 8 months
<b>Space requirements</b>	<3000 yd <sup>3</sup> /acre + small buffer because of fewer odor concerns	<3,000-4,500 yd <sup>3</sup> /acre + increased buffer depending on feedstock and turning needs	>4,500 yd <sup>3</sup> /acre + buffer depends on feedstock and compost method
<b>Equipment requirements</b>	Front end loader, Water truck	Front end loader, Water truck, Shredder, Screen	Front end loader, Water truck, Shredder, Screen or trommel, Windrow turner, Tub grinder, Bagging equipment (optional)
<b>Marketing strategies</b>	Giveaway programs, Haul for free	Bulk sales, Haul at cost	Bulk sales, Haul at profit, Retail sale (bagged)

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# Yard Waste Management

### **Product Demand**

Compost and mulch have been used by farmers and gardeners for hundreds of years, and considerable knowledge exists on proper uses. This era of recycling and landfill shortages has in some ways redefined the term "compost" in both the process and the product. While markets do exist for soil products and mulch as they have historically been produced and used, the products derived from municipal yard waste processing will have to be proven as viable alternatives or substitutes. Local governments responsible for yard waste programs have the burden of developing markets and demonstrating the benefits of its products to the consumer.

#### **Determining Product Value**

Many communities have chosen, at least initially, to give the products away to residents and use them for public works projects. The main advantage of this approach is that it allows the users (public or private) to "test" the material and become familiar with its characteristics and applications. The practice of giving the material away for free may evolve into selling the material as the processing operation is "fine tuned" and consistent product quality has been demonstrated.

- Locate potential compost/mulch users.
- Estimate the demand (quantity).
- Set product pricing.

### **Educating Consumers**

Education about yard waste recycling and compost products is an important component of a marketing strategy. Potential users need to be educated on the uses and benefits of compost and mulch. Businesses who plan an "in-house" composting program and local governments may want to seek assistance and information from local nursery associations and/or extension agents. These resources may also be willing to assist in developing demonstration programs that educate the public and private sectors on beneficial applications of the products.

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# Yard Waste Management

### **Promoting participation**

In addition to programs that demonstrate the benefits of compost products, the public needs to be educated about its responsibility for the success of the program, including the amount by which they or local businesses help reduce the community's or county's waste stream. Continued promotion of the program is necessary to maintain participation and public/upper management support for the project.

### **Wrap Up**

The role of the coordinator varies among communities or businesses concerning yard waste management. Yard waste management frequently falls under the purview of the landfill manager or groundskeeper. The coordinator is likely to be asked to be involved in developing a strategy for the finished product.

As with other recycling components, a wealth of information is available from operators across North Carolina who have developed successful composting programs. Please refer to the listing of yard waste facility contacts in the appendix of this session for more information.

**HOW IS YARD WASTE BEING MANAGED IN YOUR COMMUNITY?**

—————**Session 4**—————  
**Yard Waste Management**

**Yard Waste Exercise 1**

**Rowena County**

Population 162,5000

<u>Municipalities</u>	<u>Population</u>
Edwena	6,200
Rowdyville	1,200
Prayertown	83,750 (County Seat)
Martin's Crossing	18,000

**Background:**

Rowena County has one sanitary landfill, which is located just outside of Prayertown. Prayertown has its own garbage collection crew and collects from all households twice weekly. The other municipalities do not provide any garbage collection; most households pay for private collection or haul their own garbage to the landfill or a drop-off station. There are 14 unstaffed, county-run drop-off stations located throughout the county. The County is in the process of designing a centralized composting facility that will be capable of handling all the yard waste generated in the County and the municipalities. The facility will operate by processing all incoming material through a tub grinder, forming it into windrows (where it will compost), turning the windrows with a windrow turner, and giving the material away to the public.

You belong to a Solid Waste Task Force comprised of representatives of Rowan County and all its municipalities. Your committee has been asked to discuss yard waste recovery issues for the County and all municipalities. Prepare a presentation that outline the pros and cons; be prepared to recommend the favored option and present your rationale.

**Group A:**

List the advantages and disadvantages of drop-off vs. curbside collection of yard waste.

**Group B:**

List the advantages and disadvantages of loose (bulk) vs. containerized collection.

**Group C:**

Chose the type of container that will best suit your program and give reasons for your choice.

(continued next page)

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# Yard Waste Management

Address the following issues, at a minimum, in your discussions:

- Effect of collection or set-out method on participation rates
- Costs
- Transportation issues
- Ease of implementation
- Contaminants
- Effect of recovery on processing
- Public or worker safety issues
- Final product quality
- Environmental issues
- Resources available

**Session 4**

**Yard Waste Management**

**Yard Waste Exercise 2**

**The Good Oak Furniture Company**

The Good Oak Furniture Company, Flounderville NC, has 400 employees, three manufacturing buildings, one cafeteria building, and one office building and sits on 40 acres. The Flounderville complex is the company's national headquarters and is beautifully landscaped. One acre of land located behind building No. 3 is fenced off and houses the main dumpsters and discards.

You have recently acquired the duties of recycling coordinator for the Good Oak Furniture Company. The Good Oak has three grounds maintenance staff persons. You have noticed that the company has been discarding small amounts of untreated lumber and always has old pallets in the dumpster. You have also noticed a large pile of limbs, leaves, and grass clippings that are being stacked up behind the fence in the woods and allowed to decompose naturally. After checking with the accounting department, you find out that the company spends over \$3,000 per year on mulch alone.

**Using what you have learned in this chapter, how will you plan to manage the company's yard waste?**

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# Yard Waste Management

## Take-Home Exercise

### Step 1.

**Population.** Estimate the total amount of residential yard waste for your community by first estimating your community's population.

### Step 2.

**Number of households.** Estimate the number of single-family households in your community. If you do not know the number of households, divide the total population by 4.

### Step 3.

**Tonnage Estimates.** Based on the number of single-family households in your community and the estimated generation rates shown in Table S-2, determine:

1. Tons of residential leaves generated annually: Consider the density of tree cover in your community, especially in residential areas, to determine the end of the range to use.
2. Tons of residential grass generated annually: Consider the average lawn/lot size of homes as well as prevalent landscaping practices in your community to determine the end of the range to use.
3. Tons of residential brush generated annually.
4. Total tonnage of yard waste generated annually per single-family household (add 1 + 2 + 3).

### Step 4.

**Volume Estimates.** Based on the results of the above calculations and density factors in Table X-2, determine the expected volume of yard waste generated in your community.

1. Make one estimate from density factors for each individual material and adding them.
2. Then take the total estimated tonnage and use the average "as collected" density factor for yard waste. Compare this estimate with the results from No. 1.

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# Yard Waste Management

### **Other questions to consider after completing the worksheet:**

How accurate do you think these estimates are? Do you need more information?

How can yard waste materials coming from businesses, parks, cemeteries, etc., be accounted for in your quantity estimates?

What factors will cause variability in your estimates?

Based on your estimates, what percentage of your total waste stream is yard waste? (yard waste tonnage versus MSW tonnage).

Because these estimates give generation rates, how will you estimate actual recovery rates when designing your yard waste collection program?

Ask your landfill manager for the time the landfill's useful life can be extended if you divert the estimated amount of yard waste.

Think of other ways you can estimate yard waste generated. Then see list below.

### **More detailed estimates of yard waste generation:**

1. Compare your community's characteristics with those of a similar community that has some data on yard waste quantities.
2. Interview or survey landscapers, public works officials, haulers, arborists.
3. Conduct a pilot- or small-scale collection program in a characteristic area of the community and record types, quantities, set-out, and participation rates.
4. Record amounts actually collected and delivered during early years of your program. This record will help in the design of future modifications or improvements to the systems.





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**SOLID WASTE SECTION  
CLARIFICATION - YARD TRASH BAN  
NOVEMBER 1, 1992**

*It is the purpose of this memo to clarify the Solid Waste Section's position regarding the January 1, 1993 ban of yard trash.*

*G.S. 130A-309.10(f) 3 states no person shall knowingly dispose of yard trash after January 1, 1993, except in landfills classified for such use under rules adopted by the Commission. Yard trash that is source-separated from solid waste may be accepted at a solid waste disposal area where the area provides and maintains a separate yard trash composting facility.*

*Policy Memorandums Nos. 14 and 16 defined yard trash as solid waste consisting of vegetative matter resulting from landscaping maintenance such as leaves, grass, limbs and trimmings and emphasized that yard trash should be managed as compost or mulch.*

*Current and proposed regulations for land-clearing/inert debris landfills allow the disposal of yard trash in these classes of landfills. However, other solid waste disposal sites, those classified as municipal solid waste, industrial and construction/demolition landfills may not accept yard trash for disposal. These facilities may provide mulching and composting operations through appropriate permits.*

*To further encourage the use of yard trash as compost or mulch, the Section shall require, as part of the solid waste management planning process, that local governments evaluate alternatives to disposal of yard trash in land-clearing/inert debris landfills. After adoption of local solid waste management plans, continued disposal of yard trash will only be allowed if consistent with approved plans addressing disposal alternatives.*

*This policy is anticipated to allow the diversion of yard waste toward alternative management strategies while allowing some disposal capacity as programs are implemented and expanded. The Section encourages local governments and private waste management firms to provide alternative management facilities for yard waste. The Section also encourages the expanded use of yard waste mulch and compost by State and local governments, the private sector and individual homeowners.*

*For further information regarding the yard trash ban, please contact the Waste Management Specialist for your area indicated on the attached map.*

## SECTION .1400 - SOLID WASTE COMPOST FACILITIES

**.1401 REQUIREMENT FOR PERMIT**

(a) All persons whose purpose is or includes the production of compost from solid waste or solid waste co-composted with other wastes shall not construct, operate, expand or modify a facility until a currently valid permit for a solid waste compost facility is issued by the Division. This provision also applies to facilities that accept, store, or produce compost or mulch from yard waste or from residues from agricultural products and processing. General Provisions, Siting, design, application, operational, distribution, and reporting requirements shall be in accordance with Rules .1402, .1403, .1404, .1405, .1406, .1407, and .1408 of this Section.

(b) Plans for a Large Type 3 or Type 4 Solid Waste Compost Facility Permit, or a permit for any facility located over a closed out disposal area shall be submitted in accordance with Rule .0201(a)(3) of this Subchapter. A minimum of four sets of plans shall be submitted within each application.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;  
Eff. December 1, 1991;  
Amended Eff. May 1, 1996.*

**.1402 GENERAL PROVISIONS FOR SOLID WASTE COMPOST FACILITIES**

(a) **Applicability.** The provisions of this Rule apply to compost facilities that compost solid waste or co-compost solid waste with sludges that are not classified as a solid waste, functioning as a nutrient source. Facilities that co-compost with sewage sludge shall comply with all applicable Federal regulations regarding sludge management at 40 CFR 501 and 503. 40 CFR 503, subpart B is hereby incorporated by reference, including subsequent amendments or additions. Copies of the Code of Federal Regulations may be obtained from the Solid Waste Section at 401 Oberlin Road, Suite 150, Raleigh, NC 27605 at no cost.

(b) The provisions of this Section do not apply to compost facilities that compost sludge with municipal solid waste functioning only as a bulking agent.

(c) Solid Waste Compost Facilities that have been permitted prior to the effective date of this Rule shall meet the requirements of this Section within one year of the effective date of this Rule, or, within two years if more than one hundred thousand dollars (\$100,000) of capital investment is necessary to comply with changes.

(d) Solid waste compost produced outside the State of North Carolina and imported into the state shall comply with the requirements specified in Rule .1407 of this Section.

(e) Compost that is disposed shall not count toward waste reduction goals.

(f) Solid waste compost facilities shall be classified based on the types and amounts of materials to be composted.

- (1) Type 1 facilities may receive yard and garden waste, silvicultural waste, untreated and unpainted wood waste or any combination thereof.
- (2) Type 2 facilities may receive pre-consumer meat-free food processing waste, vegetative agricultural waste, source separated paper or other source separated specialty wastes, which are low in pathogens and physical contaminants. Waste acceptable for a Type 1 facility may be composted at a Type 2 facility.
- (3) Type 3 facilities may receive manures and other agricultural waste, meat, post consumer-source separated food wastes and other source separated specialty wastes or any combination thereof that are relatively low in physical contaminants, but may have high levels of pathogens. Waste acceptable for a Type 1 or 2 facility may be composted at a Type 3 facility.
- (4) Type 4 facilities may receive mixed municipal solid waste, post collection separated or processed waste, industrial solid waste, non solid waste sludges functioning as a nutrient source or other similar compostable organic wastes or any combination thereof. Waste acceptable for a Type 1, 2 or 3 facility may be composted at a Type 4 facility.
- (5) The listed waste types in Subparagraph (f)(2) of this Rule shall be considered to be low in pathogens and physical contaminants if handled so as to prevent development of contaminants or exposure to physical contamination. The listed waste types in Subparagraph (f)(3) of this Rule are likely to have high pathogens and low physical contamination. In determining whether a specific waste stream is acceptable for composting in a Type 2 or Type 3 facility, the Division shall consider the method of handling the waste prior to delivery to the facility as well as the physical characteristics of the waste. Testing for pathogens and physical contaminants may be required where a determination cannot be made based upon prior knowledge of the waste. Test methods shall be in accord with Appendices A and B to Table 3.
- (6) Small facilities are those that receive less than 1000 cubic yards of material for composting per quarter,

and occupy less than two acres of land, except that a Small Type 1 facility shall process or store less than 6,000 cubic yards of material per quarter.

- (7) Large facilities are those that receive 1000 cubic yards or more of material for composting per quarter or occupy two acres or more of land, except that a Large Type 1 facility shall process or store more than 6,000 cubic yards of material per quarter.
- (g) A permit is not required for the following operations:
- (1) Backyard Composting.
  - (2) Farming operations and silvicultural operations where the compost is produced from materials grown on the owner's land and re-used on the owner's land or in his associated farming operations and not offered to the public.
  - (3) Small Type 1 Facilities meeting the following conditions:
    - (A) Notification of the Solid Waste Section prior to operation and on an annual basis as to:
      - (i) Facility location;
      - (ii) Name, address and phone number of owner and operator;
      - (iii) Type and amount of wastes received;
      - (iv) Composting process to be used; and
      - (v) Intended distribution of the finished product.
    - (B) Agreement to operate in accordance with operational requirements as set forth in Rule and the setbacks in Rule .1404(a)(1) - (9) of this Section.
    - (C) Facility operates in accordance with all other state or local laws, ordinances, rules, regulations or orders.
    - (D) Facility is not located over closed-out disposal site.
    - (E) Safety measures are taken to prevent fires and access to fire equipment or fire fighting services is provided.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;*  
*Eff. December 1, 1991;*  
*Amended Eff. May 1, 1996.*

#### **.1403 GENERAL PROHIBITIONS FOR SOLID WASTE COMPOST FACILITIES**

- (a) Neither hazardous waste nor asbestos containing waste shall be accepted at a facility or processed into compost.
- (b) Household hazardous waste shall not be accepted by a facility, except in an area designated by facility site plans for storage, and shall not be processed into compost.
- (c) Any compost made from solid waste which cannot be used pursuant to the requirements of this Rule shall be reprocessed or disposed of pursuant to the requirements of 15A NCAC 13B.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;*  
*Eff. December 1, 1991;*  
*Amended Eff. May 1, 1996.*

#### **.1404 SITING/DESIGN REQUIREMENTS FOR SOLID WASTE COMPOST FACILITIES**

- (a) A site shall meet the following requirements at the time of initial permitting and shall continue to meet these requirements throughout the life of the permit only on the property owned or controlled by the applicant or by the landowner(s) at the time of permitting:
- (1) A site located in a floodplain shall not restrict the flow of the 100-year flood; reduce the temporary storage capacity of the floodplain; or result in washout of solid waste so as to pose a hazard to human life, wildlife, land or water resources;
  - (2) A 100-foot minimum buffer is required between all property lines and compost areas for Type 3 and 4 facilities, 50-foot for Type 1 or 2 facilities;
  - (3) A 500-foot minimum buffer is required between compost areas and residences or dwellings not owned and occupied by the permittee, except that Type 1 and Small Type 2 and 3 facilities shall have a 200-foot minimum buffer;
  - (4) A 100-foot minimum buffer is required between all wells and compost areas, except monitoring wells;
  - (5) A 50-foot minimum buffer is required between perennial streams/rivers and compost areas;
  - (6) A compost facility shall be located in accordance with 15A NCAC 2B .0200, Classification and Water Quality Standards Applicable to Surface Waters in North Carolina;

- (7) All portions of any compost facility located over a closed-out disposal area shall be designed with a pad adequate to protect the disposal area cap from being disturbed, as defined in Part (a)(10)(E) of this Rule, and there shall be no runoff from the pad onto the cap or side slopes of the closed out area;
- (8) A 25-foot minimum distance is required between compost areas and swales or berms to allow for adequate access of fire fighting equipment;
- (9) A site shall meet the following surface water requirements:
  - (A) A site shall not cause a discharge of materials or fill materials into waters or wetlands of the state that is in violation of Section 404 of the Clean Water Act;
  - (B) A site shall not cause a discharge of pollutants into waters of the state that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES), under Section 402 of the Clean Water Act; and
  - (C) A site shall not cause non-point source pollution of waters of the state that violates assigned water quality standards;
- (10) A site shall meet the following groundwater requirements:
  - (A) A site shall not contravene groundwater standards as established under 15A NCAC 2L;
  - (B) Portions of a site used for waste receipt and storage, active composting, and curing shall have a soil texture finer than loamy sand and the depth to the seasonal high water table shall be maintained at least 12 inches for a Type 1 or 2 facility and 24 inches for a Type 3 facility, unless a pad is provided;
  - (C) A pad shall be provided for portions of a Type 4 facility used for waste receiving and storage, active composting, and curing;
  - (D) A pad is not required for storage of finished product that is dried so as to pass the Paint Filter Liquids Test (EPA Method 9095), and for which the storage area is prepared in such a manner that water does not collect around the base of the stored material, and where the depth to the seasonal high watertable is maintained at least 12 inches; and
  - (E) The linear coefficient of permeability of pads required in accordance with this Rule shall not be greater than  $1 \times 10^{-7}$  centimeters per second. If natural soils are used, the liner must be at least 18 inches thick.

(b) For Subparagraphs (a)(2) through (a)(4) and Part (a)(10)(B) of this Rule, (dependent upon waste type, facility design, and regional topography) alternative minimum buffers or requirements may be increased if deemed necessary by the Division in order to protect public health and the environment or to prevent the creation of a nuisance.

(c) A site shall meet the following design requirements:

- (1) A site shall not allow uncontrolled public access;
- (2) A site shall meet the requirements of the Sedimentation Pollution Control Law (15A NCAC 4);
- (3) A site shall meet the requirements of the Air Pollution Control Requirements (15A NCAC 2D) to minimize fugitive emissions and odors; and
- (4) A site shall be designed to minimize odors at the property boundary.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;  
Eff. December 1, 1991;  
Amended Eff. May 1, 1996.*

#### **.1405 APPLICATION REQUIREMENTS FOR SOLID WASTE COMPOST FACILITIES**

(a) The following information is required for an application for a permit to construct and operate a proposed Type 1, or a Small Type 2 or 3 solid waste compost facility; unless the permitting requirements are exempted by Paragraph (g) of Rule .1402 of this Section:

- (1) An aerial photograph or scaled drawing, where one inch is less than or equal to 400 feet, accurately showing the area within one-fourth mile of the proposed site's boundaries with the following specifically identified:
  - (A) Entire property owned or leased by the person proposing the facility;
  - (B) Location of all homes, wells, industrial buildings, public or private utilities; roads; watercourses; dry runs; and other applicable information regarding the general topography within 500 feet of the proposed facility; and
  - (C) Land use zoning of the proposed site.
- (2) A letter from the unit of government having zoning jurisdiction over the site which states that the proposed use is allowed within the existing zoning, if any, and that any necessary zoning approval or permit has been obtained.

- (3) An explanation of how the site complies with siting and design standards in Rule .1404 of this Section.
- (4) A detailed report indicating the following:
  - (A) Waste type(s), source and estimated quantity of the solid waste to be composted, including the source and expected quantity of any bulking agent or amendment (if applicable), any expected recycle of bulking agent or compost, and any seasonal variations in the solid waste type or quantity; and
  - (B) For facilities that utilize natural soils as a pad, a soil evaluation of the site conducted by a soil scientist down to a depth of four feet, or to bedrock or evidence of a seasonal high watertable, to evaluate all chemical and physical soil properties and depth of the seasonal high water table.
- (5) Site plan at a scale where one inch is less than or equal to 100 feet to the inch that delineates the following:
  - (A) Existing and proposed contours, at intervals appropriate to the topography;
  - (B) Location and elevations of dikes, trenches, and other water control devices and structures for the diversion and controlled removal of surface water;
  - (C) Designated setbacks and property lines;
  - (D) Proposed utilities and structures; and
  - (E) Areas for unloading, processing, active composting, curing, and storing of material.
- (6) A description of the operation of the facility, which must include at a minimum:
  - (A) Name, address and phone number for the person responsible for the operation of the facility;
  - (B) List of personnel required and the responsibilities of each position;
  - (C) Operation plan for the facility;
  - (D) Special precautions or procedures for operating during wind, heavy rain, snow, freezing or other adverse conditions;
  - (E) A description of actions to be taken to minimize noise, vectors, air borne particulates, and odors; and
  - (F) A description of the ultimate use for the finished compost, method for removal from the site, and a contingency plan for disposal or alternative usage of residues or finished compost that cannot be used in the expected manner due to poor quality or change in market conditions.
- (7) A report on the design of the facility, including:
  - (A) Design capacity of the facility;
  - (B) A process flow diagram of the entire facility, including the type, size, and location of all major equipment, and feedstock flow streams. The flow streams shall indicate the quantity of materials on a wet weight and volumetric basis;
  - (C) The means for measuring, shredding, mixing, and proportioning input materials;
  - (D) Anticipated process duration, including receiving, preparation, composting, curing, and distribution;
  - (E) A description of the location of all temperature, air and any other type of monitoring points, and the frequency of monitoring;
  - (F) A description of how the temperature control and monitoring equipment will demonstrate that the facility meets the requirements in Rule .1406 Items (10), (11), or (12) of this Section, as appropriate for the feedstock;
  - (G) The method of aeration provided and the capacity of aeration equipment; and
  - (H) A description of the method to control surface water run-on and run-off; and the method to control, collect, treat, and dispose of leachate generated.
- (8) A description of the label or other information source that meets the requirements of Rule .1407(k) of this Section.
- (9) Plans and specifications for the facility, including manufacturer's performance data for all equipment selected.
- (10) A detailed operation and maintenance manual outlining:
  - (A) A quality assurance plan for the process and final product which lists the procedures used in inspecting incoming material; monitoring, sampling and analyzing the compost process and final product, testing schedule, and recordkeeping requirements;
  - (B) Contingency plans detailing corrective or remedial action to be taken in the event of equipment breakdown; non-conforming waste delivered to the facility; spills, and undesirable conditions such as fires, vectors and odors; and
  - (C) An explanation of how the facility will comply with operational requirements as outlined in Rule .1406 of this Section, detailed operational information and instruction, an outline of reports to be submitted in compliance with this Section, and safety instructions.

- (11) As built drawings where applicable.
- (b) The following information is required for an application for a permit to construct a proposed Large 2 or 3 or a Type 4 solid waste compost facility:
  - (1) An aerial photograph or scaled drawing, where one inch is less than or equal to 400 feet, accurately showing the area within one-fourth of the mile of the proposed site's boundaries with the following specifically identified:
    - (A) Entire property owned or leased by the person proposing the site;
    - (B) Location of all homes, wells, industrial buildings, public or private utilities and roads, watercourses, dry runs, and other applicable information regarding the general topography within one-fourth mile; and
    - (C) Land use and zoning of the proposed site.
  - (2) A letter from the unit of government having zoning jurisdiction over the site which states that the proposed use is allowed within the existing zoning, if any, and that any necessary zoning approval or permit has been obtained.
  - (3) An explanation of how the site complies with siting and design standards in Rule .1404 of this Section.
  - (4) A detailed report indicating the following:
    - (A) Waste type(s), source and quantity of the solid waste to be composted, including the source and expected quantity of any bulking agent or amendment (if applicable), any expected recycle of bulking agent or compost, and any seasonal variations in the solid waste type or quantity;
    - (B) For facilities which utilize natural soils as a pad, a soil evaluation of the site conducted by a soil scientist down to a depth of four feet or to bedrock or evidence of a seasonal high water table, to evaluate all chemical and physical soil properties and depth of the seasonal high water table.
  - (5) Site plans at a scale where one inch is less than or equal to 100 feet to the inch that delineates the following:
    - (A) Existing and proposed contours, at intervals appropriate to the topography;
    - (B) Location and elevations of dikes, trenches, and other water control devices and structures for the diversion and controlled removal of surface water;
    - (C) Designated setbacks, buffer zones and property lines;
    - (D) Proposed utilities and structures;
    - (E) Access roads, details on traffic patterns;
    - (F) Areas for unloading, processing, active composting, curing, and storage of material;
    - (G) Areas for unloading, processing, and storing recyclables, household hazardous waste, and other materials, where applicable;
    - (H) Proposed surface and groundwater monitoring locations;
    - (I) Flood plains and wetlands; and
    - (J) Benchmarks.
  - (6) A description of the operation of the facility, which must include at a minimum:
    - (A) Name, address and phone number for the person responsible for the operation of the facility;
    - (B) Operation plan for the facility;
    - (C) List of personnel required and the responsibilities of each position;
    - (D) A schedule for operation, including days and hours that the facility will be open, preparations before opening, and procedures to be followed after closing for the day;
    - (E) For mixed waste processing facilities, plan for removing and disposal of household hazardous waste from the waste stream;
    - (F) Special precautions or procedures for operating during wind, heavy rain, snow, freezing or other adverse conditions;
    - (G) A description of actions to be taken to minimize noise, vectors, air borne particulates, and odors; and
    - (H) A description of the ultimate use for the finished compost, method for removal from the site, and a contingency plan for disposal or alternative usage of residues or finished compost that cannot be used in the expected manner due to poor quality or change in market conditions.
  - (7) A report on the design of the facility, including:
    - (A) Design capacity of the facility;
    - (B) A process flow diagram of the entire facility, including the type, size, and location of all major equipment, and feed stock flow streams. The flow streams shall indicate the quantity of material on a wet weight and volumetric basis;
    - (C) A description and sizing of the storage facilities for amendment, bulking agent, solid waste,

- recyclables, household hazardous waste and finished compost;
- (D) The means for measuring, shredding, mixing, and proportioning input materials;
  - (E) Anticipated process duration, including receiving, preparation, composting, curing, and distribution;
  - (F) The separation, processing, storage, and ultimate disposal of non-compostable materials, if applicable;
  - (G) A description of the location of all temperature, air and any other type of monitoring points, and the frequency of monitoring;
  - (H) A description of how the temperature control and monitoring equipment will demonstrate that the facility meets the requirements in Rule .1406 Items (10), (11), or (12) of this Section, as appropriate for the feedstock;
  - (I) The method of aeration, including turning frequency or mechanical aeration equipment and aeration capacity;
  - (J) A description of the air emission and control technologies;
  - (K) A description of the method to control surface water run-off; and the method to control, collect, treat, and dispose of leachate generated; and
  - (L) A description of any recycling or other material handling processes used at the facility.
- (8) A description of the label or other information source that meets the requirements of Rule .1407(k) of this Section.
- (9) Engineering plans and specifications for the facility, including manufacturer's performance data for all equipment selected.
- (c) The following information is required for reviewing an application for a permit to operate a Type 4 or Large Type 2 or 3 solid waste composting facility:
- (1) Contingency plans detailing corrective or remedial action to be taken in the event of equipment breakdown; air pollution; non-conforming waste delivered to the facility; spills, and undesirable conditions such as fires, particulates, noise, vectors, odors, and unusual traffic conditions;
  - (2) A detailed operation and maintenance manual. The manual must contain general design information, a discussion of compliance with operational requirements as outlined in Rule .1406 of this Section, detailed operational information and instruction, equipment maintenance, list of personnel, required personnel training, outline of reports to be submitted in compliance with this Section, and safety instructions;
  - (3) A quality assurance plan for the process and final product which lists the procedures used in inspecting incoming materials; monitoring, sampling and analyzing the compost process and final product, testing schedule, and record keeping requirements;.....
  - (4) A fact sheet and process flow diagram that summarizes actual equipment sizing, aeration capacity, detention times, storage capacity, and flow rates (wet weight and volumetric) for the system and equipment chosen;
  - (5) As-built drawings;
  - (6) A copy of all applicable local, state, and Federal permits and approvals necessary for the proper operation of the facility; and
  - (7) Product marketing and distribution plan.
- (d) An application for a permit modification shall be required for changes in facility ownership, an increase in facility capacity, or the addition of new feedstock materials.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;  
Eff. December 1, 1991;  
Amended Eff. May 1, 1996.*

#### **.1406 OPERATIONAL REQUIREMENTS FOR SOLID WASTE COMPOST FACILITIES**

Any person who maintains or operates a solid waste compost facility shall maintain and operate the site to conform with the following practices:

- (1) Plan and Permit Requirements:
  - (A) Construction plans and conditions of permit shall be followed; and
  - (B) A copy of the permit, plans, and operational reports shall be maintained on site at all times.
- (2) Adequate erosion control measures shall be practiced to prevent on-site erosion and to control the movement of silt or contaminants from the site.
- (3) Surface water shall be diverted from the operational, compost curing, and storage areas.
- (4) Leachate shall be contained on site treated to meet the standards of the off-site disposal method.
- (5) Access and Security Requirements:

- (A) Large sites shall be secured by means of gates, chains, berms, fences, or other security measures demonstrated to provide equivalent protection approved by the Division, to prevent unauthorized entry.
- (B) An operator shall be on duty at the site at all times while the facility is open for public use to ensure compliance with operational requirements and access to such facilities shall be controlled.
- (C) The access road to the site shall be of all-weather construction and maintained in good condition.
- (6) A site shall only accept those solid wastes that it is permitted to receive.
- (7) Safety Requirements:
  - (A) Open burning of solid waste is prohibited.
  - (B) Equipment shall be provided to control accidental fires and arrangements made with the local fire protection agency to immediately provide fire-fighting services when needed.
  - (C) Personnel training shall be provided to insure that all employees are trained in site specific safety, remedial, and corrective action procedures.
- (8) Sign Requirements:
  - (A) Signs providing information on waste that can be received, dumping procedures, the hours during which the site is open for public use, the permit number and other pertinent information shall be posted at the site entrance.
  - (B) Traffic signs/markers shall be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.
  - (C) Signs shall be posted stating that no hazardous waste, asbestos containing waste, or medical waste can be received at the site.
- (9) Monitoring Requirements:
  - (A) Specified monitoring and reporting requirements shall be met.
  - (B) The temperature of all compost produced shall be monitored sufficiently to ensure that the pathogen reduction criteria is met.
- (10) Compost process at Type 1 facilities shall be maintained at or above 55 degrees Celsius (131 degrees F) 3 days and aerated to maintain elevated temperatures.
- (11) Types 2, 3 and 4 facilities shall maintain the compost process at a temperature above 40 degrees Celsius (104 degrees F) for 14 days or longer and the average temperature for that time shall be higher than 45 degrees Celsius (113 degrees F) or, Types 2, 3 and 4 facilities shall meet the vector attraction reduction requirements in 40 CFR 503.33(b)(4) or (7). Requirements of 40 CFR 503.33(b)(4) and (7) are hereby incorporated by reference, including any subsequent amendments or additions.
- (12) The composting process shall qualify as a process to further reduce pathogens for all Type 3 and Type 4 facilities. The following are acceptable methods:
  - (A) The windrow composting method, in which the following requirements apply: Aerobic conditions shall be maintained during the compost process. A temperature of 131 degrees F (55 degrees Celsius) or greater shall be maintained in the windrow for at least 15 days. During the high temperature period, the windrow shall be turned at least five times.
  - (B) The static aerated pile composting method, in which the following requirements apply: Aerobic conditions shall be maintained during the compost process. The temperature of the compost pile shall be maintained at 131 degrees F (55 degrees Celsius) or greater for at least three days.
  - (C) The within-vessel composting method, in which the temperature in the compost piles shall be maintained at a minimal temperature of 131 degrees F (55 degrees Celsius) for three days.
- (13) Nitrogen bearing wastes shall be incorporated as necessary to minimize odor and the migration of nutrients.
- (14) Miscellaneous Requirements:
  - (A) The finished compost shall meet the classification and distribution requirements outlined in Rule .1407 of this Section.
  - (B) The quality of the final product shall determine the allowable uses as outlined in Rule .1407 of this Section.
  - (C) The final product shall be approved by the Solid Waste Section as outlined in Rule .1407 Subparagraph (6)(b) of this Section.
    - (i) Non-compostable solid waste and unacceptable compost shall be disposed in a solid waste management facility permitted to receive the particular type of waste under 15A NCAC 13B.
    - (ii) The amount of compost stored at the facility shall not exceed the designed storage capacity.

History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29



*Eff. December 1, 1991;*

*RRC objection Eff. April 18, 1996 due to lack of statutory authority;*

*Amended Eff. June 1, 1996.*

**.1407 CLASSIFICATION/DISTRIBUTION OF SOLID WASTE COMPOST PRODUCTS**

(a) Compost shall not be applied to the land or sold or given away if the concentration of any metal exceeds the concentration in 40 CFR 502.13(b)(3) [See Table 1 below], unless the concentration of all metals are less than the values in 40 CFR 503.13(b)(1) and records are maintained to show compliance with the cumulative and annual metal levels in 40 CFR 503.13(b)(2) and (4).

Table 1

Metals	Concentration mg per kg
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2800

(b) Solid Waste shall be classified based on Table 2:

Table 2

Grade	Manmade Inerts % dry wt. of inerts	Pathogen Reduction	Metal Concentration
A	≤6	PFRP	Table 1
B	>6	NA	40 CFR 503.13(b)(1)

(c) Man made inerts shall not exceed 1 inch in size.

(d) Distribution of the defined grades shall be as follows:

- (1) Grade A compost shall have unlimited, unrestricted distribution. This product may be distributed directly to the public;
- (2) Grade B compost shall be restricted to distribution for land and mine reclamation, silviculture, and agriculture (on non-food chain crops) projects; and
- (3) Compost or mulch that is produced at a Type 1 facility and that contains minimal pathogenic organisms, is free from offensive odor, and contains no sharp particles that would cause injury to persons handling the compost, shall have unrestricted applications and distributions if directions are provided with the compost product.

(e) Solid waste compost products may not be distributed or marketed until the permittee has provided adequate test data to the Division as outlined in Rule .1408 of this Section. Within 30 days of receipt of the test data, the Division shall approve or deny the distribution and marketing of the product based upon the compost classification and distribution scheme. As long as the test data required in Rule .1408 of this Section continues to verify that compost is produced to the specifications of this Rule, the Division's approval to distribute the compost shall be ongoing.

(f) The applicant is responsible for meeting any applicable requirements of the North Carolina Department of Agriculture, Fertilizer Section concerning the distribution of this product.

(g) If the owner intends to distribute the product, the owner shall provide instructions to the user on any restrictions on use and recommended safe uses and application rates. The following information shall be provided on a label or an information sheet and a copy of the label or information sheet shall be submitted to the Solid Waste Section:

- (1) Classification grade as outlined in Paragraph (d) of this Rule;
- (2) Recommended uses;

- (3) Application rates;
- (4) Restrictions on usage; and
- (5) Total N (for products containing sludge).

*History Note: Authority G.S. 130A-309.11;  
 Eff. December 1, 1991;  
 RRC objection Eff. April 18, 1996 due to lack of statutory authority;  
 Amended Eff. June 1, 1996.*

**.1408 METHODS FOR TESTING AND REPORTING REQUIREMENTS**

- (a) The compost product from Type 2, 3, and 4 facilities shall be sampled and analyzed as follows:
  - (1) A composite sample of the compost produced at each compost facility shall be analyzed at intervals of every 20,000 tons of compost produced or every six months, whichever comes first, for test parameters for each Type of facility as designated in Table 3 of this Rule. Standard methods equivalent to those in Table 3 may be approved by the Division.

Table 3

Parameter	Unit	Facility	Test Method
Foreign Matter	%	all	see Subparagraph (d) of this Rule
Arsenic	mg/kg dry wt.	Type 4	See Appendix A
Cadmium	mg/kg dry wt.	all	
Chromium	mg/kg dry wt.	Type 4	
Copper	mg/kg dry wt.	all	
Lead	mg/kg dry wt.	all	
Mercury	mg/kg dry wt.	Type 4	
Nickel	mg/kg dry wt.	all	
Selenium	mg/kg dry wt.	Type 4	
Zinc	mg/kg dry wt.	all	
Pathogens	See Appendix B	all	See Appendix B
Total N	%	see *	Kjeldahl

\* Total N required for products containing sludge subject to 40 CFR 503.

The parameters listed in Table 3 of this Rule may also be determined by methods accepted by the North Carolina Department of Agriculture.

- (2) Sample collection, preservation, and analysis shall assure valid and representative results pursuant to a Division-approved quality assurance plan. At least three individual samples (of equal volume) shall be taken from each batch produced in separate areas along the side of the batch. Each sampling point shall be at a depth of two to six feet into the pile from the outside surface of the pile. Samples that have been analyzed for metals shall be composited and accumulated over a six month period or at intervals of every 20,000 tons of product produced, whichever comes first. Any sample collected for testing for pathogens and nutrients shall be a representative composit sample of the compost and shall be processed within a period of time required by the testing procedure.
- (3) Compost containing sewage sludge shall be tested in accordance with 40 CFR 503, Subpart B.
- (4) The Division may decrease or increase the parameters to be analyzed or the frequency of analysis based upon monitoring date, changes in the waste stream or processing, or information regarding the potential for presence of toxic substances that are not on the list of monitoring parameters.
- (5) Foreign matter content shall be determined by passing a dried, weighed sample of the compost product through a one-quarter inch screen. EPA Method 160.3 shall be used to dry the sample. The material remaining on the screen shall be visually inspected, and the foreign matter that can be clearly identified shall be separated and weighed. The weight of the separated foreign matter divided by the weight of the

total sample shall be determined and multiplied by 100. This shall be the percent dry weight of the foreign matter content.

(b) **Record Keeping:** All facility owners or operators shall record and maintain records for a minimum of five years. Records shall be available for inspection by Division personnel during normal business hours and shall be sent to the Division upon request:

- (1) Daily operational records must be maintained, which include, at a minimum, temperature data (length of the composting period) and quantity of material processed;
- (2) Analytical results on compost testing;
- (3) The quantity, type and source of waste received;
- (4) The quantity and type of waste processed into compost;
- (5) The quantity and type of compost produced by product classification; and
- (6) The quantity and type of compost removed for use or disposal, by product classification, and the market or permitted disposal facility.

(c) **Annual Reporting:** An annual report for the period July 1 to June 30 shall be submitted by all facility owners or operators to the Division by August 1, 1996 and every August 1 thereafter and shall contain:

- (1) The facility name, address, and permit number;
- (2) The total quantity in tons, with sludge values expressed in dry weight, and type of waste received at the facility during the year covered by the report, including tons of waste received from local governments of origin;
- (3) The total quantity in tons, with sludge values expressed in dry weight, and type of waste processed into compost during the year covered by the report;
- (4) The total quantity in tons and type of compost produced at the facility, by product classification, during the year covered by the report;
- (5) The total quantity in tons and type of compost removed for use or disposal from the facility, by product classification, along with a general description of the market if for use during the year covered by the report;
- (6) Monthly temperature monitoring to support Rule .1406 of this Section; and
- (7) Results of tests required in Table 3 of this Rule.

(d) Yearly totals of solid waste received and composted shall be reported back to the local government of origin for annual recycling reporting.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;  
Eff. December 1, 1991;  
RRC objection Eff. April 18, 1996 due to lack of statutory authority;  
Amended Eff. June 1, 1996.*

#### **.1409 APPROVAL OF ALTERNATIVE PROCEDURES AND REQUIREMENTS**

(a) An owner or operator of a composting facility, subject to the provisions of this Rule, may request in writing the approval of an alternative procedure for the facility or the compost that is produced. The following information shall be submitted to the Solid Waste Section:

- (1) The specific facility for which the exception is requested;
- (2) The specific provisions of this Section for which the exception is requested;
- (3) The basis for the exception;
- (4) The alternate procedure or requirement for which the approval is sought and a demonstration that the alternate procedure or requirement provides equivalent protection of the public health and the environment; and
- (5) A demonstration of the effectiveness of the proposed alternate procedure.

(b) An individual may request in writing the approval of a solid waste composting pilot or demonstration project for the purpose of evaluating the feasibility of such a project. The following information shall be submitted to the Solid Waste Section:

- (1) The owner, operator, location, and contact numbers for the project;
- (2) The specific primary waste stream for which the project is to be evaluated;
- (3) The specific time frame for the project;
- (4) The estimated amount of each type of waste or bulking material to be composted;
- (5) The basis for running the pilot or demonstration project;
- (6) A description of all testing procedures to be used;
- (7) A description of the process to be used, including the method of composting and details of the method

of aeration;

(8) The expected final usage or disposal of the final product; and

(9) An outline of the final report to be submitted to the Solid Waste Section upon completion of the project.

(c) For Paragraph (a) of this Rule, the Division will review alternative procedures only to the extent that adequate staffing is available.

(d) Permits shall not be required for primary and secondary school educational projects that take place on the school grounds and that receive less than one cubic yard of material per week.

*History Note: Authority G.S. 130A-294; 130A-309.03; 130A-309.11; 130A-309.29;  
Eff. December 1, 1991;  
RRC objection due to lack of statutory authority Eff. April 18, 1996;  
Amended Eff. June 1, 1996.*

## **Full Cost Analysis and Program Financing**

### **Session Preview**

The primary objectives of this session are for local governments and business to understand (1) the value of Full Cost Analysis and (2) the array of financing options available to them to fund solid waste operations and capital needs. After this session, recycling coordinators will be able to perform a Full Cost Analysis of their solid waste program as well as further explore options to finance their program.

### **I. Full Cost Analysis**

#### **A. The Importance of Full Cost Analysis**

Full Cost Analysis (FCA) brings a business-like approach to solid waste management. FCA helps local governments understand their expenditures associated with waste material collection, processing, and disposal so that the true costs and benefits of each of management method are understood. Although a FCA may not be easy to conduct, calculating the full costs associated with solid waste management activities offers many benefits to local governments:

- ✓ FCA provides local governments with a valuable planning tool to aid in determining a program's future direction as well as help in preparing future budgets.
- ✓ Hidden costs are exposed so that refuse management costs and recycling costs can be fairly compared.
- ✓ Program inefficiencies can be better recognized and remedied, especially if a FCA is performed annually.
- ✓ Large capital expenditures (such as landfills) can be annualized so that these costs can be distributed over the time that benefits are received.
- ✓ FCA can help local governments examine various financial scenarios and their resulting impact upon solid waste rates.
- ✓ Through FCA, a local government can better understand and explore incorporating financial incentives (such as pay-as-you-throw user fees) into its solid waste management program.

Not only will a FCA benefit a local government's planning and program analysis, the Solid Waste Management Act requires that specific financial information be included in the Solid Waste Management Plan, as follows:

- A Solid Waste Management Plan shall "include an assessment of the full costs of solid waste management, including the costs of collection, disposal, waste reduction, and other programs, and of the methods of financing those costs.

## Full Cost Analysis and Program Financing

- “Each county and municipality shall annually determine the full cost for solid waste management within the service area of the county or municipality for the preceding year . . . and shall establish a system to inform, no less than once a year, [the public] of the full cost for solid waste management.

DPPEA has developed a voluntary Full Cost Analysis worksheet to assist local governments in performing a FCA.

### 2. The Basics of Full Cost Analysis

The main purpose of a FCA is to gain an understanding of the cost of doing business for each service category of a solid waste program. This process can be broken down into three steps.

#### Step 1: Separate Out the Major Categories of the Solid Waste Budget.

A solid waste budget cannot be well understood if recycling and solid waste management costs are combined. The budget should be broken down into its program categories (which are also known as cost centers), such as the following:

- Solid Waste Collection
- Solid Waste Disposal
- Recycling

Depending on the program, other possible categories include Waste Reduction, Yard Waste, HHW, Commercial, Tires, and White Goods.

#### Step 2: Allocate Line Item Costs to Appropriate Service Categories.

1) Within each service category, perform a detailed assessment of costs, as follow:

- Wages and Fringe Benefits
- Equipment Operations and Maintenance
- Educational Materials
- Contracted Services
- Large Capital Expenditures

As people, equipment, and other resources may be shared among programs, it may be necessary to apportion costs among the different program categories according to the percentage of time dedicated to each use. As it may be difficult to estimate actual time resources dedicated to a specific program, costs can be apportioned according to quantities of material managed. For example, convenience center costs can be apportioned between solid

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### Full Cost Analysis and Program Financing

waste collection and recyclables collection according to percentage of material managed by each of these programs.

#### Step 3: Annualize Large Capital Expenditures

Items such as equipment and fixed assets often have many years of useful life; therefore, their costs should be apportioned (“annualized” or “depreciated”) over those years. This process includes annualizing landfill start-up and closure costs.

#### Step 4: Aggregate Detailed Costs Into Total Program Costs.

Sum all costs in a service category.

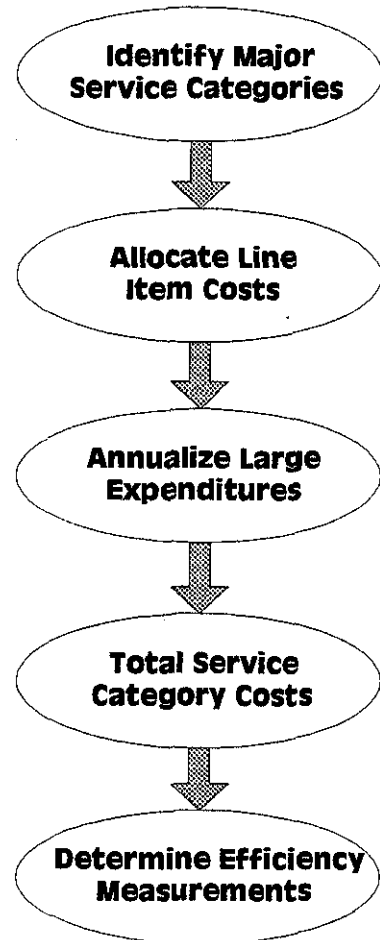
#### Step 5: Determine Metrics to Measure Program Efficiency

Generally, service category total costs divided by tons managed in that program will provide the cost per ton for providing the service.

### 3. Utilizing Information From a Full Cost Analysis

- Once FCA is completed, a local government can compare recycling costs per ton and per household to similar solid waste collection and disposal costs. Costs can also be compared to results from local governments with similar demographics. If costs seem high in one area, FCA may help determine the reasons the costs are high and ways they can be reduced.
- Comparisons can also be used to educate the public about the true costs of solid waste management.
- FCA can help local governments redesign a solid waste budget so that costs are properly allocated to the proper category and hidden costs are exposed.
- When performed annually, FCA is an effective tool to track program costs over time.

When conducting a FCA, it is important to consider the many non-monetary costs and benefits associated with managing solid waste. It is very difficult to measure environmental damage associated with ground water contamination, air pollution, or energy consumption. Even though these costs are not easily quantified, they should be given equal consideration to the dollar costs directly paid by a local government.



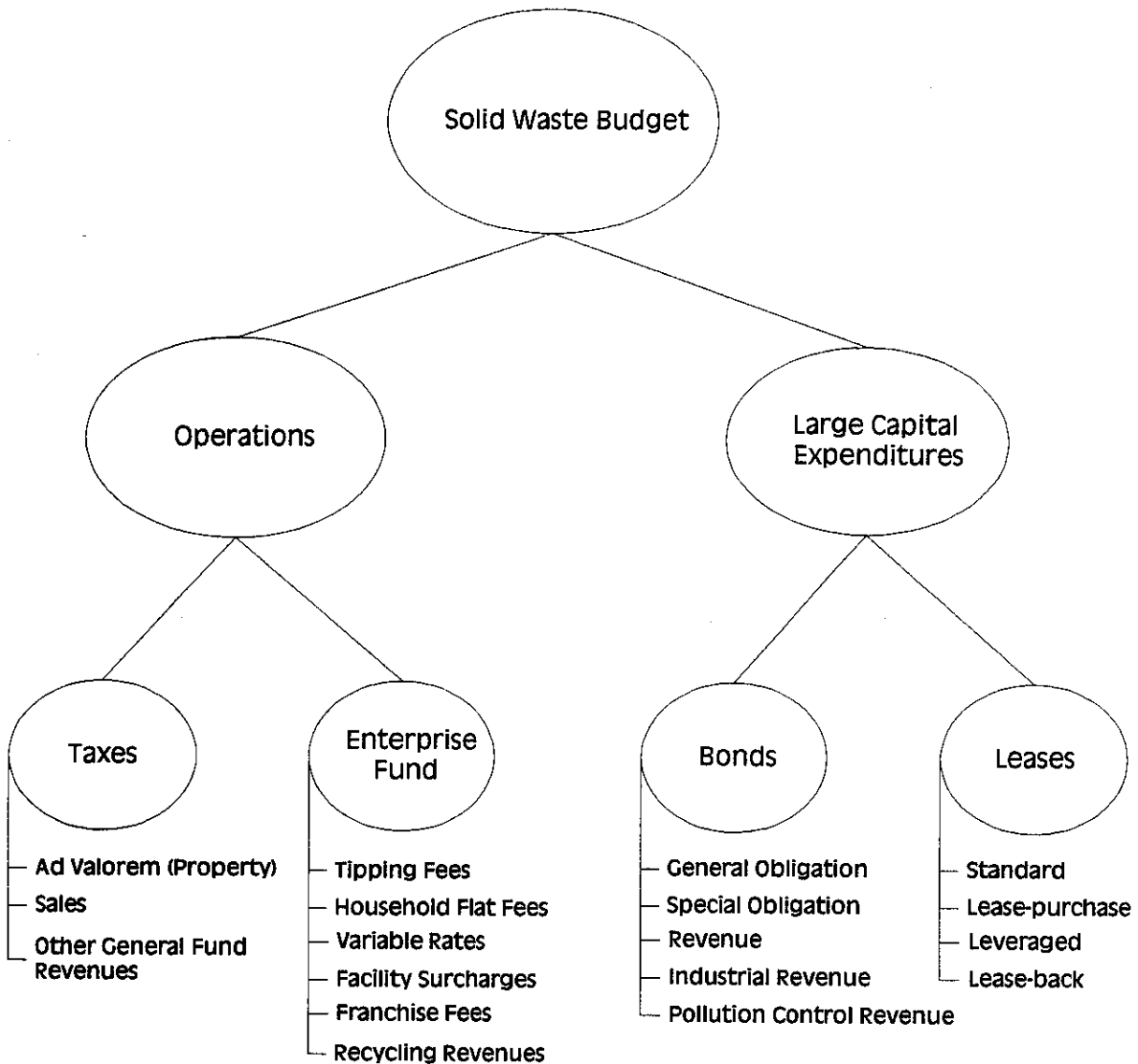
Fiscal Year: <i>Annual Cost of Operations</i>		Total MSW Budget	SW Collec- tion	Program Category		
				SW Disposal	Recycling	Other:
	# of Employees					
1	Wages + Benefits of Employees (FTE)					
2	Local Government Administrative Support					
3	Equipment Operations and Maintenance					
4	General Operations					
5	Educational Materials					
6	Cash Capital Outlays					
7	Lease Payments					
8	Contracted Services					
9	Professional Services					
10	Insurance					
11	Tipping Fees					
12	Other:					
<i>Costs of Large Capital Expenditures</i>						
13	Annualized Large Capital Expenditures					
14	Annualized Landfill Development & Construction Costs					
15	Annualized Landfill Closure Costs					
16	Cost of Debt Service (loan & bond interest)					
17	<i>Total Annual Costs: (sum lines 1 - 16)</i>					
<i>Revenues</i>						
18	Sales of Recyclables					
19	Equipment Salvage					
20	Other Revenue Sources:					
21	<i>Total Annual Revenues: (sum lines 18 - 20)</i>					
22	<i>Net Annual Costs: (subtract line 21 from line 17)</i>					
<i>Indicators of Efficiency</i>						
23	Tons of Material Managed per Year					
24	# of Households or Clients Served					
25	<i>Total Cost per Ton: (divide line 22 by line 23)</i>					
26	<i>Total Cost per Household: (divide line 22 by line 24)</i>					



# Full Cost Determination and Program Financing

## II. Solid Waste Program Financing

Financing a local government solid waste management program can be a balancing act. A spectrum of revenue options is available to local governments to fund their operation and capital expenditures as show in the diagram below. This section describes each of the financing options listed in the diagram and outlines their advantages and disadvantages.



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## Full Cost Determination and Program Financing

### Funding Options for Solid Waste Budget Categories

#### A. Operations Financing

Operating expenses are costs that can be covered by incoming revenues and tend to be expenditures that occur every year. Salary and equipment maintenance are examples of operating expenses. Operations can be financed through general fund taxes, an enterprise fund, or combined system.

##### 1. Tax-Based Financing (General Fund)

Traditionally, solid waste operations have been financed by a *general fund*, which is the general operating budget for the local government and tends to be supported by ad valorem (property) and sales taxes. In most North Carolina communities, at least some of the costs of waste management are supported by taxes. However, rising property taxes and competition for general fund revenues have prompted many local governments to look for alternative funding sources. Other disadvantages of funding solid waste programs through the general fund include:

- Programs supported by the general fund give the false impression that the service is free or that additional levels of service are not more expensive.
- Residents may not understand the true cost of waste management since the costs are hidden in the tax structure.
- When there is no direct charge for waste collection, there is no incentive to reduce the use of this service or, therefore, reduce the waste stream through source reduction, reuse, recycling, and other measures.

##### 2. Enterprise Fund

An enterprise fund is a pool of money that gathers its revenues from user fees and other sources to partially or fully cover solid waste expenditures. The use of an enterprise fund can be compared to private sector financing techniques since the fund is constrained by earnings and other revenues. North Carolina law encourages local governments to "operate their solid waste management systems through use of an enterprise fund."

##### Characteristics of an Enterprise Fund

- ✓ All costs are documented in detail for all activities of the operation.
- ✓ Users are charged according to the cost of providing the service.
- ✓ The service becomes, at least to some degree, self-supporting because associated costs are recovered through fees.

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# **Full Cost Determination and Program Financing**

- ✓ They present no increase in cost to users for basic service since collections are transferred from taxes to user fees.
- ✓ Rates can be set to provide increased incentives for source reduction, reuse, and recycling.
- ✓ A solid waste program tends to be more fiscally accountable because it has well defined budget parameters.
- ✓ Depending on many budgetary factors, an enterprise fund can partially depend upon general revenues to meet financial needs.

## **2. a. Types of User Fees in Enterprise Funds**

As well as generating revenues, user fees are designed to make the generator pay for the cost of solid waste management. When a user fee system is implemented, a number of issues should be addressed:

- How fees should be set. Should they cover the full cost of the program or only a portion.
- How the fees should be structured to promote waste reduction but not so high as to induce illegal dumping.
- The means by which fees are collected.
- mechanisms to assist people who cannot afford to pay.

### **1) Tipping Fees**

Generators of waste are charged a fee to deposit materials at a transfer or disposal facility.

#### **Advantages of Tipping Fees**

- Easy to implement and simple for community to understand.
- The best single initiative a local government can implement to promote waste reduction.
- Opportunity to annualize landfill and incinerator start-up and closure costs so that these large costs are distributed over time and paid for by users of the disposal facility over the life of the facility.

#### **Disadvantages of Tipping Fees**

- Potential user dissatisfaction when initially instituted.
- May encourage illegal dumping.

## Full Cost Determination and Program Financing

### 2) Flat Rate

All customers (generally households) are charged the same price, which is based on the average cost of providing the service.

#### Advantages of Flat Fees

- Easy to implement and simple for citizens to understand.
- Consistent revenues.

#### Disadvantages of Flat Fees

- Does not encourage source reduction or recycling.
- May be inequitable.

### 3) Variable Rates

Household solid waste collection charges are based on the quantity of material disposed. Local governments can charge households by bags, weight, or bin size and offer a discount if the household recycles. A variable rate can be designed to cover the total cost of the residential solid waste collection and disposal program. However, because this variable rating system may result in fees too high to be politically feasible, some local governments set variable fees to cover only operational expenses or even a smaller portion of the full cost of the program. Regardless of the exact level of the fee, the system is designed not only to raise revenues but to provide an incentive for households to reduce the amount of waste set out for disposal.

#### Advantages of Variable Rates

- The bill received by the citizen reflects the quantity of material that they dispose.
- Customers are provided an incentive to change their consumption patterns by purchasing products that are more durable or recyclable.
- The system provides an incentive for participation in existing recycling programs.
- Can work at both curbside and staffed collection centers.

#### Disadvantages of Variable Rates

- Requires established recycling infrastructure.
- May encourage illegal dumping.
- It is difficult to match fees to needed revenues, especially as waste reduction increases.
- Initial undercharge for services may force a later, very unpopular raise in rates.

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# Full Cost Determination and Program Financing

- Educating citizens about changes in the system is an enormous challenge.
- Residents may overstuff containers.

### Variable Rate Options

(a) **The Bag System**

Refuse is placed in easily identifiable bags offered for sale by the local government or by a vendor. Bags can be made available at convenient outlets such as supermarkets or convenience stores. The price of each bag should reflect the cost (or some portion) of providing solid waste services. Fee collection is simple for accounting and administrative departments. Because consumers pay for bags immediately upon purchase, billing and data entry only need to be collected from private vendors selling bags.

(b) **The Sticker System**

Refuse is collected the same as in the past but only if the container displays a sticker or tag purchased by the resident. Administratively, stickers work well because they are small, convenient, and may not require recordkeeping or data entry. Residents may put out containers for collection only when they are full; thus, collection efficiency is maximized. Disadvantages include their fragility and susceptibility to theft and the logistics of distributing the stickers.

(c) **Variable-Size Container System**

Refuse is set out in one of several sizes of containers made available by the service provider, and different rates are charged for the different containers. The incentive for the citizen is to use the smallest container practical. Communities must consider the means by which variable sizes of cans will be collected curbside as automatic collection systems may not easily incorporate cans of different sizes.

(d) **Weight-Based System**

Refuse is placed in standard containers or in bags which are weighed on trucks especially equipped with scales or at staffed drop-off centers. Billing is based on the weight collected during the billing period, or, in the case of collection centers, the fee could be collected on the spot. Some advantages of weight-based systems are that (1) they provide a greater incentive to reduce waste since the customer is charged by the actual weight of waste discarded and not by the size of the bag or can that

## **Full Cost Determination and Program Financing**

may not be filled and (2) they provide precise data for measuring source reduction.

### **2. b. Other Sources for Enterprise Fund Revenues**

#### **1) Facility Surcharges**

The local government institutes a surcharge on solid waste facilities such as privately operated landfills or incinerators in its jurisdiction.

##### **Advantages of Surcharges**

- Potential large revenue source.
- Promote waste reduction.

##### **Disadvantages of Surcharges**

- Appropriate facilities must exist within jurisdiction.
- May be politically difficult to institute.

#### **2) Franchise Fees**

The local government sells or auctions a franchise area to a solid waste server such as a hauler.

##### **Advantages of Franchise Fees**

- Local government is relieved from hauling responsibilities.
- Shrinks size of government.

##### **Disadvantages of Franchise Fees**

- Franchise company may not provide adequate level of service.
- Loss of local government control.
- Lack of competition may cause higher rates for households.

#### **3) Recycling Revenues**

### **B. Capital Financing Mechanisms**

Local governments may find that current revenues cannot always cover the cost of a large expenditure such as a facility expansion or a major new piece of equipment. In such cases,

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# Full Cost Determination and Program Financing

the local government may need to go into debt or “finance” the expenditure in order to distribute payments for the equipment over a number of years. Depending on the type of program and needs, a variety of financing options ranging from bonds (which are similar to loans) to leases are available to local governments.

### Factors To Consider in Capital Financing Options

- The risk related to the project and investments.
- Desirable level of project financing by government.
- Accuracy of cash flow projections.
- Ability to make debt repayments.
- The return on investment.

## 1. General Obligation (GO) Bonds

Bonds issued by the governing body. Guaranteed by the credit of the jurisdiction based on its ability to levy taxes and the demonstrated full faith of the voters through approval in a referendum. Municipalities, counties, or solid waste authorities may issue GO bonds.

### Advantages of GO Bonds

- Backed by the public entity's credit rating.
- Independent of risks associated with project.
- Lowest interest rates.
- Low debt service.

### Disadvantages of GO Bonds

- Require voter approval.
- May be high risk to the issuing entity/taxpayer.
- Require higher payback in earlier years.
- Lost opportunity for property and income tax.
- Lost potential for federal tax benefits.

## 2. Special Obligation (SO) Bonds

Special Obligation Bonds are issued by the governing body, and the bond is secured by revenue other than taxes. Funds for SO's may or may not come from a self-supporting enterprise. These bonds are often used to fund landfills and recycling facilities.

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# Full Cost Determination and Program Financing

### Advantages of SO Bonds

- Do not require voter approval.
- Revenue does not have to come from self-supporting enterprise.

### Disadvantages of SO Bonds

- Security is not as good as in a GO Bond.
- Higher interest rate.

## 3. Revenue Bonds

Bonds issued to provide financing for a single revenue-generating project that are guaranteed by a pledge of the net revenue from the project financed. Revenue sources can include tipping fees, recovered material sales, energy sales, and refuse collection user fees.

### Advantages of Revenue Bonds

- Issued by local governments.
- Create potential for economic development.
- Property tax base not affected.
- Potential federal tax benefits.
- Help stretch credit line.

### Disadvantages of Revenue Bonds

- Complex.
- Shortfalls in revenue may require increased fees to make payments.

## 4. Industrial Revenue Bonds (IRB)

Bonds issued by a local government for a private enterprise; thus, the lower interest available to government is passed on to the corporation. Technically, the local government is lessor and the private enterprise is lessee.



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# **Full Cost Determination and Program Financing**

### **Advantages of IRBs**

- Tax exempt.
- Issuable by a public benefit corporation.
- Promote industrial or economic development.
- Bond proceeds leased/loaned to private company.

### **Disadvantage of IRBs**

- Often require long-term contracts.

## **5. Pollution Control Revenue Bonds**

Similar to IRBs except that they are applied to pollution control equipment.

### **Advantages of Pollution Control Revenue Bonds**

- Tax exempt.

### **Disadvantages of Pollution Control Revenue Bonds**

- Apply only to pollution control equipment.

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## **6. Standard Leasing**

Instead of going into debt, a local government sometimes may find it is more advantageous to simply lease property or equipment. Short-term leases may be suitable for equipment while long-term leases may be suitable for land. If recycling is involved, leasing rates can be negotiated down in exchange for recycling revenues. A market will sometimes provide equipment in exchange for recyclables.

### **Advantages of Standard Leasing**

- No debt.
- Responsibility and risk are lowered.
- Flexible in terms of project development.
- More expedient than purchasing.

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# Full Cost Determination and Program Financing

### Disadvantages of Standard Leasing

- Ownership is never acquired.
- Site improvement may eventually revert to owner.

## 7. Lease-Purchase

Local government pays a set amount for a determined period and pays the balance at the end of the lease period. Maintenance is paid by either party, and the primary lessor provides service.

### Advantages of Lease-Purchase

- Leasing leads to eventual ownership.
- Option to back out of purchasing equipment.

### Disadvantages of Lease-Purchase

- Higher rates than for standard leasing.

## 8. Leveraged Leasing

A financial package in which a private intermediary puts up a percentage of the capital and acts as a lessor; the local government finances the remainder through a usual method and acts as the lessee.

### Advantages of Leveraged Leasing

- Pass-through tax breaks.
- Pass-through low interest rates.

### Disadvantages of Leveraged Leasing

- Complex mechanism.
- Community is charged for services.

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# Full Cost Determination and Program Financing

### 9. Lease-Back

Public, private, or non-profit corporations use proceeds from the sale of bonds to construct facilities that are then leased to a government entity. At the end of the lease period, the title is transferred to the local government.

#### Advantages of Lease-Backs

- Development agency provides capital.

#### Disadvantages of Lease-Backs

- Government or contractual operation.

### 10. Public/Private Financing

Private financing of solid waste management facilities can often be used in conjunction with public financing to create an innovative financing package which distributes debt burden and risks among the public and private players. Participation by a public entity in financing arrangements adds reassurance to potential investors because of lower risk.

#### Advantages of Public/Private Financing

- Reduces governmental risk.
- Relatively easy to implement.

#### Disadvantage of Public/Private Financing

- Potentially higher costs.
- Uncertainty of continuity in service.
- Loss of governmental control over facilities.
- Risk that private company goes out of business and leaves local government responsible for all debt obligations.

## C. Closing Remarks on Local Government Financing

Financing solid waste operations and capital needs may be one of the most difficult parts of implementing a solid waste management plan. Not only is it difficult to identify and tap potential revenue sources, it is also challenging to budget so that revenues and

## **Full Cost Determination and Program Financing**

expenditures meet. A Full-Cost Analysis<sup>1</sup> of a solid waste management program may simplify the intricacies of a program's financial status. Also, the local government finance or budget office may be a very useful resource when the financing options outlined in this section are explored. Finally, local governments are encouraged to select financing mechanisms such as user fees that help internalize the costs of solid waste management.

### **III. Private Sector Cost and Financing**

As with the public sector, costs for private sector solid waste management need to be clearly defined. A business that does not know the cost of its solid waste management programs puts itself at a competitive disadvantage.

#### **A. Cost Savings**

Solid waste costs related to the commercial/industrial sector include costs for in-house handling, container purchase or rental, hauling, and disposal. Source reduction and recycling of solid waste will be economically beneficial to businesses if the quantity of solid waste and the costs of waste handling, both internal and external, can be reduced. Therefore, it is important that businesses clearly understand the current costs associated with waste generation.

To determine the possible cost savings of a waste reduction program, the following information should be investigated:

1. Current total solid waste management costs.
2. The potential for cost avoidance through the implementation of a waste reduction program.
3. Long-term solid waste management plans.

#### **1. Current Total Solid Waste Management Costs**

One way to evaluate current total waste costs is to itemize solid waste costs. Table 1 identifies the usual solid waste costs a business or industry experiences. Businesses may reduce these costs through the implementation of a waste reduction program. However, the impact of a waste reduction program may be difficult to quantify. For example, costs for a source reduction program may be difficult to quantify as they usually involve a one-time change in behavior or a change in purchasing, storage, or shipping. Savings from source reduction may be most easily seen in purchasing records. However, once less waste is generated, costs for handling, hauling, and disposal will be reduced. Costs for a recycling

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<sup>1</sup> See Full Cost Analysis Worksheet available through the NC Division of Pollution Prevention and Environmental Assistance.

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## Full Cost Determination and Program Financing

program may be quantified in the same way costs for solid waste management are calculated.

**Table 1. Solid Waste Cost Balance Sheet**

**Solid Waste Costs**

- Add
- A. Waste fixed asset cost (e.g., dumpsters, roll-offs).
  - B. + In-house waste handling costs.
  - C. + Hauling costs.
  - D. + Disposal costs.

**E. = Total Solid Waste Costs**

**Recycling Costs**

- Add
- F. + Recycling fixed assets costs (e.g. balers, bins).
  - G. + Recycling operational costs (materials handling).
  - H. + Recycling hauling costs.

**I. + Total Waste + Recycling Costs**

**Solid Waste Program Costs With Source Reduction and Recycling**

- Subtract
- J. - Avoided costs for off-specification products.
  - K. - Avoided waste fixed asset cost.
  - L. - Avoided waste hauling costs.
  - M. - Avoided in-house waste operations and handling costs.
  - N. - Avoided disposal costs.
  - O. - Avoided raw material costs.
  - P. - Value of tax incentives for resource recovery.
  - Q. - Recycling revenues.

**R. = Total cost of solid waste program including waste reduction**

## **Full Cost Determination and Program Financing**

Some additional information gathering may be required to complete items in this balance sheet. For example, if a company does not know in-house waste handling costs, the number of employees, the time spent, and containers and equipment used to handle wastes must be examined and quantified. When these numbers are calculated, efforts to reduce materials handling will reflect the benefits of waste reduction. On the other hand, avoided waste hauling costs may not be reflected immediately if businesses are under fixed-time contracts. Similarly, a fixed asset cost may not decrease unless the reduction is sufficient to warrant, for example, the rental of a smaller dumpster to replace a larger unit.

### **2. Cost Avoidance Through Waste Reduction**

Through implementation of waste reduction activities, business and industry can avoid or reduce certain costs. In addition to the avoided costs listed in Table 1, there may be other avoided costs as a result of implementing a waste reduction program; these cost may be quantifiable or non-quantifiable.

#### Quantifiable Avoided Costs

- Reduced raw material purchases.
- Reduced on-site collection/storage costs.
- Reduced off-specification products.
- Reduced hauling costs to landfill/treatment facility.
- Reduced treatment/disposal costs.

#### Non-Quantifiable Avoided Costs

- Reduced environmental liability (primarily associated with hazardous wastes).

### **3. Long-Term Solid Waste Management Plans**

Business and industry should discuss with local government the local solid waste management plan and its effects on current and future waste disposal. Based on expected future disposal costs, the cost savings of investing in a source reduction program should be projected and evaluated. Information to collect from the local government includes:

- The remaining life of the existing disposal facility in the community.
- Plans for the next disposal facility and the timetable for resolving disposal issues.

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# Full Cost Determination and Program Financing

- The current fee structure for disposal methods and future fees and fee structures for disposal.
- Current expenditures on solid waste, changes from past expenditures, and expected changes to current expenditures.
- Current local solid waste policies including local ordinances and programs and plans for future policies and programs.
- The local waste stream and contributions by local commercial and industrial waste.
- Examples of "environmentally progressive" companies that are leading the way locally.

To demonstrate that the local situation is not isolated, the local government may be able to provide information on the solid waste situation in neighboring counties and to share information on any restrictions other counties have imposed.

## B. Financing

When financing capital needs, businesses can reference some of the options listed above in this section. Frequently, equipment costs can be offset by revenue from the sale of recyclables, or a recycling market may provide equipment in exchange for recyclable materials. North Carolina offers tax incentives to promote the use of recycling and pollution abatement equipment:

- **Special Tax Provisions for Recycling and Resource Recovery**  
Special tax treatment may be available to a business for purchasing or constructing facilities or equipment used exclusively for recycling or resource recovery. Special treatment may apply to the following taxes: real and personal property tax, corporate state income tax, and franchise tax on domestic and foreign corporations. Facilities or equipment used part of the time for recycling or resource recovery do not qualify.  
Contact: Solid Waste Section, NC Division of Waste Management,  
DEHNR, (919) 733-0692  
401 Oberlin Road, Suite 150, Raleigh, NC 27605-1350
- **Tax Certification of Pollution Abatement Equipment**  
NC General Statute 105, Articles 3,4, and 12 allow industries that discharge pollutants to the air or surface water to be eligible for tax benefits for the installation of pollution abatement equipment.  
Contact: Division of Environmental Management, (919) 733-7015.

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# Full Cost Determination and Program Financing

## IV. Grants and Loans for Local Government and Businesses

Below are outlined some grants and loans available to businesses and local governments that may be used for implementation or expansion of a waste reduction program.

### A. Businesses

#### Challenge Grants for Pollution Prevention

Annual matching grants of up to \$20,000 are available to business, industry, or trade associations from the NC Division of Pollution Prevention and Environmental Assistance. The purpose of the program is to develop and implement innovative programs that eliminate, prevent, and/or reduce the generation of waste. This waste can be in any media: wastewater discharges, air emissions, hazardous waste, or industrial solid waste. Eligible projects are those that address waste reduction through source reduction or recycling. Proposal deadline is usually July or August.

Contact: Industrial Assistance, NC Division of Pollution Prevention and Environmental Assistance, (919) 715-6500, PO Box 29569, Raleigh, NC 27626-9569.

#### Recycling and Business Assistance Center (RBAC) Awards

In 1994, North Carolina was awarded an EPA grant to establish an RBAC. The Center is housed with the NC Division of Pollution Prevention and Environmental Assistance. Limited funding is available for unsolicited recycling market development projects through the RBAC.

Contact: RBAC, NC Division of Pollution Prevention and Environmental Assistance, (919) 715-6500, PO Box 29569, Raleigh, NC 27626-9569.

#### U.S. Small Business Administration (SBA) Loans

Loans are made by private vendors and guaranteed up to 90 percent by SBA. In addition to general business loan guarantees, the SBA provides several specialized loan-guarantee programs:

- Small general contractor financing.
- Lender incentives for small loans of less than \$50,000.
- Community economic development loans.
- Pollution control loans.
- Energy and conservation loans.



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# **Full Cost Determination and Program Financing**

Contact: Small Business Answer Desk, 1-800-8-ASK-SBA, or consult the telephone directory under U.S. Government.

### **U.S. Small Business Administration (SBA) Pollution Control Loans**

Loans guaranteed up to \$1 million can be used to finance the planning, design, or installation of a "pollution control facility," defined as:

- Real or personal property likely to help prevent, reduce, abate, or control noise, air or water pollution or contamination, by removing, altering, disposing, or storing pollutants, contaminants, wastes, or heat.
- Real or personal property to be used for the collection, treatment, utilization, processing, or final disposal of solid or liquid waste.
- Any related recycling property when a local, state, or federal environmental regulatory agency says it will be useful for pollution control.

Contact: Small Business Answer Desk, 1-800-8-ASK-SBA, or consult the telephone directory under U.S. Government.

### **U.S. Small Business Administration (SBA) Energy and Conservation Loans**

Small businesses involved in engineering, manufacturing, distributing, marketing, installing, or servicing products or services designed to conserve the nation's energy resources are eligible for financing under this loan program. Loans can be used to expand existing facilities, to purchase equipment, etc., or to buy land for facility construction.

Contact: Small Business Answer Desk, 1-800-8-ASK-SBA, or consult the telephone directory under U.S. Government.

### **N.C. Department of Commerce, Commerce Finance Center - Industrial Revenue Bonds**

These bonds are funded by Congress, which determines, based on population, the amount each state may issue annually. Bonds can only be used by manufacturing companies for capital expenditures, fixed assets, land, building, and new equipment. Bonds offer long-term, low interest financing. To be cost-effective, an issue should amount to at least \$1.5 million.

Contact: Commerce Finance Center, (919) 733-5297,  
430 North Salisbury Street, Room 2174, Dobbs Building, Raleigh, NC 27611

### **U.S. Small Business Administration (SBA) - Small Business Innovation Research (SBIR) Grants**

Through a three-phase program, assistance is provided to small hi-tech enterprises to transfer products and services from the laboratory to the commercial market place.

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# **Full Cost Determination and Program Financing**

Contact: Floretta Futrell, North Carolina Biotechnology Center, (919) 541-9366,  
P.O. Box 13547, Research Triangle Park, NC 27709-3547

### **B. Local Governments**

#### **DEHNR Solid Waste Management Trust Fund**

The DPPEA Solid Waste Management Trust Fund funds implementation or expansion of waste reduction programs. Local governments may apply individually or for a multi-party grant. Applicants must provide a percentage match of requested grant funds. Grant cycle proposals are due in early Spring. Also, unique unsolicited proposals are accepted year round.

Contact: Scott Mouw, N.C. Division of Pollution Prevention and Environmental Assistance, (919) 715-6500, PO Box 29569, Raleigh, NC 27626-9569.

### **C. Local Governments and Businesses**

#### **NICE<sup>3</sup> - National Industrial Competitiveness Through Energy, Environment, and Economics**

The U.S. Department of Energy and the EPA have allocated \$2.5 million to fund innovative demonstration projects that advance competitiveness through energy efficiency, waste reduction, and pollution prevention. Federal grants may range up to \$425,000 per project. Non-Federal funding must equal or exceed Federal contribution. Both industrial and non-industrial entities (local governments, non-profit organizations, businesses, individuals, and State and private universities) are eligible. As all project proposals must be submitted through certain State agencies, the NC Division of Pollution Prevention and Environmental Assistance is soliciting pre-proposal summaries for review. Contact DPPEA for details.

Contact: Industrial Assistance Section, NC Division of Pollution Prevention and Environmental Assistance, (919) 715-6500, PO Box 29569, Raleigh, NC 27626-9569.

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## **Wrap Up**

Only through understanding the full cost of solid waste management can local governments (1) maximize the efficiency of its program and (2) develop the ideal mix of funding sources to meet program financial needs.

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# **Full Cost Determination and Program Financing**

**WHAT WILL BE YOUR FIRST STEPS IN CONDUCTING A FULL COST ANALYSIS OF YOUR SOLID WASTE MANAGEMENT PROGRAM?**

### **Exercise: Watsamatta County and its Municipalities**

The towns and the county of Watsamatta County are having a joint planning session to help coordinate the regional Solid Waste Management Plan. At this meeting, each local government will present the status of its of solid waste management program and its ideas for the future.

Before attending the meeting, the solid waste contingent of each local government will analyze the full cost of its budget for the previous year and use these results to plan for the future.

Be prepared to present the following at the group planning meeting:

- ✓ **Major program categories (cost centers) of your local government's solid waste program.**
  
- ✓ **Cost per ton of each program category, along with the challenges in performing your full cost analysis.**
  
- ✓ **Given the results from your full cost analysis, how do your propose to improve your existing program?**
  
- ✓ **What one new program will you consider to implement? Why?**
  
- ✓ **Develop a simple budget for the new initiative.**
  
- ✓ **How will you finance any expansions and your new initiative?**





# North Carolina Office of Waste Reduction

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## **COST AVOIDANCE ANALYSIS**

- Shows a more realistic picture of total waste costs
- Provides framework for evaluating waste reduction options
- May reveal inefficiencies and unnecessary costs in current system
- Provides baseline for measuring cost effects of waste reduction

## **STEPS IN A COST AVOIDANCE ANALYSIS**

- I. Assess Total Current Waste Disposal Costs
- II. Assess Total Proposed Waste Reduction Costs
- III. Assess Cost Avoidance Effects of Waste Reduction
- IV. Assess Revenues and Other Benefits from Waste Reduction
- V. Summarize Cost Avoidance Analysis for True Economic Picture of Waste Reduction

## **I. ASSESS TOTAL CURRENT WASTE DISPOSAL COSTS**

$$\text{Total Waste Costs} = A + B + C + D$$

A = Waste Fixed Assets (e.g., dumpsters, rolloffs)

B = In-House Waste Handling

C = Hauling Costs

D = Disposal Fees (tipping fees)

## **II. ASSESS TOTAL PROPOSED WASTE REDUCTION COSTS**

$$\text{Total Waste Reduction Costs} = E + F + G + H$$

E = Recycling Fixed Assets (e.g., balers, bins)

F = Recycling Operational Costs (material handling)

G = Recycling Hauling Costs

H = Process Modifications or Other Changes

## **III. ASSESS COST AVOIDANCE EFFECTS OF WASTE REDUCTION**

$$\text{Total Costs Avoided} = I + J + K + L$$

I = Avoided Waste Fixed Asset Costs

J = Avoided Waste Hauling Costs

K = Avoided In-house Waste Operations Cost

L = Avoided Disposal Costs

## **IV. ASSESS REVENUES AND OTHER BENEFITS FROM WASTE REDUCTION**

$$\text{Total Revenue and Other Benefits} = M + N + O + P$$

M = Revenues from Sale of Recyclables

N = Value of Tax Incentives for Resource Recovery

O = Improved Efficiencies in Production

P = Reduced Purchases and Inventory Costs

## **V. COST AVOIDANCE PICTURE OF WASTE REDUCTION OPTIONS**

- + Current Waste Disposal Costs
  - + Proposed Waste Reduction Costs
  - Costs Avoided from Waste Reduction
  - Value of Revenues and Other Benefits
- 

Net Bottom Line Effect of Waste Reduction Options

## TYPICAL SOLID WASTE CHARGES BY HAULERS

An understanding of the general cost of solid waste services to businesses and industries can be critical to helping them explore waste reduction options. Source reduction and recycling can help business or industry reduce the number and/or size of disposal containers it rents or owns, and can help reduce the number of pickups or hauls it needs for disposal of wastes. Reduced disposal charges can help them cover expenses related to waste reduction (such as the cost of a baler).

The following sheet shows "ballpark" figures for typical solid waste charges by private haulers to commercial and industrial clients. Actual charges depend on local conditions, competition, level of client demand, and local tipping fees.

Charges are broken down here by four items of cost: Monthly Rental, Pick-up or Per-dump fees, Hauling fees, and Tipping fees. Haulers generally charge all itemized costs as a single billed fee per month.

### MONTHLY RENTAL OF CONTAINERS

<u>Container size/type</u>	<u>Average Monthly Rent</u>
4 cubic yard front-loading box	\$15
6 cubic yard front-loading box	\$15
8 cubic yard front-loading box	\$20
30 yard roll-off container	\$60
40 yard roll-off container (open-top uncompacted)	\$60
40 yard roll-off container (compacted, including compactor)	\$275

### PICK-UP (PER DUMP) CHARGES - MONTHLY TOTAL CHARGES (not including tipplings fees)

<u>Container size</u>	<u>Dumping Schedule</u>		
	<u>Once/week</u>	<u>Twice/week</u>	<u>Three/week</u>
4 cubic yard front-loading box	\$40	\$70	\$80
6 cubic yard front-loading box	\$40	\$70	\$80
8 cubic yard front-loading box	\$40	\$70	\$80

### HAULING CHARGES

Large, bulky containers, such as compacted or uncompacted rolloffs, are charged for each time they are hauled to a disposal facility.

<u>Typical hauling charge</u>	<u>Range of <u>monthly</u> costs to facility (four weeks/month)</u>		
	<u>Once/week haul</u>	<u>Twice/week haul</u>	<u>Three/week haul</u>
\$75-120 per haul	\$300 - 480	\$600 - 960	\$900 - 1440

Hauler will append the tipping fees for each load to the charge; tipping fee charges are not included here.

### TIPPING FEES

Haulers will also need to cover the costs of tipping fees in their charges. For roll-off loads, the direct expense of the tipping fee at the scale is appended directly to the bill. For front-load containers, haulers figure around 100 to 120 lbs. per yard in the box. Thus they would charge 100 lbs x yard size of container x weekly number of dumps x 4.33 (average weeks in a monthly), all divided by 2000 (lbs in a ton) x local tipping fee.

### OTHER EXPENSES

Container purchase prices (approximate)

<u>4 cubic yard</u>	<u>6 cubic yard</u>	<u>8 cubic yard</u>	<u>30 yard open-top</u>	<u>40 yard open-top</u>
\$350	\$475	\$600	\$2000	\$2800

# —Session 6—

## Recycling Begins With Markets

### Session Preview

Every coordinator should begin a recycling program with a thorough understanding and assessment of markets for the materials to be collected. This session discusses the importance of markets, the structure of the marketplace, and methods to assess the marketplace as it relates to the program. In addition, this session also takes up the effects that processing, materials transport, and procurement have on markets and the quality of finished products.

### Importance of Markets and Marketing

Without markets, there can be no recycling. A market is the physical alternative to disposal of a solid waste material. It is important to understand the distinction between a market and marketing.

A market is a buyer (or buyers) of materials. The market determines the material that can be collected and the way it must be processed. The market will provide specifications which must be followed so that the end manufacturer can ensure a quality end product. The market may manufacture the end product or act as a broker and sell the material to the end manufacturer. Stable markets are critical to recycling programs.

Marketing is the act or process of transferring or selling a recyclable material. It involves bringing together the market(s) and collector(s) of recyclable materials. A recyclable material is considered marketed - but not necessarily recycled - when ownership of or title to the material changes hands.

### Structure of the Marketplace

The marketplace consists of end users, i.e., handlers, processors, and brokers, and the businesses and organizations that supply materials to these end users.

### Key Definitions

End User - A company or organization that incorporates recycled materials into products it uses or manufactures. An example of an end user is Carlisle Plastics, Inc., Battleboro, N.C. Carlisle purchases post-consumer HDPE and LDPE (collected in community recycling programs) and re-manufactures the plastic into three separate product lines: ECO-CHOICE trash bags (55% recycled materials, 30% post-consumer); Ruffies trash bags (100% recycled materials, 25% post consumer); and FILM-GUARD plastic sheeting for construction and agricultural applications (75% recycled materials, 25% post-consumer.) The recycling loop is completed as the re-manufactured products are purchased by consumers.

## —————Session 6—————

# Recycling Begins With Markets

**Processor** - A company or firm that prepares recyclable materials to meet the specifications required by end users, for example, by sorting, densifying, and packaging materials. Processors may market the processed materials to a broker or end user or may use the processed materials themselves. Paper Stock Dealers Inc., Durham, N.C., purchases corrugated cardboard, newspaper, and office paper and prepares it for re-manufacture at a paper mill.

**Handlers/Collectors** - A company, organization or local government that physically collects and/or recovers recycled materials directly from residential, commercial/institutional, or industrial sources. Pitt County is an example of a local government that handles/collects materials: the County operates (1) a curbside recycling program, (2) staffed convenience centers, and (3) commercial/industrial recycling and exchange programs.

**Broker** - An agent or firm that purchases recycled materials and facilitates their processing and transport to an end user. A firm may function exclusively as a broker, in which case it does not take possession of the materials, or it may serve multiple functions, i.e., as a processor and a broker.

All markets except the end users are considered “intermediate” markets because they act as links between collection or recovery of materials and their transformation into new products. Recyclables are commodities, and like many commodities, the higher value materials tend to attract the greater the number of intermediate players.<sup>1</sup>

### *Examples:*

- **Recycled Newsprint.** In the recycled newsprint marketplace, recovered newsprint is either shipped directly to an end user by the handler or transferred to a processor. The processor usually bales the newsprint for ease of handling then ships the material to an end market.
- **Scrap Metals.** In the scrap metals marketplace, the scrap dealers are the principal intermediaries between recovery and the end users.

**Demand** - Demand for recycled materials is driven by the consumers who purchase products with recycled content and/or by an end user’s preference for recycled materials over virgin raw materials.

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<sup>1</sup>Note: Markets do not always pay for materials and in some cases, they may charge to take materials. However, it may still be profitable to incur the cost of recycling the materials in order to provide services and avoid other costs.



## Session 6

# Recycling Begins With Markets

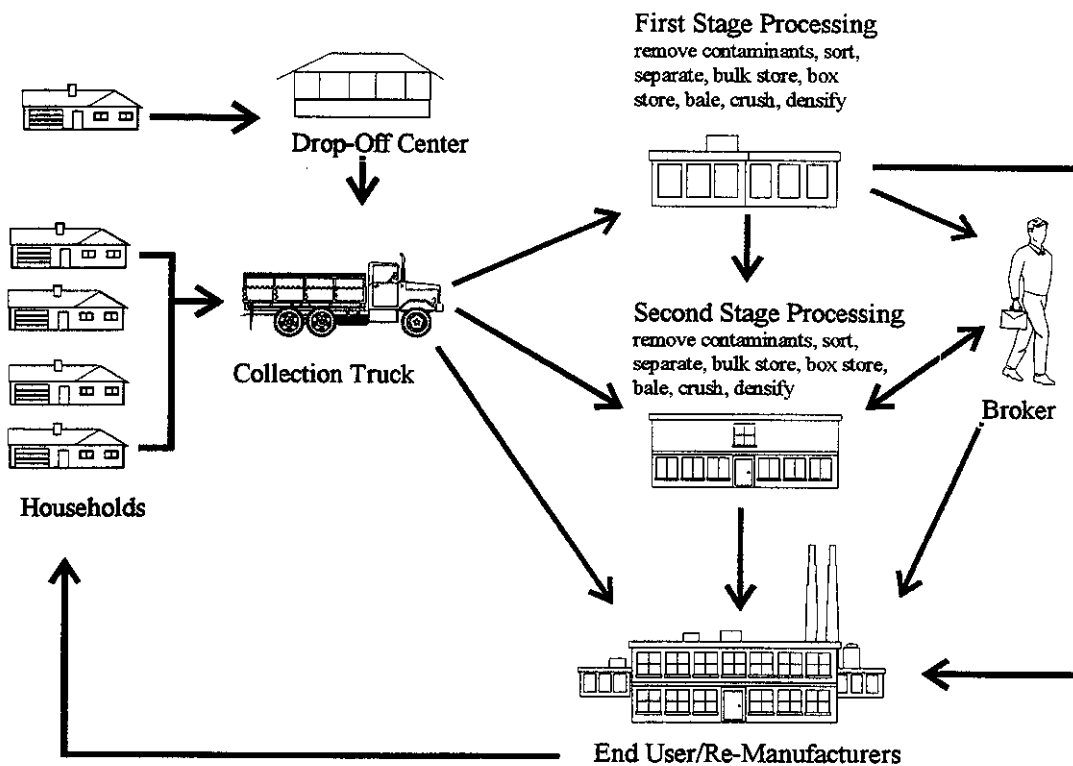
**Supply** - Supply of recycled materials is provided by consumers who participate in programs operated by handlers /collectors or by waste generators who implement programs to recycle certain materials.

## How the Market Works

- In the complete recycling loop, materials are collected, processed, marketed, may be processed again, re-manufactured, and sold as a new product.

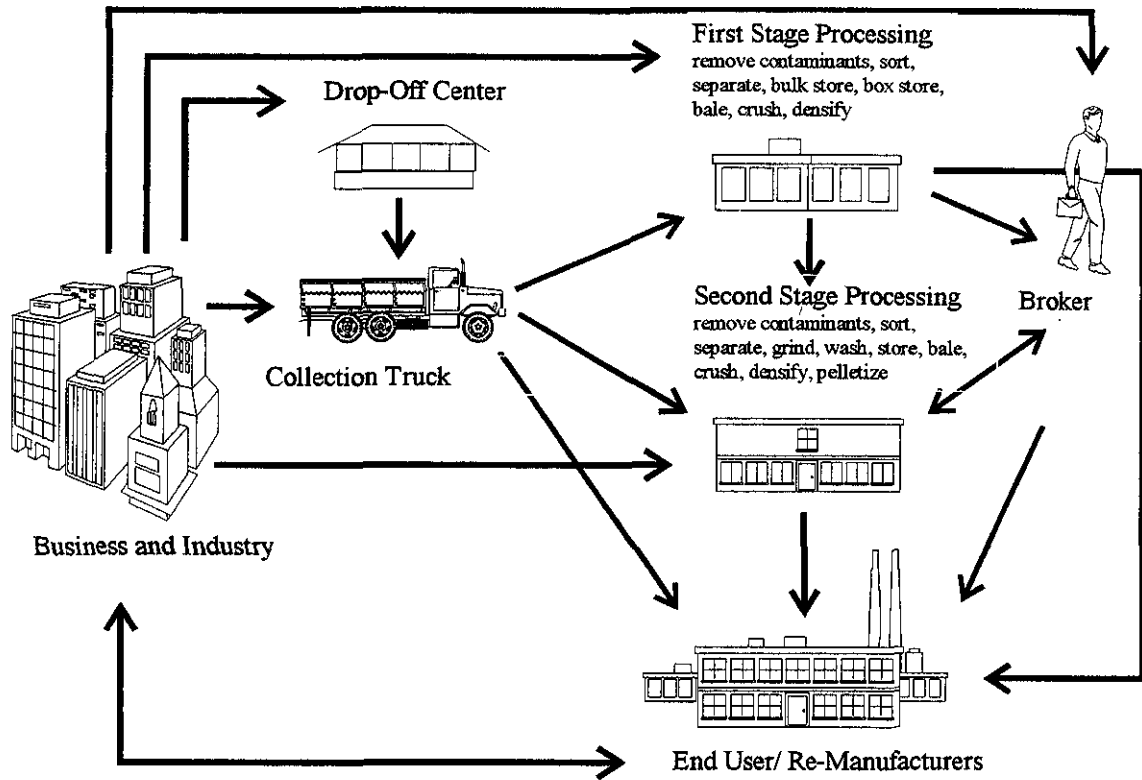
Materials may flow from generator to end user through different paths.

### Residential Material Flow to Market



————— **Session 6** —————  
**Recycling Begins With Markets**

**Business, Commercial, and Industrial Materials Flow to Market**



## —Session 6—

# Recycling Begins With Markets

### Assessing the Marketplace - Phase I

The market for collected material must be sustainable. This consistency requires an assessment of the marketplace for a specific material under consideration for recovery. The following is the most important issue to be determined in this assessment:

There is sufficient **demand** on a long-term basis for the material to be absorbed by the market for the **volume** that will be collected from the community.

After this thorough assessment, local governments should be convinced that once they begin collecting the material, it is unlikely that they should have to stop because the marketplace fails to accept the material.

While conducting this determination, coordinators should address several questions:

1. The number of processors serving the area and their specifications.
2. The time the market for the material has been in existence, if the buyer can provide references, and if there is a well established market.
3. Will potential markets agree to accept the materials for an extended period of time.
4. The number of end users for the material serving the area and their specifications for the material, their maximum capacity, the percentage of this capacity that has been attained, and if there is additional capacity planned for the foreseeable future.
5. If materials will be processed at the local government's facility so that it can market directly to the end user, and, thus, skip an intermediate processor.

## —————Session 6—————

# Recycling Begins With Markets

### Assessing the Marketplace - Phase II

When coordinators are assessing the marketplace, it is very important that they discuss all the questions they have prepared and then ask if there are other items that should be discussed. Most reputable markets will have everything spelled out in a contract, although a contract is not always necessary to market materials. Coordinators should be wary of markets that do not have requirements or say that they can accept any and everything.

#### 1. Evaluating a Processor, End User, and/or Broker

At a minimum, the following information should be obtained from a potential processor.

- **Location**, including shipping and mailing addresses and telephone and fax numbers.
- **Specifications of materials accepted.** (1) **Commingling:** if processor accepts more than one material type, can materials be commingled in packaging/storage; for example, aluminum and steel cans collected and stored together and/or all plastics collected and stored together. (2) **The acceptable level of contamination.** (3) **Will the local government be expected to screen the materials before shipping.** (4) **The minimum tonnage that must be collected before shipping.**
- **The amount the processor will pay for the materials.**
- **Terms of Freight on board (FOB).** Will the processor provide trucks and labor to come to your dock (FOB your dock) to pick up the materials, or will you have to ship the materials to his/her dock (FOB his/her dock).
- **Length of agreement, i.e., will the processor commit to a long-term arrangement.**
- **Storage Containers, i.e., will the processor furnish them.**
- **Length of notice provided if the processor decides to stop taking the recyclables.**

**Note:** When evaluating a broker you should also question years experience with the material and also what the payment terms are. For example payment terms can vary from 15 days from ship date, to 45 days from end of month that ship date is in!

## —————Session 6—————

# Recycling Begins With Markets

### Market Access: Processing and Transport

In selecting the market outlet best for a recycling program, coordinators must weigh each market in terms of processing and transport requirements, the local government's resources, and the associated costs. Processing and transportation of materials are inherently linked. The greater the distance materials must be shipped, the greater the need for densified loads, i.e., higher levels of processing and aggregation of materials.

Example:

If a local government chooses to market its old newsprint directly to an end user, it will enjoy the benefits of higher prices paid for the material. The tradeoffs here include additional costs incurred for processing the material to end-user specifications and administration of the transportation and marketing. In addition, the end user will probably want some assurances about a consistent supply of relatively large volumes.

To compare the relative costs between markets, the following variables must be considered:

Cost/ton of processing  
+ cost/ton of transportation  
- revenues/ton  
= cost of utilizing market.

These costs can be computed with the following equation:

$$P_1 + T_1 - R_1 = C_1$$

Where:

$P_1$  = cost/ton of processing  
 $T_1$  = cost/ton of transportation  
 $R_1$  = revenues/ton  
 $C_1$  = cost of utilizing market

**If one or more of the variables are equal among market outlets, only the remaining variables require comparison.**

*Discussion question? Where would you go to get this cost information?*

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# Recycling Begins With Markets

In addition, if a market quote from one market outlet is FOB your dock, the transportation costs will not factor into the equation for that market outlet because they have been incorporated into the quote.

## Market Development and Procurement

As stated, **recycling is market driven**. In fact, recycling is possible only because a demand other than disposal exists for these materials. **Therefore, the continued health and expansion of recycling depends on consumers of recycled goods**. If we participate in the recovery of recyclable materials from the waste stream, we must also support the markets that make this activity possible.

### How Local Governments and Businesses Can Support Markets

- To the greatest extent possible, buy products that contain recycled materials and that are made with post-consumer recycled content.
- Where practical, increase the cost effectiveness of buying recycled products by combining purchasing efforts with adjacent cities and counties, purchasing off state contract, or forming business cooperatives.
- Purchase products that may be reused or recycled in the community.
- Whenever relevant, show preference for contractors who use recycled materials in their work.
- Encourage others to buy recycled products.
- Adopt a procurement policy for recycled-content purchases. Such a policy may include price preferences, set-asides, purchasing goals, and requirements that bidders disclose percentages of recycled-content.
- Make a commitment to collect and supply the largest quantity possible of economically valuable raw materials from you community's recycling program. Strive for growth in recovered tonnage each year.

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# Recycling Begins With Markets

### Factors To Consider in a Buy-Recycled Program

Price Preferences. Recycled-content products may sometimes be more expensive than those manufactured from virgin materials. Price preferences included in procurement policies set a ceiling on the amount of increase procurement agencies may spend for recycled-content products. Most of the policies with price preferences specify a 5- to 10-percent preference. This policy means that agencies may favor recycled-content products if the total price does not exceed by more than 5 or 10 percent the low-bid quote for a non-recycled product.

Set-asides. A procurement policy may specify a minimum portion of recycled-content products to be purchased. This number is defined as a set-aside.

Purchasing Goals. These goals may include two elements and are most often directed at paper. One element is that a percentage of total paper purchases be recycled paper. Another specifies a percentage for recycled content. For instance, a goal may require that 10 percent of the total purchase of paper be recycled paper by a set date and that the paper must contain no less than 25-percent post-consumer fibers.

Post Consumer Materials. These are materials which have "passed through their end usage as a consumer item" (Federal Register 1988).

Increasingly, local governments are recognizing the need to purchase recycled-content products in order to support the recycled materials marketplace. Some governments have discussed "closed loop" arrangements with end users, i.e., if the end user buys their recycled materials, they will buy the end user's finished recycled-content product.

### State Government Model

On April 22, 1993, Governor Hunt signed Executive Order Number 8, "State Government Recycling, Reduction of Solid Waste, and Purchase of Products With Recycled Content." All State agencies are required to maximize their efforts to purchase and use products made wholly or in part from recycled materials. On an annual basis, goals were established to increase the purchase of goods and supplies made from recycled materials by specified percentages. The Order also requires that each state agency report on an annual basis the amounts and types of recycled products purchased.

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# Recycling Begins With Markets

### Examples of Recycled Content Products Purchased by State Agencies

- Bituminous concrete
- Re-refined oil
- Retread auto and truck tires
- Flooring from recycled tires
- Other recycled rubber products
- Writing papers
- Towels
- Computer paper
- Copy paper
- Recycled plastic products (plastic channel posts, plastic garbage bags and trash cans, polyester carpet)
- Recycled aluminum products (license plates, aluminum guardrails, which are 100-percent post-consumer)
- Steel (highway posts/grates and fence, channel posts on roads)

**Note:** A program has been implemented in which local governments may purchase recycled-content products on state contract. For more information contact:

Betsy Watson  
Local Government Purchasing Program  
Division of Purchase and Contract  
NC Department of Administration  
116 W. Jones Street  
Raleigh, NC 27603-8002  
(919) 733-3581



## — Session 6 —

# Recycling Begins With Markets

### North Carolina Market Development Efforts

The Department of Environment, Health, and Natural Resources in cooperation with the Department of Commerce was selected by the U. S. Environmental Protection Agency to establish a Recycling and Reuse Business Assistance Center (RBAC) for North Carolina in the Office of Waste Reduction.

Below are the primary goals of the RBAC.

1. To increase interaction of economic development and solid waste management professionals.
2. To increase end-use capacity for utilizing recovered materials.
3. To increase demand for products made from recycled materials.
4. To recruit intermediate processors and end users of recycled feed-stock to North Carolina.

For more information about the RBAC, contact Matt Ewadinger or John Nelms at the Office of Waste Reduction, 1-800-763-0136.

### Wrap Up

Your recyclable materials are the products of your recycling program. It's your job to sell them. Even though it may sound ludicrous, the marketing of a pound of PET is similar to selling a box of detergent. **It is most important that every aspect of your program focuses on the final sale of your product.** Recovery, processing, and transportation components should all be directed by the marketing goal.

**In what ways would your program change if it were designed with marketing as a number one priority?**

# —————Session 6—————

## Recycling Begins With Markets

### EXERCISE: To Market, To Market...

Which of the following two marketing scenarios would be best for your recycling program? Be prepared to justify your answers using what we have covered in the last hour.

### Marketing Old Newspaper

#### Scenario No. 1: Marketing To an End User

Must be baled (minimum of 1,500 lbs/bale)  
\$100/ton  
FOB end user's dock  
Minimum 6 tons per drop-off  
Must sign 6-month contract. Price will be renegotiated at end of contract.

- ★ Only wants ONP and will accept anything which is normally delivered with a daily newspaper.
- ★ Contaminants include glass, plastic containers or bags, string, and brown paper bags.
- ★ Must conform to ISRI scrap specification circular 1991, No. 6 News, as follows:
  1. Prohibitive materials may not exceed 1/2 of 1%\*.
  2. Out-throws are defined as other papers which are "unsuitable for consumption as the grade specified."\*
  3. Prohibitive materials are materials which by their presence render the associated package (bale) unusable as the grade specified.\*

#### Scenario No. 2: Marketing to a Processor

Must be loose in bulk containers  
Processor provides roll-offs  
Charges \$30. for pick-up  
Pays \$25/ton, can adjust price monthly based on market trends  
FOB your dock  
No contract required  
Will also take mixed household paper in roll-offs, separate from ONP. Charges \$30. per pick-up. pays \$5/ton.

- ★ Will accept anything which is normally delivered with a daily newspaper.
- ★ Contaminants include glass, plastic bags and containers, string. (Brown paper bags are OK).
- ★ Must conform to ISRI scrap specification circular 1991, No. 6 News, as follows:
  1. Prohibitive materials may not exceed 1/2 of 1%\*
  2. Outthrows are defined as other papers which are "unsuitable for consumption as the grade specified."\*
  3. Prohibitive materials are materials which by their presence render the associated package (bale) unusable as the grade specified.\*

\*Institute of Scrap Recycling Industries, Inc., Scrap Specifications Circular 1991.

**Session 6**

**Recycling Begins With Markets**

***Discussion Questions for ONP Scenario***

1. *How can you decide if you can afford a baler?*  
*How much ONP will you generate in a month?*  
*Could you obtain more from surrounding counties?*  
*Could you also bale other materials to receive more revenue? What materials?*  
*What could happen to your contract after 6 months?*
  
2. *How much does a full roll-off of ONP weigh?*  
*Is this going to be a problem going down the road?*  
*How will your cost per pick up balance with your revenue?*  
*How much mixed household paper do you think you could collect?*  
*What will the costs and benefits of collecting it be?*

**The blank space below can be used to jot down your thoughts!**

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## Session 6

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# Recycling Begins With Markets

### Marketing Plastics

#### Scenario No. 1: Marketing To a Processor

Your processor will accept commingled bottles of PET (#1) and natural and colored HDPE (#2). It will be okay if there is some PVC (#3) and custom (non-soft drink) PET mixed into the bunch. The processor asks that you do not advertise that you can accept the PVC, but he does encourage the collection of the custom PET.

The processor will pick up the plastic, but the only storage container he accepts is a 30-yard roll-off. The processor will provide a roll-off and collect it when full. It must be covered with a tarp if it is located outside. You will be charged \$30 per pick-up plus \$0.02/lb processing fee. He wants a one-year contract.

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#### Scenario No. 2: Marketing To an Intermediate Processor or End User

This market will accept PET (#1) custom and soft-drink and HDPE (#2) natural and colored. It is very strict about PVC contamination. The plastic must be separated into three grades: PET, natural HDPE, and colored HDPE. The plastic must be baled and will be picked up in an enclosed trailer. If the bales are stored outside, they must be kept clean and dry. The baled plastic can be commingled within the trailer.

Prices follow national trends. Currently, these are \$0.25/lb for PET, \$0.12/lb for natural HDPE, and \$0.02/lb for colored HDPE. FOB your dock. There is no contract and no price guarantee, but the market agrees to never charge a pick-up fee. The worst case scenario is that you will get \$0.00/lb for the material.

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#### *Discussion Questions:*

1. *How many pick-ups will be needed per month?*  
*How will material be deposited into roll-offs? Can you put roll-offs directly at convenience centers for public use?*  
*What are the benefits and draw-backs of that scenario?*  
*What happens if there is too much contamination?*  
*How will pick-up costs be paid?*
  
2. *At what price does it pay to sort and bale?*  
*What is your per/lb cost to sort and bale? How do you find this cost?*  
*How long before you actually generate a cash flow?*

## Highlights of "Buy Recycled" Resolutions from North Carolina Local Governments September 1993

### *Chapel Hill*

Date Effective: July 10, 1989

The resolution supports and encourages the use of paper products made of recycled paper fiber and directs the Town to purchase such products when feasible. Declares that it is the intent of the Town to commit to using recycled paper products and sets a goal to buy a minimum of 75% of paper products that contain recycled paper. Authorizes the Town Manager to develop and implement a policy for purchasing paper products containing recycled paper fiber. The resolution states that it is the goal of the Town to become a leader in the State of North Carolina and in the nation in the percentage of recycled paper products used by a municipality.

Contact: Blair Pollock (919) 968-2788.

### *Carrboro*

Date Effective: August 15, 1989

The resolution authorizes the Town Manager to support and encourage the use of paper products made of recycled paper fiber and to direct the purchase of such products by the town when feasible. The Town Manager is authorized to develop and implement a policy for purchasing paper products containing recycled paper fiber.

Contact: Sarah Williamson (919) 968-7705.

### *Chatham County*

Date Effective: February 19, 1990

The resolution directs Chatham County Government to 1) use recycled paper for its letters, copies, reports, other publications, and computer paper; 2) use recycled paper products for the maintenance department — for example, paper towels; and 3) the resolution directs the County Manger to write the School Board asking it to do the same.

Contact: Matthew Young (919) 542-8255.

### *Cary*

Date Effective: June 14, 1990

The resolution requires all Town stationery, all copier paper, and all other printing done by the Town be done on recycled paper. The Town Purchasing Division stocks all recycled items available on state contract and continues to replace non-recycled items with recycled ones whenever possible.

Contact: Kim Fisher (919) 469-4092.

### *Pasquotank County*

Date Effective: November 5, 1990

The resolution urges Pasquotank County Departments to purchase recycled products as long as their price does not exceed the price of non-recycled products. (Amended earlier resolution which resolved to purchase recycled materials so long as the cost of products made from recycled materials does not exceed the cost of similar products not made from recycled materials by 10%. Original resolution passed September 17, 1990.)

Contact: Maureen Colwell (919) 335-9079.

### *Asheville*

Date Effective: April 23, 1991

The resolution supports the United States Council of Mayors "Buy Recycled" campaign and the 1991 Earth Day Challenge to United States' cities and towns to purchase products with recycled content. The resolution cites N.C.G.S. 130A-309.14 (f) as a precedent for preferential purchasing of recycled products. The section states,

"All State agencies, including the Department of Transportation, and the Department of Administration, and units of local government, are required to procure compost products when they can be substituted for, and cost no more than, regular soil amendment products, provided the compost products meet all applicable State standards, specifications, and rules. This product preference shall apply to, but not be limited to, the construction of highway projects, road rights-of-way, highway planting projects, recultivation and erosion control programs, and other projects."

The resolution allows for preferential purchasing of recycled products and supports the concept that for recycling programs to be effective, markets must be developed for products that incorporate post-consumer materials in their manufacture, are reusable, or are designed to be recycled.

Contact: Vicki Heidinger (704) 259-5629.

### *Belmont*

Date Effective: September 9, 1991

The resolution sets a precedent and directs the City to purchase recycled goods when possible as long as the goods are cost competitive.

Contact: Mozelle Lingafeldt (704) 825-5586.

### *Lincoln County*

Date Effective: April 6, 1992

The resolution endorses and accepts the challenges of the "CORE" (County Offices Recycle Environmentally) program. One stated purpose of the "CORE" program is to create demand for recycled products and directs the County to purchase 25% of all office paper with recycled material.

Contact: Tim Morgan (704) 736-8477.

### *Wake Forest*

Date Effective: September 15, 1992

The resolution directs the Town to buy and use products made with recycled materials and that are reasonably cost competitive. Cost competitive is defined as products that are no more than 10% more expensive than the non-recycled product alternative. Preference is given to products with post-consumer content. The resolution directs the Town to coordinate purchasing activities with other governments to promote recycled product purchasing and directs the Town Administrator to review the Town's purchasing needs and specifications to identify feasible new opportunities to specify and purchase items with recycled material. The resolution also authorizes the Town Administrator to establish administrative policies and procedures regarding purchase of items made with recycled material.

Contact: John Johnson (919) 556-2024.

### *Wake County*

Date Effective: December 7, 1992

The resolution states that the County shall buy and use products needed for County services made with recycled products. The County has the option, on a case by case basis, to consider purchasing recycled products not to exceed 10% premium over a virgin product. Preference is given to products with post-consumer recycled content. The resolution directs the County to coordinate purchasing activities with other governments to promote recycled product purchasing and directs the County Manager to review the County's purchasing needs and specifications to identify new opportunities to specify and purchase items with recycled material. The resolution authorizes the County Manager to establish administrative policies and procedures regarding purchase of items made with recycled material.

Contact: Phil Carter (919) 856-6835.

### *Greensboro*

Date Effective: April 29, 1993

The resolution supports and encourages the development and implementation of practices and policies which further the aims of recycling and waste reduction within City government operations. The "Recycling and Waste Reduction Policy" directs all City Departments to maximize procurement of recycled products. The policy directs the Purchasing Department to identify products made from recycled materials that meet appropriate standards for use by City Departments. The policy directs the City to publish a list of recycled products available on City contract annually and distribute the list to all potential purchasers to increase awareness of opportunities to purchase recycled products. City Departments are directed to purchase and use recycled paper for all reports, memoranda, and other documents whenever possible. The policy authorizes Departments to request purchase of recycled products if the cost of the recycled product does not exceed the cost of the virgin product by more than 5 to 10%. (Final approval of purchase orders should be determined by the Purchasing Division.)

Contact: Jerry Bulla (919) 373-2787.





EPA 1530-SW-89-05  
 Feb 1990  
 Methods to Manage  
 and Control Plastic  
 Wastes

Table ES-1  
 PLASTIC RESIN CHARACTERISTICS, MARKETS, AND PRODUCTS

Resin Name	Characteristics	Primary Product Markets	Product Examples
Low-Density Polyethylene (LDPE)	Moisture-proof; inert	Packaging	Garbage bags; coated papers
Polyvinyl Chloride (PVC)	Clear; brittle unless modified with plasticizers	Building and construction; packaging	Construction pipe; meat wrap; cooking oil bottles
High-Density Polyethylene (HDPE)	Flexible; translucent	Packaging	Milk and detergent bottles; boil-in-bag pouches
Polypropylene (PP)	Stiff; heat- and chemical-resistant	Furniture; packaging	Syrup bottles; yogurt tubs; office furniture
Polystyrene (PS)	Brittle; clear; good thermal properties	Packaging; consumer products	Disposable foam dishes and cups; cassette tape cases
Polyethylene Terephthalate (PET)	Tough; shatterproof	Packaging; consumer products	Soft drink bottles; food and medicine containers



PETE



HDPE



V



DPE



PP



PS



OTHER

ES-2



## BUYING RECYCLED PRODUCTS

Richard Keller  
October, 1991

### OVERVIEW

The homeless garbage barge demonstrated the severity of our solid waste problems. The U.S. now handles the equivalent of approximately 58,000 barge loads (or about 180 million tons per year) of municipal solid waste. To make matters worse, landfill costs are already \$20-150 per ton and rising, and the number of U.S. landfills decreased 50% in between 1979 and 1986.

The U.S. Environmental Protection Agency (EPA) has established a national goal of 25% recycling by 1992. By the end of 1990, thirty-three states and the District of Columbia (D.C.) had comprehensive recycling laws. Thirty states and D.C. established goals to recycle 15%-50% of the waste stream. While the programs have laudable goals, they will not succeed unless markets for recyclable materials are sufficient to handle the increased volumes.

Recycling involves three distinct steps: collection, manufacturing and use. (These steps are represented by the three arrows in the traditional recycling symbol.) The three elements must be in balance if we are to fully realize recycling's potential for waste management, energy conservation, and resource conservation. Merely collecting recyclables is not recycling. Recycling does not occur until a product made from recycled materials is actually used.

### EXISTING PROGRAMS

According to the National Institute of Governmental Purchasing, government purchases represent 20-21% of the Gross National Product (7%-8% federal, 12%-13% state and local). Governments can have a significant effect on the market by buying recycled products. Governments also have an important role in influencing private purchases, both through leadership by example and through their standards and specifications. Thus, government can influence private groups, from non-profits to Fortune 500 companies, to use recycled products.

At the federal level, Section 6002 of the Resource Conservation and Recovery Act, as amended, requires

purchasing programs for recycled products by federal agencies, and by state and local agencies and contractors using appropriated federal funds. The U.S. EPA has published five recycled product guidelines (paper and paper products, re-refined oil, retread tires, building insulation products and fly ash in cement and concrete). The guidelines include guidance on specifications, minimum content standards and recommendations on establishing a procurement program. EPA is also examining the feasibility of guidelines for building and construction materials, rubber products, asphalt rubber and yard waste compost. Information on the guidelines and federal implementation can be obtained by contacting the EPA procurement guideline hotline at 703-941-4452.

At the state and local level, all 50 states and the District of Columbia have laws, executive orders or policies that favor recycled products. Over 100 local governments also favor recycled products. Just 4 years ago, only 13 states (representing 46% of the population) had been identified. These programs include general statements favoring recycled products, goals, set-asides, price preferences, specification review and other methods to favor recycled products. Regional efforts are also beginning, such as those by the Northeast Recycling Council, the Baltimore and Metropolitan Washington Councils of Governments and the States of Minnesota and Wisconsin.

### IMPORTANT PROGRAM ELEMENTS

In order to establish a good program for buying recycled products, organizations should include the following key elements:

1. **Commitment to buy** - Organizations must establish a policy to buy recycled products. This commitment is necessary to provide leadership to users and to convince manufacturers that a consistent, long-term demand exists so that they can invest in recycling equipment.

2. **Review purchasing specifications** - All specifications must be reviewed to eliminate prohibitions or limitations against recycled products. In addition, more subtle obstacles to purchasing recycled products, such as



brightness levels for paper, must be identified and revised.

**3. Common definitions and percentages -**

Organizations should use existing minimum content standards and definitions, such as those established by the U.S. EPA or the Northeast Recycling Council. Manufacturers cannot supply different products to the 50 states, 83,166 local governments, and thousands of private organizations. By making one product, manufacturers can produce shelf items instead of specialty items, lowering the cost of production.

**4. Variety of products -** Even though paper makes up the largest percentage of the waste stream, buying recycled paper alone will not solve the solid waste problem. Organizations should consider buying a variety of recycled products, including but not limited to, paper, oil, plastics, auto parts, compost, aggregate, insulation, solvents and rubber products. Organizations should also consider recycling services such as tire retreading or oil recycling, and encourage printers and contractors to use recycled products.

**5. Testing products -** Organizations should test recycled products to determine how they work on certain equipment and for particular end uses. Tests should be done "blind" so that recycled and virgin products can be compared without bias.

**6. Phased-in approach -** Organizations should phase-in use of recycled products so that users can adjust to the program and manufacturers can make long-term capital investments to retool equipment to accept recycled materials.

**7. Price incentives -** Recycled products may be more expensive than virgin products due to tax policies, price fluctuations, or economies of scale in production or end use. Organizations should use price preferences (of 5% - 10%), life-cycle costing, or use of set-asides (where recycled products are purchased separately) to provide incentives for using recycled products. Any extra funds spent should be viewed as an investment in market development, the same as collection equipment, materials recycling facilities, trucks and other costs of collecting recyclables.

**8. Cooperation between solid waste and purchasing officials -** Both solid waste and purchasing officials have expertise and experience which should be used to develop an effective program for buying recycled products.

**9. Cooperation among manufacturers, vendors and users -** Organizations must actively solicit and publicize bids from manufacturers and vendors of recycled products. Manufacturers and vendors must provide a wide range of recycled products and let users know about the products. Information on recycled products is available from the Official Recycled Products Guide (800-267-0707, \$195/yr. for 2 issues), a listing of recycled

products. The EPA procurement guideline hotline (703-941-4452) can provide information on manufacturers and vendors that meet the EPA standards.

**10. Cooperative purchasing -** Organizations should join together to buy recycled products. These cooperative purchases expand the volume of products purchased, reduce unit costs of recycled products, help ensure availability, and establish common definitions and percentages. States and local governments can establish regional programs; non-profits and community groups can buy together, and businesses can establish joint programs.

**11. Data -** Organizations should keep good records on buying recycled products and share this information with others.

**12. Waste reduction and recyclability -** In addition to buying recycled products, organizations should buy recyclable products and buy fewer and more durable products.

**13. Market development -** Procurement strategies alone will not be sufficient to create markets. Governments must establish a market development strategy to create or expand markets for recyclables. In addition to procurement, the strategy can include identifying existing users of recycled material, and providing incentives for new and existing businesses such as tax credits, siting and zoning assistance, loans and grants.

**14. Source separation -** In order to provide materials for recycled products, collection programs must emphasize source separating clean, quality material that meets manufacturers' specifications. Recycling programs should focus on collecting high value materials for recycling, not simply on diverting material from the landfill. For example, ledger and computer paper should be collected instead of mixed paper. This will help ensure that raw materials are available to make high quality recycled products.

## CONCLUSION

Market forces are not sufficient to create adequate demand for recyclable materials. One important way to support recyclable materials markets is through the purchase of recycled products. As we head for the 21st century, we must continue to expand our efforts to collect, manufacture and use recyclable materials and products so that we may realize the full benefits of recycling in waste management and energy and resource conservation.

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# Procurement Guidelines for Government Agencies

To foster markets for recovered materials and reduce the amount of solid waste requiring disposal, consumers, including corporations and government agencies, need to buy products made from recovered materials. Such a commitment is an important step in sending a message to industry that markets for recovered materials exist. The Environmental Protection Agency (EPA) has issued "procurement guidelines" requiring government agencies to buy products made with recovered materials. The guidelines provide recommendations for implementing certain requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA).

To date, EPA has published five guidelines, designating the following specific items containing recovered materials for procurement by government agencies:

- *Paper and paper products,*
- *Lubricating oils,*
- *Retreaded tires,*
- *Building insulation products, and*
- *Cement and concrete containing fly ash.*

Once EPA issues a procurement guideline designating a specific item, procuring agencies have one year to meet the guideline's requirements.

Procurement Guideline for Paper and Paper Products, 40 CFR Part 250, 53 *FR* 23546 (June 22, 1988)

Procurement Guideline for Lubricating Oils Containing Refined Oil, 40 CFR Part 252, 53 *FR* 24699 (June 30, 1988)

Procurement Guideline for Retread Tires, 40 CFR Part 253, 53 *FR* 46558 (November 17, 1988)

Procurement Guideline for Building Insulation Products Containing Recovered Materials, 40 CFR Part 248, 54 *FR* 7328 (February 17, 1989)

Procurement Guideline for Cement and Concrete Containing Fly Ash, 40 CFR Part 249, 48 *FR* 4230 (January 28, 1983)

## To Whom Do the Guidelines Apply?

RCRA defines procuring agencies to include federal, state, and local agencies using appropriated federal funds, and their contractors. The requirements of a particular guideline apply only if the procuring agency purchases more than \$10,000 a year worth of the guideline item. For example, if a county government agency spends more than \$10,000 a year on paper, and part of that money is from appropriated federal funds, then the county government is a "procuring agency" for paper and must follow the procurement guideline for paper and paper products.

Purchases unrelated or incidental to the purpose of federal funding are not subject to RCRA Section 6002. Thus, they are not subject to the procurement guidelines. However, when it is not apparent whether a purchase is subject to RCRA, EPA encourages procuring agencies to follow the guidelines to help expand markets for products made of recovered materials.

## What Are the RCRA Section 6002 Requirements?

### *Review and Revise Specifications*

RCRA requires procuring agencies to review their specifications for the designated items and to revise them to allow procurement of products containing recovered material. Procuring agencies should eliminate requirements that specifically exclude the use of recovered materials. In addition, procuring agencies should revise performance standards that in effect exclude items containing recovered materials and that are more stringent than necessary to satisfy the agency's needs.

For example, if an agency has a specification that precludes the use of retreaded tires, it must be replaced, preferably with a performance standard that specifies relevant performance factors for tires, such as tread wear, burst strength, and stopping distance.

### *Establish an Affirmative Procurement Program*

Each procurement guideline contains EPA's recommendations for establishing an effective affirmative procurement program. However, each procuring agency may design its own program, so long as it meets the RCRA requirements.

All affirmative procurement programs must have four components:

1. a preference program,
2. a promotion program,
3. procedures for obtaining and verifying estimates and certifications of the content of recovered materials, and
4. annual review and monitoring.

### Preference Program

The statute provides three options for a preference program:

- *Minimum-content standards*, which identify the minimum content of recovered materials that an item should contain; procuring agencies may include these standards in their specifications for purchasing an item;

- *Case-by-case procurement*, open competition between products made of virgin materials and products made of recovered materials; procuring agencies must exercise a preference for the latter; or
- *Other*, any approach which is substantially equivalent to the above approaches.

The procurement guidelines *recommend* that agencies consider the following approaches for the five items designated thus far:

*Paper and paper products*: Specific minimum-content standards for paper and paper products. For newsprint, tissue packaging, and paperboard categories, postconsumer minimum-content standards are recommended. For printing and writing papers, "wastepaper" minimum content standards are recommended. ("Wastepaper" includes both postconsumer materials and certain preconsumer wastes.)

*Lubricating oils*: Minimum re-refined oil content standards for engine lubricating oils, hydraulic fluids, and gear oils at no lower than 25 percent of the basestock.

*Retreaded tires*: Case-by-case procurement programs consisting of two components—(1) procurement of retreading services for the agencies' used tire casings, and (2) procurement of replacement tires through competition among vendors of new and retreaded tires. If an agency is unable to carry out one component of the guideline—for example, because of unavailability—then it should implement the other component and continue to attempt to carry out the unrealized component.

*Building insulation*: Specific minimum-content standards for insulation materials commercially available with recovered materials, such as cellulose, perlite composite board, most of the plastic foams and boards, and rock wool. When purchasing insulation materials for which minimum-content standards have not been established (e.g., fiberglass and polystyrene rigid foam), agencies should use case-by-case procurement.

*Cement and concrete containing fly ash*: Inclusion of provisions in all construction contracts to allow for the use of cement or concrete containing fly ash.

#### Promotion Program

Agencies must actively promote their desire to buy recycled products. For example, they may choose to include explicit statements in solicitations for bids and proposals, discuss their commitment to recycling at prebidders' conferences, issue general announcements about their procurement preferences, and print a recycling statement or logo on official documents.

#### Estimation and Certification

Vendors must estimate the percentage of and certify the actual content of recovered material in their products. Such estimates and certifications are most easily expressed as a percentage of total content.

Vendors must certify the percentage of recovered material actually used in performance of the contract and must make their own arrangements for obtaining this information from the manufacturer. Vendors usually discuss product specifications and availability with manufacturers before submitting a bid; information for certification can be obtained at that time. The certification then becomes part of the contract awarded to the successful vendor.

### Annual Review and Monitoring

During the year, procuring agencies should review the range of estimates and certifications they received to determine whether they are using the highest percentage of recovered materials.

While the EPA guidelines recommend minimum-content standards, procuring agencies should adjust the standards when market conditions warrant a change. For example, if the data suggest that a sufficient number of bids would have been submitted in response to higher standards, then agencies should consider raising their minimum-content standards. Conversely, if there is a lack of competition, agencies may consider lowering their standards.

### When May an Agency Purchase Items Not Containing Recovery Materials?

Procuring agencies may choose not to purchase a guideline item containing recovered materials if:

- a guideline item's price is unreasonable;
- applying minimum-content standards results in inadequate competition;
- obtaining designated items results in unusual and unreasonable delays;
- or
- guideline items do not meet all reasonable performance specifications.

The word "reasonable" is key to the above conditions. A procuring agency cannot exclude guideline items based on unreasonable needs. For example, recycled paper cannot be excluded based on a brightness specification that is higher than needed.

### How Are the Guidelines Enforced?

Anyone who is injured by the failure of an agency to carry out the law may take civil action, either through that agency's appeal procedures, the General Accounting Office's appeal procedures, or the federal courts. There are no provisions in RCRA for federal enforcement of the guidelines.

### How Is EPA Helping to Implement the Guidelines?

EPA has established several mechanisms for assisting federal and non-federal agencies in setting up programs and for helping vendors market their recovered materials to procuring agencies. These include a telephone hotline and frequently updated lists of manufacturers and vendors of products designated in the guidelines.

Copies of the guidelines listed in the box on the front cover, lists of manufacturers and vendors, and information on purchasing guideline items can be obtained from the procurement hotline by calling (703) 941-4452.



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# Recyclable Materials Recovery

### Session Preview

Material recovery is the physical act of extracting or diverting from the waste stream materials that would otherwise be disposed. It is a method or assortment of methods employed to collect recyclables from the generators of these materials. There are several methods of material recovery and many variations on these methods. Coordinators often have the task of matching a recovery system with the goals, budget, markets, and processing capabilities inherent to their communities.

Recovery is, in part, source oriented. In a comprehensive recycling program that targets multiple source categories such as residential (single-family and multi-family), commercial, industrial and institutional recyclable materials, recovery systems are usually custom designed according to the unique nature of the source (quantity of materials, type of materials, physical accessibility).

Recovery must also be carefully matched with the processing and marketing of the materials once they are collected. The availability of certain types of processing or certain types of markets can determine the way materials are recovered. As waste reduction coordinators choose their recovery methods, they should always keep in mind that they will have to move materials to market after recovery.

In this session, we will first cover residential recovery of recyclables and then discuss commercial, institutional, and industrial recovery.

### Importance of Recovery

As stated, recovery refers to the systems applied to gather or collect recyclables from the waste stream; thus, these systems divert recyclables from disposal and are the first in a process that will end in the delivery of the materials to markets.

In addition to diverting materials from disposal, recyclables recovery can bring important educational benefits for participants who, while in the act of recycling, become more aware of both the quantity and type of waste they generate.

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# Recyclable Materials Recovery

When planning for recovery, coordinators should think carefully about both the generators of the recyclables and the processing and marketing of the materials. Recovery systems are usually custom designed according to the unique nature of the source of the material and the fate of the materials after collection.

A recovery program should be designed to achieve several objectives, some of which are not always compatible:

- To maximize the recovery of selected materials.
- To recover materials in a cost-effective and efficient manner.
- To minimize contamination and breakage, thereby enhancing the quality of materials collected.

**In designing a recovery program, the goal is to select an optimal design that balances the inherent trade-offs between these objectives and, at the same time, is functionally compatible with both market and processing realities.**

## Residential Recovery

### Determining Target Materials and Sources

In the residential waste stream, the sources of materials for recovery are single and multi-family dwellings. Special residences such as hotels and motels are categorized as commercial waste sources because room occupants do not exhibit typical household waste-producing behavior; and these facilities generate restaurant and office waste as well.

To select materials to target for recovery, the following issues should be addressed:

- **The composition** of the residential waste stream.
- **If a reliable market exists** for the materials in the community's residential waste stream.
- **The method(s)** by which will these materials be recovered.
- **The extent and limits** of the recovery and processing needs and capabilities as they relate to the materials in question.
- **Assessment of the results of the recovery of these materials** in terms of both qualitative and quantitative recycling and community environmental goals?
- **The effect**, if any, recovery of recyclable materials will have on other local (competing) waste management technologies or programs. (For example, if an

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# Recyclable Materials Recovery

oversized MSW incinerator is present, it may be competing for recyclables with high BTU values.)

### Residential Recovery Options and Planning Considerations

Residential recovery methods may be grouped into two categories:

- Materials are brought by the residents to one or more locations (drop-off), or
- Materials are collected from the source (curbside).

Drop-off programs may accept recyclables on a donation basis (drop-off centers), or they may offer payment for the materials (buy-back centers).

### Selecting a Recovery Method

The objective in selecting recovery options is to obtain a balance between efficiency and effectiveness while remaining compatible with market specifications and processing means.

### Factors Determining Choice of Curbside or Drop-off Programs

- Housing density
- Recycling goals (curbside recovers higher volume)
- Budget constraints
- Space restrictions (multi-family)
- Materials to be collected

### Rule of Thumb

The places that people take waste for disposal should help determine residential recycling options. The most effective recovery systems run parallel to the regular solid waste collection methods. If residents take solid waste to a rural convenience center, establish drop-off recycling sites there; if waste is collected directly from households, implement a curbside recycling program. Parallel design of recycling and solid waste collection helps residents see that recycling is a normal, “main stream” activity and allows them “one-stop”

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convenience in the handling of their discards. Parallel design also helps integrate the two services. For example, the addition of curbside service may allow a community to drop back from twice/week to once/week solid waste collection, thus saving money in that service.

### **Drop-off Recycling Centers**

#### **Description**

A drop-off center consists of collection containers located at sites frequented by many people such as shopping centers, schools, churches, or solid waste management facilities (such as convenience centers). Container labels for various categories of recyclables depend in large part on the ways the materials will be processed and marketed. Drop-off centers is the method most frequently used to recover recyclable materials in North Carolina. The Local Government Annual Reports (LGAR) for FY 94-95 reported 215 drop-off programs in the state.

#### **Materials Accepted**

Materials typically collected are newspapers, glass containers, plastic bottles, and aluminum cans; although, depending on budgets, contracts, available markets and processing capacity, other materials such as magazines, steel cans, corrugated cardboard, high-grade waste paper, mixed paper, and used motor oil also can be collected. An effective way to expand the recovery potential of drop-off centers is to add materials for which there is a ready market.

Staffed drop-off centers can also be effective resources for public education and to promote source reduction or reuse activities. Some local governments in North Carolina have established “swap sheds” at convenience centers where residents can exchange usable items such as clothing, appliances, furniture, toys, books, and other materials. Chatham, Orange, and Scotland counties have established very effective swap sheds that help keep items that still have value out of the disposal containers.

#### **Advantages of Drop-Off Centers**

- Drop-off centers can be located strategically throughout a community.
- Drop-off centers are well suited to unincorporated areas and multi-tenant housing complexes that do not receive curbside solid waste collection service and, thus, may not be effectively provided with curbside recycling service.

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- Drop-off centers do not require staffing, but staffing can improve quality, participation, and materials management.
- Drop-off centers can accept a full range of materials and can be established with a modest financial commitment.
- Generally, drop-off centers are less expensive to operate than curbside.

### **Disadvantages of Drop-Off Centers**

- Problems of vandalism and litter.
- Contamination of recyclables with unacceptable items.
- Possible conflicts with zoning ordinances or protests of neighbors.
- Ineffectiveness because of inconvenient locations.
- Lower participation rate than that associated with curbside collection.

Staffed drop-off centers, although more costly, may minimize some of the disadvantages. **Convenience, visibility of location, and ongoing promotion** are the most important factors in the successful operation of drop-off centers.

### **Drop-Off Recycling Systems**

Drop-off systems can be arranged so that recyclers either separate materials into specific containers by type or mix (commingle) materials in the containers provided. Clear instructions and signage are important for effectiveness of either method. The decision about the method to choose must take into account factors such as costs, equipment, and the type of processing and marketing system to be used. Market availability and specifications help determine what and how materials can be collected. The type of processing available can determine whether materials are collected separately or commingled. Sometimes materials can be collected so they can be taken directly to a market and avoid processing.

A wide variety of container types exist, the optimal choice varying significantly from one community to another.

There are four basic types of drop-off recycling systems.

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1. Roll-off container
2. Front-loader container
3. Collection trailers
4. Single material containers (such as recycling igloos, 55-gallon drums, or customized units)

### 1. **Roll-off container systems**

Roll-off containers are used extensively in solid waste collection, especially at commercial locations. The containers are 20, 25, 30 or 40 cubic yards in volume and rectangular in shape. Variations in volume and dimensions of such containers are increasing. The container is collected by a truck with a hook and cable or hook and hydraulic arm assembly. This system requires that the collection truck deliver an empty container to the site and collect the full container.

#### **Advantages of Roll-Off Container Systems**

- May more likely be compatible with existing solid waste management equipment.
- Minimal handling during collection: requires only one dump - at the processing site
  - Offers the possibility of compaction.

#### **Disadvantages of Roll-Off Container Systems**

- Require a two-way vehicle trip for each container collection.
- Often more capital intensive, both for container and for truck modification or purchase of wench.

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### 2. Front-Loader Container Systems

In addition to roll-off containers, traditional front-loading container systems have been used extensively. Typically, these utilize rectangular boxes (often called “green boxes”) with a volume of 4 to 8 cubic yards (8 cubic yard is most prevalent).

#### Advantages of Front-Loader Container Systems

- If commingling, this system offers more efficient collection than roll-offs since only the material is removed, as opposed to the entire container.
- May be compatible with existing solid waste management equipment.

#### Disadvantages of Front-Loader Container Systems

- May result in greater breakage of glass, but this problem may only occur if commingling.
- Equipment is typically not designed to carry heavy loads of material, such as glass.
- Containers look like solid waste containers, which may encourage contamination.

### 3. Single Material Container Systems

Another drop-off system involves single, small containers for different materials. One example is a dome- or bell-shaped container with a hook at the top which controls a hinged, drop bottom floor. "Igloos" are an example of this type container. The system requires a specialized truck/crane combination, usually paired with a divided truck or truck/trailer. Some programs in the initial stages use 55-gallon drums, which are placed at the drop-off sites and collected with manual labor, sometimes with the assistance of a hydraulic tailgate lift. Still another option is to build custom-designed containers such as wooden drop-boxes.

#### Advantages of Single Material Container Systems

- Containers generally cost less than roll-offs.
- Igloos can be aesthetically pleasing containers.
- Several types of materials may be removed at one time if divided truck/trailer utilized.

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- Container system may more easily match community's processing capabilities, and even allows processing to be bypassed.
- Equipment used to service containers generally costs less than roll-off or front-loading trucks.

### **Disadvantages of Single Material Container Systems**

- Smaller container size limits storage capacity between servicing.
- Barrels and some customized containers may have high labor costs or injury potential.
- Multiple handling associated with small containers may cause inefficiencies.

#### **4. Trailer systems**

Some communities use compartmentalized trailers to collect recyclables. The mobility of the trailers allows communities to set up multiple drop-off sites with only a single collection unit. A number of different containers are available for purchase. Some recycling trailers have hydraulic dump options for each compartment, while others have slanted floors at the bottom of the compartments that allow the materials to unload by gravity at processing centers.

### **Advantages of Trailer Systems**

- Low initial capital cost of trailers.
- Trailers can be moved by small trucks, which cost less than roll-off trucks and which a community may already have available.
- The mobility of trailers allows use of multiple sites with one collection unit.
- Unloading generally requires little or no manual labor.
- Trailers may be purchased to match the community's processing system.

### **Disadvantages of Trailer Systems**

- Trailers must be moved when only one material compartment fills up.
- Limited number of compartments available; adding types of materials to program may be difficult.
- Frequent servicing required because of limited size of trailer compartments.



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# Recyclable Materials Recovery

### Buy-Back Recycling Centers

#### Description

Buy-back centers are variations of drop-off recovery programs that offer the public an opportunity to receive payment for recycled materials. Like drop-off centers, buy-back centers can be single or multi-material in nature and stationary or mobile. Buy-back programs can encourage greater participation because of monetary incentives but generally are only feasible for high value materials such as aluminum cans.

Buy-back centers require staff to weigh and purchase materials. Cash incentives appeal particularly to people with low incomes, unemployed people, retirees on fixed incomes, youth, and non-profit organizations. As with drop-off centers, promotion and advertising activities are essential to encourage high participation.

#### Advantages of Buy-Back Recycling Centers

- Cash incentives help attract people who may not participate other programs.
- Provide fund raising opportunities for youth and non-profit organizations.

#### Disadvantages

- Require staff to weigh and purchase materials.
- Require significant promotion and advertising.
- May require greater capital investment than drop-off centers.

#### Special Note About Drop-off Programs: Recycling “Drives”

Sometimes the nature of markets allows for only intermittent recycling of certain materials. In addition, some materials such as telephone books may be generated only once a year in large quantities. In such circumstances, it may not be appropriate to establish permanent drop-off sites for the materials but instead to recover the materials through special drop-off programs. These programs are often referred to as recycling “drives,” such as a “paper drive”. For example, coordinators can hold a collection day for mixed paper when markets become available or hold a collection drive for old telephone books when new ones come out. These drives can also offer promotional opportunities. For example, a special buy-back day for aluminum cans set up as a contest for kids encourages participation and presents an opportunity to encourage them to become permanent recyclers.

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### Residential Collection at the Source (Curbside)

#### Curbside Recycling

##### Description

Many recovery programs collect recyclables at the point of generation according to a periodic schedule. Household recyclables are usually collected at the curb or, in rural areas, at resident mailboxes. Depending on a community's processing system, recyclables can either be separated by the resident, sorted at the truck-side by the collection crew, or sorted at a central facility.

Curbside collection is most efficient in areas with higher densities of single-family homes and low-rise multi-family dwellings. Curbside recycling offers the greatest convenience to the resident and the best opportunity for materials recovery from residential waste.

Voluntary, weekly commingled collection programs in North Carolina typically achieve participation levels of 60 to 70 percent. Participation rates depend highly on convenience of service and the strength of a community's education program. Variable rate pricing of solid waste collection services can also strongly encourage recycling participation. Because curbside collection can be labor-intensive and requires purchase and maintenance of equipment, costs can be high. Still, the typical cost for a multi-material collection program is only about \$1-\$2 per residence per month.

Cost assessments of curbside collection also should take into account the diversion of residential wastes from the landfill and reductions in the quantity of residential waste that require municipal trash collection. Curbside recycling typically recovers between 5 and 20 percent of the residential waste stream. The rate of recovery can vary with the rate of participation and the range of materials collected.

As mentioned, the addition of curbside service may offer opportunities to achieve efficiencies in solid waste collection services. In particular, the removal of a portion of resident wastes through recycling may allow a community to decrease solid waste collection from twice to once per week. Other changes such as automating solid waste collection or moving collection from back to front door may be possible at the time curbside is added.

##### Materials Collected

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# Recyclable Materials Recovery

Typical curbside programs collect newspapers, glass containers, plastic drink containers (PETE), milk jugs (HDPE), and aluminum cans. Some communities also collect magazines, cardboard, mixed paper, yard waste, steel cans, waxed beverage cartons and aseptic packages such as “drink boxes,” and/or used motor oil. A critical step for enhancing curbside recovery is to expand the range of materials collected.

### Advantages of Curbside Collection

- Well suited to high densities of single-family households and low-rise multi-family dwellings.
- Is most convenient to participants.
- Achieves high participation rate.
- Diverts maximum materials from households.

### Disadvantages of Curbside Collection

- Can be relatively expensive.
- Can be labor intensive.
- Not always practical in multi-family setting or rural low-density environment.

Typically, urban communities employ a combination of drop-off and curbside programs while rural communities utilize drop-offs.

### Curbside Collection Systems

Households may be required to put their different recyclables out at the curb in different containers or be allowed to mix (commingle) the recyclables or different types of recyclables in a single container. Curbside collection crews may then either separate the materials into different compartments in a truck or throw all or some of the commingled materials together in the same compartment.

The decisions on whether households or collection crews either separate or commingle recyclables depend on a number of factors. Commingling allows convenience and simplicity for households, just as commingling materials in the collection truck allows greater collection efficiencies, e.g., crews do not have to stop to separate materials and can move

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through a collection route more quickly. However, separation of materials can improve the quality of recyclables, and can reduce the need for extensive processing.

In choosing a system, a community also needs to consider equipment, labor, and supply costs associated with each option. Above all, the choice of a collection system should be made with a view toward the process after collection. If a local government chooses to use existing processors or put in its own processing system, the collection system must be designed to match the system. If a commingled processing system is in place (i.e., a MRF), it would be logical to select a commingled collection system, although single materials can be put through a commingled processing system. Market availability can also determine which materials are feasible to recover. In short, recovery, processing, and marketing decisions cannot be made separately; they must be made together.

There are four basic types of curbside collection systems.

### 1. **Commingled curbside collection (MRF Sort):**

Resident separates recyclables from waste materials and sets them out in a **single container** for pick up in a "commingled" or mixed fashion by the collection crew.

- **Requires special processing.**
- **Saves collection time and money.**
- **Increases convenience to participants (participation rate).**

### 2. **Separation by residents (residential sort):**

Recyclables are separated by the resident into **multiple containers** and collected in this separated fashion by the collection crew

- **Reduces processing needs slightly.**
- **Increases collection costs.**
- **Decreases convenience to participants (lower participation rate).**

### 3. **Separation of materials by vehicle attendant:**

Resident sets out commingled materials that are sorted by the collection crew and placed in separate compartments on the collection vehicle. In a **truckside sort**, the

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vehicle stops at each container while the operator separates the materials into side compartments on the truck. In an enroute sort, the vehicle stops only long enough to pick up the container and dump the contents into a sorting tray. The materials are put into separate containers as the vehicle is moving to the next stop.

- **Reduces processing needs slightly.**
- **Increases collection costs.**
- **Increases convenience to participants (participation rate).**

#### 4. "Blue Bag" system:

Separation of recyclables by the resident into blue bags, which can be co-collected with regular trash.

- **Eliminates the need for separate recyclables recovery vehicles.**
- **Requires extra processing steps, the cost of which may off set collection advantages.**
- **May work best in a program with a specialized transfer station.**
- **Possible cross-contamination of materials.**

### Efficiency

When evaluating the different curbside collection systems, coordinators should incorporate the efficiencies of each type of system into the decision-making process.

- **The number of households one unit can service in one shift, i.e., households per vehicle/day.**
- **The number of households one unit can service before the unit must return to the processing facility for unloading.**

### Multi-family dwellings

The same methods used in single-family recovery may be used to recover materials from multi-family dwellings. However, some physical differences must be to considered, especially space constraints. Multi-family dwellings have less space for storage of materials (especially pre-sorted) by participants, less space for on-site drop-off containers, and limited room for collection vehicle mobility. These factors present special problems in the design of

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multi-family recovery programs. Curbside collection is feasible for small, low-rise buildings and can involve setting out individual containers.

If curbside is not feasible, small, central drop-off containers such as 4- or 8-cubic-yard "dumpsters" serviced by rear or front loading vehicles with hydraulic lift mechanisms may be used. Another option is roll-out containers serviceable by selected curbside collection vehicles equipped with container tipping mechanisms. The multi-tenant dwellings system should be compatible with existing collection programs, if possible, to minimize the need for additional equipment and labor. The system also should be flexible with respect to different dwelling types and changes in the materials to be collected.

## Special Wastes

Special wastes include construction and demolition debris, tires, used oil, white goods, lead acid batteries, yard waste, and household hazardous waste. Special wastes, although not always recyclable, are often collected in an integrated waste management system. The recovery of each of these categories is unique and requires separate discussion.

## Construction and Demolition Debris

Opportunities for recovery of construction and demolition (C&D) debris exist through salvage operations at sanitary and C&D landfills. However, recovery of materials at the construction or demolition site is also feasible and is becoming more common. Materials recovered include organics such tree stumps, limbs, and leaves; concrete debris; brick; wood; gypsum; insulation; specific items such as doors and sinks; and earth.

### Opportunities:

- Reusable items and materials can be salvaged and offered for resale to the public, donated to Habitat for Humanity, or reused in remodeling projects.
- Trees unsuitable for firewood, stumps, and unsalvageable wood from construction and demolition can be shredded, offered to the public as mulch, sold as boiler fuel, or used as a bulking agent in sludge composting.
- Gypsum wallboard can be ground up and utilized in agricultural and landscaping applications or marketed to a gypsum processor.
- Inert soils, rock, concrete, asphalt, and other clean rubble can be stockpiled and processed for use in local construction and grading projects.
- Clean dirt may be received and used for daily cover operations at the landfill.

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### **Regional Approach to Construction and Demolition Waste Recycling**

The Triangle J Council of Governments (TJCOG), through a grant from the Division of Pollution Prevention and Environmental Assistance, conducted a regional cooperative study to explore possibilities for reducing, reusing, and/or recycling C&D waste. A public-private task force 1) reviewed existing C&D waste stream data, facilities and operations in the region; 2) identified locally available markets for the prevalent, potentially recoverable components of C&D waste; 3) assessed technology and system options; and 4) defined an action strategy. A detailed report is available. For more information, contact Judy Kincaid, TJCOG Solid Waste Planner at (919) 549-0551 or DPPEA at (919) 715-6500.

### **Tires**

Under the Solid Waste Management Act of 1989, whole scrap tires are banned from disposal in municipal solid waste landfills. Whole scrap tires resist compaction and, once buried in landfills, have been known to "float" up through surrounding wastes to disrupt final cover. In addition, as scrap tires stored aboveground hold water, they provide a breeding ground for mosquitoes and other disease-carrying organisms.

By law, tires must be processed (chopped, ground, sliced or shredded) prior to disposal in a municipal solid waste landfill or a "monofill" that takes only tires. The NC Waste Management Division administers extensive rules on the storage, hauling, and disposal of scrap tires (see the North Carolina Solid Waste Management Rules).

As of January 1, 1994, a 2-percent tax is assessed on all tires sold in North Carolina. Five percent of the tax proceeds goes to the Solid Waste Management Trust Fund, 27 percent goes to the Scrap Tire Disposal Account, and 68 percent goes to counties on a per capita basis. Counties may not charge an additional tipping fee on tires except under special conditions.

Opportunities for alternative end uses for scrap tires are expanding in North Carolina. A number of firms currently process tires into tire-derived fuel (TDF) and crumb rubber for use as admix to road asphalt. Tires are also used as floor mats, dock bumpers, and truck tire flaps. The retreading of tires, particularly truck tires, is a well-established end use. To encourage markets for scrap tires, local governments should purchase retreads whenever possible and encourage the use of crumb rubber in local road projects. For a list of private processors/recyclers of scrap tires, contact the Division of Pollution Prevention and Environmental Assistance at 1-800-763-0136.

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### Used Oil

The land disposal of used oil has been prohibited in North Carolina since October 1, 1990.

#### Opportunities

- Solicit proposals to evaluate the field of vendors who will collect oil from a locally sponsored collection program (could be accomplished regionally).
- Establish properly designed drop-off facilities.
- Solicit the cooperation of local high-volume vehicle lubricating centers in providing drop-off facilities for used motor oil brought in by the public.
- Work with the media and local service stations to promote locally sponsored drop-offs; include posted signs notifying customers of oil collection sites.
- Work with all local government departments to procure re-refined used oil for use in all technically feasible lubricating applications.

### White Goods

The disposal of white goods in landfills (as of January 1, 1991) and in incinerators (as of July 1, 1994) is prohibited. White goods (large appliances) are problematic to dispose because of their bulk and relatively poor compactibility. Although white goods generally contain a high percentage of recyclable ferrous metal, the presence of other components such as plastic, rubber, and insulation materials makes recovery of the metal difficult.

An additional hindrance to recycling white goods is the presence of PCB-laden oil in capacitors associated with compressors and motors in a small number of older (pre-1979) appliances, primarily refrigerators, freezers, and air conditioners. To shred appliances to recover the metal without removing capacitors poses environmental risks from the resultant PCB-contaminated "fluff." Alternatively, removal of the capacitors is labor-intensive, and the capacitors must still be disposed.

### CFC Recovery From White Goods

The 1990 Clean Air Act and state law require that the refrigerants used in air conditioners, refrigerators, and freezers be reclaimed prior to recycling. The release or venting of the



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refrigerants, or chlorofluorocarbons (CFCs), destroys stratospheric ozone molecules which protect humans and other life from the harmful effects of the sun's ultra-violet rays. The heat-absorbing quality of CFCs also worsens global warming.

Recyclers of white goods and air conditioners must provide for safe and complete reclamation of CFCs. Technology exists for such reclamation, and a number of companies will take the CFCs for recycling or decommissioning. Recyclers should remember, however, that there are different types of CFCs, e.g., CFC-11, CFC-12, and HCFC-22 used in refrigeration, which may affect the choice of a recovery method.

Cities and counties can either purchase machinery and equipment to recover CFCs or contract to a recovery service vendor. Possible vendors include (1) local air conditioning and appliance repair companies; (2) specific vendors of the service; or (3) private white goods recyclers, such as scrap yards. A contract avoids investment in machinery and equipment as well as staff time to operate the equipment. In addition, contractors generally have strong connections with established CFC reclamation companies.

Local governments with adequate funds and staff resources can choose to do their own CFC recovery. Depending on the life of the equipment, local governments may, in fact, save money over the long run by doing it themselves. In addition, a local government may be able to exercise more control over the timing of recovery and in the handling of the white goods.

Regardless of the recovery option chosen, local governments may need to reassess the receipt and storage of white goods at disposal or recycling sites. CFC recovery generally requires a clean working area, access to electrical power, and, for efficiency, close and upright placement of CFC-bearing appliances. DPPEA can help identify vendors of recovery services as well as of CFC recovery machines and equipment. An advance disposal fee charged on the sale of appliances statewide generates revenue that is returned to local governments for use in recovering, processing, and marketing white goods. A portion of the fees goes into a white goods account managed by the NC Solid Waste Section, to which local governments can apply for grants to help in their recovery efforts.

Recovery of white goods can contribute substantially to overall waste tonnage diversion and reduce operational problems and space requirements associated with bulky items.

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### Opportunities

- Identify a scrap dealer or vendor to purchase or receive white goods.
- Identify processing specifications necessary to market white goods.
- Evaluate transportation options for moving white goods to selected buyers.
- Arrange for the processing of appliances to meet market specifications, and consider regional cooperation to improve marketing capabilities.
- Evaluate the costs and benefits of sorting metals by grade in order to enhance metals marketability and increase sales revenues.

### **Lead-Acid Batteries**

North Carolina prohibits the disposal of lead-acid batteries in a landfill or incinerator. As reclaimed lead-acid batteries can be recycled, potential environmental and human health problems are reduced. Retailers are required to accept old batteries in exchange for the purchase of new ones. Recycled lead-acid batteries enjoy a favorable market and well established recovery infrastructure. Nationwide estimates show that 80 to 90 percent of all lead-acid batteries are recovered.

### Opportunities

- Provide educational literature to all local battery wholesalers and retailers that outlines recycling options and proper storage and transportation methods.
- Monitor distributors of lead-acid batteries to assure that they accept used batteries returned for recycling by customers who purchase new batteries.
- Require that all facilities for collection and storage of lead-acid batteries be designed to prevent leakage to the environment.
- Establish a public drop-off center for lead-acid batteries.

### **Household Hazardous Waste**

Most households have small quantities of hazardous products, which become household hazardous waste (HHW) when they are placed in the trash or are otherwise discarded. A product is considered hazardous if it has one or more of the following characteristics:

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- Corrosive or caustic
- Explosive or reactive
- Flammable
- Toxic or poisonous

### Types of Household Hazardous Waste

**Automotive Products:** lead-acid batteries, anti-freeze, transmission fluid, brake fluid, fuel additives, gasoline.

**Paints and Solvents:** acetone, wood preservatives (arsenic), varnishes and lacquers (benzene), paints (cadmium, toluene, xylene, petroleum distillate, mercury), paint and varnish removers (ethylene dichloride, acetone, benzene, methylene chloride, toluene), paint thinner (turpentine).

**Pesticides:** More than 1,400 different active pesticide ingredients are used in over 45,000 pesticide formulations including insecticides, herbicides, rodenticides, fungicides, germicides, miticides and insect repellents.

**Other Household Products:** pool chemicals, aerosols, air fresheners, bleach, ammonia, drain cleaners (lye, sulfuric acid), oven cleaners, aluminum cleaner, ammunition, dry cell and disc batteries, airplane glue (benzene), spot remover (perchloroethylene, toluene, benzene, naphtha, trichloroethane, ethylene dichloride), dyes (formaldehyde), furniture polish (ammonia, nitrobenzene, petroleum distillates) some glues and adhesives, mothballs (naphthalene, paradichlorobenzene), photography chemicals (acids, benzene), septic tank cleaner, rug cleaners, wood preservatives.

There are no state laws in North Carolina regulating HHW, although the establishment of permanent HHW collection facilities is regulated by the NC Solid Waste Section. In addition, HHW is exempt from Federal hazardous waste regulations promulgated under Subtitle C of the Resource Conservation and Recovery Act. Many HHWs now fall under EPA's "universal waste" rule, which lessens regulatory burdens associated with the handling of such wastes.

### HHW Management Practices

HHW is often placed in the trash or poured down the drain, on the ground, or into ditches or storm drains. Because the amount of hazardous waste required to create environmental and public health problems is small, many communities sponsor HHW management programs. Alternatives to traditional management methods include reduction, reuse, recycling, and disposal at approved hazardous waste facilities.

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### Opportunities

- **Reduction through education:** residents are educated about the contents and hazards of household hazardous products. Residents should understand that (1) it is better to “use-up” the entire product so that only the container is discarded as household solid waste and (2) there are safer, less toxic alternatives to many products.
  - **Reuse (exchange):** usually a reuse program will collect and exchange paint, which typically is more than 60 percent of the volume of material collected in a HHW program. A local government may sponsor a one-day collection or an ongoing program and offer the collected paints to the public for reuse.
  - **Collection and handling of HHW:** trained hazardous waste handlers segregate and consolidate by type the materials that which are collected. Materials are then packaged for transport and redistribution for use, recycling, or secure disposal.
1. **Periodic Collection Days.** After planning the event, a sponsor will publicize and hold a HHW collection day when residents deliver their collected HHWs to a specified location.
  2. **Permanent Facility.** A permanent HHW collection center functions like a periodic collection program only on a continuous basis. Permanent HHW collection facilities must be permitted by the NC Solid Waste Section.
  3. **Door-to-Door.** In a door-to-door program, residents are provided a telephone number to call if they have HHW requiring disposal. A pick-up is then scheduled, and trained staff collects the materials.
  4. **Periodic Collection By a Mobile Unit.** Usually involves a tractor-trailer; facilitates collection days at different locations.

### Resources

- *Collecting Household Hazardous Waste: A Guide for North Carolina Communities.* Available from Office of Environmental Education, P.O. Box 27687, Raleigh, NC 27611-7687; telephone (919) 733-0711.
- Solid Waste Section, (919) 733-0692

## Non-Residential Recovery

### Determining Target Generators and Materials

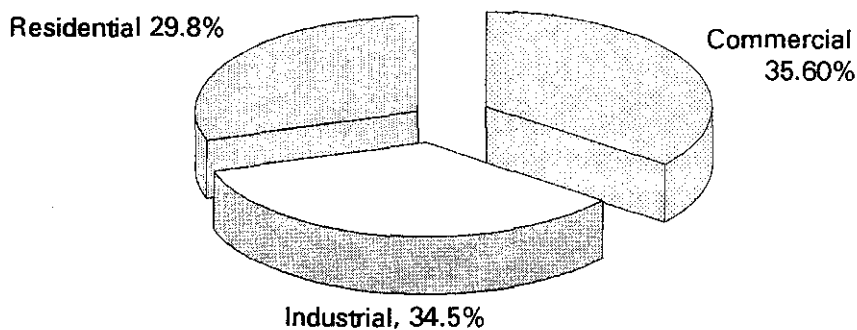
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Residential collection of recyclables is not only important, it also meets the average person's desire to participate in solving the waste management crisis. Non-residential waste, however, may comprise well over 50 percent of a community's total waste stream. The term "non-residential" refers to industries, institutions, and commercial businesses.

According to the NC Recycling and Solid Waste Management Plan, an estimated two thirds of North Carolina's total waste stream comes from non-residential sources. These sources present exciting opportunities for the success of recycling programs because of the relative size of the non-residential waste stream, the presence of highly recyclable items, and the desire of generators to avoid rising disposal costs.

### North Carolina Waste Generation by Source Sector



Source: NC DEHNR, 1990

### Sources of Non-Residential Waste

Several criteria can be used to determine targets for commercial recyclables recovery:

- Size of company and location, e.g., serviceability of the building.
- Quantity and value of recyclables generated in the waste stream.
- Cost-avoidance potential.
- Publicity value: can program be used as a model for other businesses?
- Commitment of top management or administration.

The type of waste generated by a non-residential entity depends on the type of business. For example, a governmental office would generate primarily office paper while a hospital may have an equal amount of office paper, corrugated cardboard, and plastics to be recycled. Although the

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nature of waste generated from non-residential sources is highly variable, some common materials encountered in non-residential entities are discussed here.

Businesses with similar practices and characteristics should be encouraged to network and exchange information and ideas. Such cooperation can enhance the quantity of recyclables collected and promote sharing of collection points.

### Common Categories of Non-Residential Entities

- Light industrial and manufacturing firms of a specific SIC code (*see appendix*)
- Offices and other paper-based businesses such as printing and mail order.
- Retail establishments.
- Agricultural operations.
- Governmental and other institutions such as schools and hospitals.
- Restaurants, hotels, and other hospitality businesses.
- Special events.

### **Determining the Wastes to Recover**

The following techniques can help determine the wastes most suitable to include in a commercial recovery program:

- Waste audits.
- Waste characterization data from local disposal sites (if available).
- Existing data from similar commercial entities.
- Purchasing records to discover purchases that will result in recyclable wastes.

The information obtained from these efforts enables a coordinator to identify and quantify materials in the waste stream that have the most potential for significant recovery and to identify specific locations within the community that generate these wastes.

### Criteria for Prioritizing Recyclable Material To Be Recovered

- Amount of material.
- Degree of contamination.
- Ease of recovery.
- Marketability and value.

### **Overview of Recovery Options**

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### Local Government Goals

The goal of local government non-residential recovery programs is to maximize participation by non-residential entities and the tonnage of materials recovered and while minimizing public sector involvement.

Local government involvement should be governed by the following considerations:

- Ability and willingness of private sector to establish recovery programs without government intervention.
- Level of public sector resources available for this purpose.
- Overall solid waste management goals.
- Careful selection of target source materials and activities to address priorities.
- Markets for materials.

### Levels of Local Government Involvement in Non-Residential Waste Recycling

Low Involvement	Moderate Involvement	High Involvement
Provide Generic "How To" Information	Provide Promotional Suggestions	Distribute Information on Waste Audits
Set or Increase Tipping Fees	Provide Training and Education on Strategies	Establish In-house Programs
Provide Technical Assistance	--	Provide Customized Publicity
Provide General Publicity Assistance	--	Own and Operate a MRF
Assist in Arranging for Collection/Processing/ Marketing	Operate Dump/Sort Facility at Landfill	Implement Recycling/Source Reduction Programs Serving Businesses/Institutions
Institute/Reinforce Disposal Bans	Partially Subsidize Company Programs	Perform Waste Audits

### The Concept of Cost Avoidance

The best motivators for any business, institution, or industry to pursue recycling and source reduction are the potential benefits. The economic benefits of waste reduction programs can be determined with little effort.

At the start, a coordinator should examine current waste handling and costs. Such an analysis can provide the basis for constructing a recovery program for certain materials. Equally important, it

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can provide a sense of the costs of current waste disposal and the costs that may be avoided with an effective recovery program. Because recovery programs can cost money to implement, a coordinator should be prepared to show that the recovery program actually saves money over time.

For example, effective recovery of large amounts of recyclable waste from the waste stream may allow a business or industry to reduce the size of its rented disposal container and, thus, the rental costs. A business may also be able to reduce the number of disposal pick-ups required. And last but not least, a recycling program may allow a business to avoid “tipping fees” or the direct fees associated with disposal at landfills and incinerators.

### **Designing a Commercial/Industrial Recovery Program**

An effective in-house recovery program requires planning, organization, and clearly defined instructions for participants; with careful planning, coordinators may be able to capture a significant percentage of the waste stream. Also, a well-publicized in-house recycling program can improve public relations as well as prompt others to implement recycling programs. Materials recovery programs should be implemented along with source reduction programs.

#### **Implementation Steps**

##### **(1) Assess the potential feasibility**

- Solicit approval and support from upper level management; determine its expectations.
- Conduct an inventory of available resources: storage space, staff time, funds.

##### **(2) Select a program coordinator or program team to plan, implement, and monitor the program with input and assistance from others.**

##### **(3) Determine types and quantities of recyclables.**

A waste audit will help determine the materials in the waste stream and quantities (sample audit forms follow in this section).

- ➔ An audit can be performed by recycling staff, volunteers, or trained personnel from the company itself.



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- ➔ The audit can locate recyclables that can be separated from other refuse to avoid contamination. Coordinators can use a simple visual inspection, plant walk-through, or a full-blown separation and weighing procedure.
- ➔ The audit should investigate each area of the office, plant, or building, no matter how small or how familiar the area.
- ➔ A notebook should be created in which audit forms, data records, and current recyclable activities are recorded. The notebook can be used as a summary decision-making guide for the commercial business, industry or institution.
- ➔ Other topics may be included in the audit notebook such as procurement guidelines and a list of materials filed or mailed.

#### **(4) Evaluate the audit results to determine:**

- Types and quantities of materials available for source reduction, recovery and recycling.
- Potential for reducing contaminants.

#### **(5) Analyze recyclable materials markets/find reliable vendors.**

(See Session V: Recycling Begins With Markets for reference directories).

- Identify potential market outlets in your community/region.
- Determine their processing requirements and product specifications.
- Specifications vary by buyer, location, and amount of material. For example, by separating CPO from other white office paper, businesses may receive higher revenues than for mixed paper. However, if companies produce small quantities, have limited storage space, or, like hotels or service stations, have a large group of different waste producers, a commingled collection program may be more advantageous.
- Discuss container services and transportation options.
- Compare buyer prices: remember that the more services the buyer provides, the lower the price paid.

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- **Select buyer(s) and finalize agreement terms** (see section V for complete information on markets.)

### **(6) Design the collection and storage system**

After determining amounts and types of wastes coming from each location, **storage space must be identified and containers for storing these items must be located.** Recycling trade journals offer lists of dealers who sell recyclables storage containers. Containers suitable to any outside contractors that may be handling them should be selected, and those who will be responsible for collecting the materials internally should be involved in the decision-making process.

- **Place containers near heavy generators in convenient locations** with very clear instructions about the materials that should be placed in them.
- **Consider acquiring equipment to process material into a more valuable state;** balers, shredders, crushers, and other equipment should be conveniently located near storage areas and pick-up points such as loading docks (Note: North Carolina tax credits may apply to this equipment; contact DPPEA for tax credit information).

### **Rule of thumb**

As with residential recovery programs, recovery of materials in an industry, business, or institution can be more effective if it runs parallel with waste disposal. The key is not to make recovery a hardship but a part of normal worklife. For example, most offices have a waste basket for convenience of disposal: an office paper program should be designed to be just as convenient. A desk-top container or another basket just next to the desk for office paper only can improve the likelihood that the employee will participate in recovery of the paper.

Space constraints that limit the placement of a parallel recovery program can be addressed in terms of the whole waste system. If space is limited, coordinators should consider giving recovery options precedence over disposal options or find other methods such as co-existing two-part containers for recovery and disposal.

### **(7) Provide training, education and promotion**

(See Session 8 for in-depth information about training and education)

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- Staff should be kept informed about the progress of implementation efforts.
- Kick-off should be scheduled when implementation work is complete and containers, storage facilities, and markets are organized.
- Initial and on-going education for employees should be offered; this training may include new employee training and annual review of recycling guidelines and policies.
- Upper level management should be updated and reminded about the program, even after having given its initial support; examples include newsletters, in-house presentations at meetings, logos on posters, desk-top folders, etc. )
- Kick-off notices and sign-up sheets for volunteers, host meetings for all personnel at start-up, and follow-up at frequent intervals should be posted.
- Employees must be educated on materials that are recyclable, the way they must be processed, and various methods for source reduction.
- Incentives should be provided, such as revenues donated from the sale of recyclables to a charity selected by employees and awards for outstanding participation.

### **(8) Monitor the program and provide feedback to participants,**

- Recovery rates, revenues, and costs as well as operational problems encountered should be monitored.
- As recycling is a method of solid waste management and, especially at first, costs may exceed revenues; a record should be kept of all disposal costs so that the cost savings from recycling may be compared.
- To determine they are satisfied with the quality of materials supplied to them, market contacts should be called periodically.
- Participants should be offered a sustained and continuous flow of information because (1) people need reminders and periodic encouragement to recycle, (2) materials and processing methods change, and (3) frequent changes in market conditions for recyclables require updating.
- Opportunities to improve the program should be investigated: the start-up design is unlikely to be the ideal system.

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# Recyclable Materials Recovery

### Wrap Up

A successful recyclable recovery program will ensure that you have an ample material supply from which to derive a high-quality product. Large quantities of material will help you establish leverage with intermediate and end-user markets that can deliver cost efficiencies from a high-volume program.

In this session, we have illustrated the planning methods for both residential and non-residential recovery programs.

**HOW WILL THIS INFORMATION HELP YOU ASSESS AND PRIORITIZE DIFFERENTLY THAN BEFORE?**



Handout

## Mechanics of a Successful Program

In order to have a successful recycling program you should have:

- Commitment and initiative at the highest level of local government.
- Innovative and consistent education and communication with all affected parties.
- Public works support, including monitoring and follow-up.
- Equipment and facilities in place to enable efficient material handling and product flow.

### 5 Steps to an Efficient Curbside Program

#### Step 1 - Find your market

Find out who you can sell to, how they want material shipped, etc. Then decide what items to recycle. Estimate potential revenue and stability of markets.

#### Step 2 - Design the program

Decide when pick-ups will be, routes, staff, etc. Factor in lead time of 6 months to get equipment and determine method of processing.

#### Step 3 - Educate the public

Start educating householders who, what, when, where, how, and why about 3 months before collections begin.

#### Step 4 - Process materials

Materials need to be processed to meet buyers specifications.

#### Step 5 - Maintain excellence

*Success depends on participation. Keep users happy and include new market development in timetable.*

## 10 Points For Locating Successful Drop-Off Centers

- located in high traffic, high visibility areas such as at large stores or malls
- provide hassle-free parking for five cars to use site simultaneously
- provide ample space for easy traffic flow to and from the site for both recyclers as well as collection trucks.
- provide adequate security lighting to encourage confident 24-hour use of the site.
- provide trash bins and adequate litter control to ensure site attractiveness
- allow for good on-site drainage and ease of snow removal
- enter into specific lease agreement with site owner
- enter into cooperative advertising agreement with associated businesses
- provide complete insurance coverage to protect site owner from liability
- distribute sites geographically so that population centers are conveniently reached

# WHAT KIND OF RECYCLING TRUCK SHOULD YOU BUY?

Recycling trucks represent a major investment for a community collection program, but initial cost isn't the only reason choosing the right truck is so important. Trucks can make or break your curbside collection effort for PET plastic containers and other recyclable materials. Carefully chosen options will increase your program's operating efficiency; trucks that are too small or inadequately equipped increase operating costs and inhibit program growth.

Many factors will affect your truck needs, ranging from MRF capability to local terrain. Before you start collecting brochures on the various models available, take a good look at "the road ahead". Prepare a strategic recycling plan covering the next five years of your program. Consider materials to be collected, MRF design, and anticipated program growth. Once you've assessed your needs, you can begin to compare options and cost of various truck models.

## TRUCK TIPS

1. Choose a truck with a minimum **CAPACITY** of 31 cubic yards. Trucks that are too small will make it hard to handle increased volumes of recyclables as your program grows, or as you add to the list of materials collected.
2. You'll need trucks with two **COMPARTMENTS** if you're commingling at the curb (PET, HDPE, aluminum, steel and glass in one compartment; newspaper in the second); six to seven compartments if you source-separate at the curb. Consider a truck with **MOVABLE PARTITIONS** for maximum flexibility in the number and size of compartments.
3. **MRF DESIGN AND OPERATION** may dictate truck needs. If your MRF is automated, you have a better chance to commingle recyclables on the truck; if there's limited sorting capacity at the MRF, you may need to source-separate at curbside. Consider whether recyclables need to be side-dumped into a roll-off or rear-dumped onto a tipping floor.
4. **AUTOMATIC TRANSMISSION** is desirable. Manual transmissions are time-consuming in a stop-and-go collection situation.
5. **RIGHT AND LEFT HAND STAND-UP DRIVE** enables you to minimize labor costs by using a one-person crew; in addition routes can be designed with all right-hand turns for maximum efficiency.
6. A **DUAL-SIDE LOADING** truck will reduce route miles by enabling pick-up from both sides of the street.
7. Consider **LABOR COSTS OF OPERATING** while comparing truck prices. Truck options that enable you to reduce crew size, and thus labor costs, may be more cost-effective over the long-term than a less expensive, "no-frills" truck that requires two or more crew members.
8. Communities that utilize bag-based programs may be able to **MODIFY OLD REAR-LOADERS** as a cost-effective option to buying a new truck fleet.
9. If adding PET containers or other materials to your program, consider using **TRAILERS OR CAGES AS ADD-ONS** to handle the added volume of materials collected. Or, stage roll-offs in strategic areas around town, where recyclables can be unloaded without diverting the collection trucks from their routes. (This may require side-dump trucks).

10. Make sure the truck you buy suits local ROUTE AND TERRAIN specifics. For example, is the truck narrow enough for alleys; can it handle tight turns such as those in cul-de-sacs?

## FINDING YOUR TRUCK

Once you've assessed your needs for a truck, request bids from at least three truck dealers. Ask if a vehicle is available on loan, or if there is a nearby location where you can see the truck in action. Ask if any "demo" vehicles are available at reduced prices. Check into the possibility of purchasing used vehicles from another community that may be upgrading.

To see the latest in truck design and options, attend one of the large solid waste expos, where the "latest and greatest" in collection vehicles may be on display.

## HOW MUCH WILL IT COST?

Expect to pay \$70,000 to \$80,000 for a new, well-equipped recycling vehicle. A small truck pulling a trailer will cost around \$35,000.

## HOW MANY DO YOU NEED?

Designing routes for efficient collection can make a big difference. Research shows that your daily routes should cover approximately 1,000 urban homes per truck. Expect to spend between 53 and 70 seconds per stop on the route, and to serve 339 to 478 stops per route, per day.

## COMMUNITY EXAMPLES

Other communities can be an important source of information about trucks. Take a look at what nearby or similar-size communities are using; ask recycling coordinators and collection route crew what they like or don't like about their trucks.

Here's a look at the trucks used in four programs.

### CHARLOTTE, NC

- Weekly service to 103,297 households
- 20 one-person crews service 100 collection districts
- Average daily route size: 1,033 homes
- Number of curb sorts: 3
- Designated recyclables: PET bottles, natural HDPE, glass containers, aluminum and steel cans, and newspapers

Truck fleet: 22 Lodal ECO-300 vehicles equipped with low-level side loading, dual-side low entry cab and driving controls. Collection capacity: 19 older trucks have 34.5 cubic yard capacity; 3 trucks provide 41 cubic yards. Three compartments separate the following materials: commingled PET, glass, aluminum and steel cans; newspapers; HDPE milk jugs in the top cage of the truck. The 19 older trucks



were retrofitted for collection of HDPE milk jugs with a 6.5 cubic yard cage mounted on top of the existing three compartments; the cage was a vehicle specification requirement on the newer trucks. Crews also use two 28-cubic-foot capacity Belgium Standard trucks equipped with one compartment and 6 pickup trucks on some routes. All collection vehicles operate from one garage.

#### MILWAUKEE, WI

- Weekly service to 58,000 households
- 12 one-person crews service 61 daily routes organized into 13 districts at present
- Average daily route size: 888 homes
- Number of curb sorts: 2
- Designated recyclables: PET bottles, HDPE bottles, glass containers, aluminum and steel cans, and newspapers

*Truck fleet:* Labrie and Dempster semi-automated recycling trucks equipped with dual-side loading, dual-entry cabs and stand-up drive. The Labrics have 29-cubic yards of space; the Dempsters have 31 cubic yards of space. Future collection, encompassing 120,000 homes, will involve specially designed semi-automated 30 cubic yard split collection trucks. Homeowners will receive a split 90 gallon container, one side for newspaper, one side for all other recyclables. Pick-up will be on a monthly basis and will cut the routes by one-third.

#### PALM BEACH COUNTY, FL

- Weekly service to 30,215 single family households
- 7 one-person crews
- 25 routes, average route size 1,208 homes. Some crews do not operate five days a week
- Number of curb sorts: 2-4
- Designated recyclables: PET bottles, natural HDPE, glass containers, aluminum cans and newspapers. Plastics 3-7, steel cans and old corrugated cardboard have been added to some routes

*Truck fleet:* Labrie 1,000 single-sided and Labrie dual-sided recycling trucks equipped with low-entry cab and dual-driving controls. Collection capacity is 29-31 cubic yards. Trucks have two compartments, one for commingled containers, one for newspapers. Extra compartments have been added to the trucks on the pilot routes collecting the plastics 3-7, steel cans and cardboard. The county is subject to significantly larger population and waste generation during winter and spring months.



## Sample Weight to Volume Conversion Factors for Recyclables

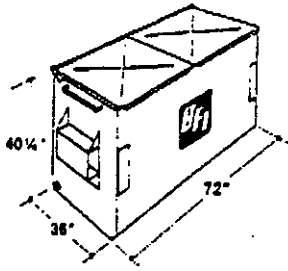
<u>Material</u>	<u>Volume</u>	<u>Weight In Pounds</u>
Newsprint, Loose	one cubic yard	360 - 800
Newsprint, compacted	one cubic yard	720 - 1,000
Newsprint	12" stack	35
Corrugated cardboard, loose	one cubic yard	300
Corrugated cardboard, baled	one cubic yard	1000 - 1200
Glass, whole bottles	one cubic yard	600 - 1,000
Glass, semi crushed	one cubic yard	1,000 - 1,800
Glass, crushed (mechanically)	one cubic yard	800 - 2700
Glass, whole bottles	one full grocery bag	16
Glass, uncrushed to manually broken	55 Gallon Drum	125 - 500
PET soda bottles, whole, loose	one cubic yard	30 - 40
PET soda bottles, whole, loose	gaylord	40 - 53
PET soda bottles, baled	30" x 48" x 60"	500
PET soda bottles, granulated	gaylord*	700 - 750
PET soda bottles, granulated	semi-load	30,000
Film, baled	30" x 42" x 48"	1,100
Film, baled	semi-load	44,000
HPDE (dairy only), whole, loose	one cubic yard	24
HPDE (dairy only), baled	30" x 48" x 60"	500 - 800
HPDE (mixed), baled	30" x 48" x 60"	600 - 900
HPDE (mixed), granulated	gaylord	800 - 1,000
HPDE (mixed), granulated	semi-load	42,000
Mixed PET & Dairy, whole, loose	one cubic yard	average 32
Mixed PET, Dairy and other rigid, whole, loose	one cubic yard	average 88
Mixed rigid, no film or Dairy, whole loose	one cubic yard	average 49
Mixed rigid, no film, granulated	gaylord	500 - 1,000
Mixed rigid & film, densified by mixed plastic mold technology	one cubic foot	average 60
Aluminum cans, whole	one cubic yard	50 - 74
Aluminum cans, whole	1 one full kraft paper grocery bag	average 1.5
Aluminum cans	one 55 gal plastic bag	13 - 20
Ferrous cans, whole	one cubic yard	150
Ferrous cans, flattened	one cubic yard	850
Leaves, Uncompacted	one cubic yard	250 - 500
Leaves, compacted	one cubic yard	320 - 450
Leaves, vacuumed	one cubic yard	350
Wood chips	one cubic yard	500
Grass Clippings	one cubic yard	400 - 1500
Used Motor Oil	one gallon	7
Tire - Passenger Car	one	12
Tire - Truck	one	60
Food Waste, solid and liquid fats	55 gallon drum	412

\*Gaylord size most commonly used 40" x 48" x 36"

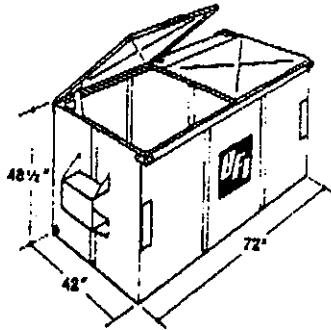
National Recycling Coalition Measurement Standards and Reporting Guidelines, October 31, 1989



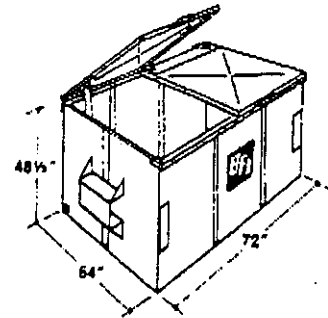
## Examples of Roll-Off Containers



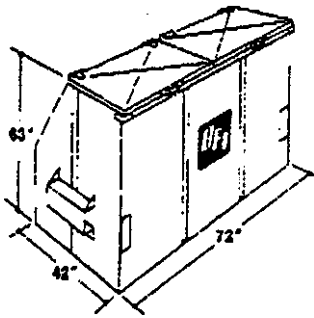
**Two Cubic Yard**



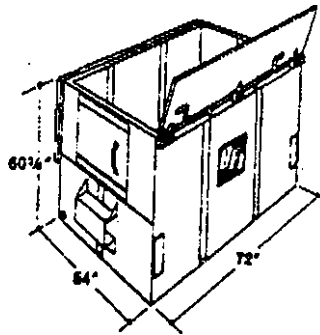
**Three Cubic Yard**



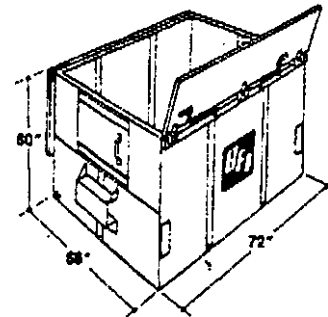
**Top Loading  
Four Cubic Yard**



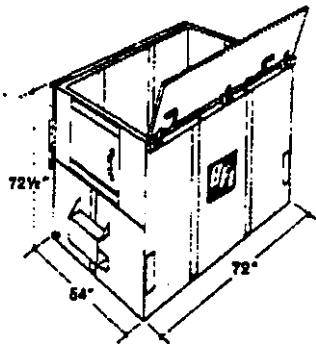
**Apartment  
Four Cubic Yard**



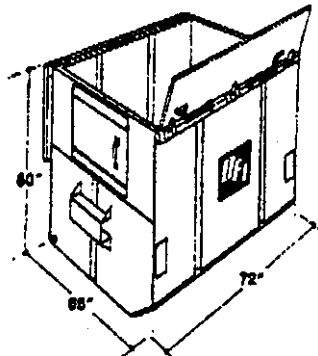
**Top and End Loading  
Five Cubic Yard**



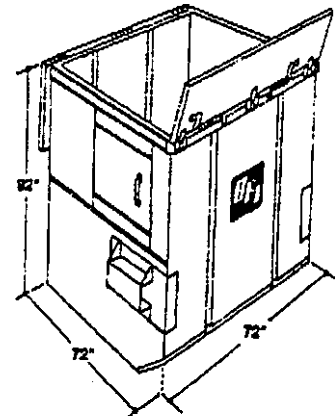
**Low Top and End Loading  
Six Cubic Yard**



**High Top and End Loading  
Six Cubic Yard**



**Top and End Loading  
Eight Cubic Yard**



**Top and End Loading Ten Cubic Yard**

Source: BFI Industries, who reserves the right to change designs and specifications without notice. Outside dimensions may differ slightly due to manufacturing variances. Not all models available in all areas. Should casters be added, please add 7" to the height of the containers.



# —————Session 8—————

## **Recyclable Materials Processing**

### **Session Preview**

*Processing* is the action applied to recycled or other solid waste materials after collection in order to prepare them for transport to market.

Processing is a key activity in enhancing the marketability of the material collected in a recycling program as well as for controlling costs involved with transportation to and from a processing facility.

### **Importance of Processing**

Processing is a critical link between the recovery of materials and the marketplace because it is the most significant step for enhancing quality in the recycling process. Properly conducted, processing ensures that quality materials are transported efficiently to market.

#### **To Ensure Top Quality Material**

- Consistently minimize contaminant levels.
- Achieve material densities (crush, densify).
- Conform to materials packaging specifications (bale, box, etc.).

#### **Efficiently Transporting Materials to Market**

- Achieve maximum allowable weight per shipment.
- Enhance material handling capability.

## — Session 8 —

# Recyclable Materials Processing

### Determining Processing Needs and Requirements

Processing needs and requirements are determined primarily by the market outlets available, the recovery method(s) utilized, and the volume of materials to be collected.

### Processing Specifications

The following are *examples* of typical processing specifications required by markets and equipment needed to meet these specifications.

Material	Specification	Program Requirements
Paper	Loose	System for handling, storage, and loading.
	Baled	Baler, pallets, forklift, storage and loading system.
Aluminum	Loose	System for handling, storage, and loading.
	Flattened	Flattener/blower, dedicated trailer.
	Densified	Densifier, pallets, forklift, storage and loading system.
Glass	Gaylord boxes, loose	Conveyor, pallets, forklift, loading dock.
	Gaylord boxes, crushed	Conveyor, crusher, pallets, forklift, loading dock.
	Loose	Conveyor, bunkers, front loader.
Plastic	Granulated	Granulator, pallets, gaylord boxes, forklift.
	Baled	Baler, forklift, storage and loading system.
	Loose	System for handling, storage, and loading.



## —Session 8—

# Recyclable Materials Processing

### **Material Quality Specifications**

Markets will issue a list of contaminants and, often, a limit on the amount of these contaminants tolerated before a load is rejected. See list of typical contaminants following this session.

### **Market Location**

Generally, in order to minimize transportation costs, a distant market will require a more highly processed material than will a local market.

*Example:* A community is recovering newsprint through a curbside collection program. The newsprint is stored in a separate compartment in the collection vehicle. If collection personnel at the curb exercise adequate contaminant control and the market is local, it may be possible to effectively bypass processing altogether by delivering the newsprint directly to the market. However, if the market is not local, the newsprint must be taken to a central facility for aggregation and preparation for shipment.

### **Recovery Method**

A commingled collection program usually requires a higher order of processing than source-separated materials or a truck-side sort of commingled materials. A drop-off program will yield a lower quality of materials than a curbside program.

### **Volume**

Small quantities of material may be processed by manual labor; however, as volume increases, the practicality of applying equipment and systems to materials processing becomes evident.

# —————Session 8—————

## Recyclable Materials Processing

### Evaluating Processing Options

#### Description of Processing Options

- **On-site processing.** For example, processing cardboard with a small baler at the loading dock.
- **Intermediate processors.** These are an option only if they are available locally.
- **Materials recovery facility (MRF).** Central processing facility for all the collected material. The MRF may be:
  - Government owned and operated.
  - Government owned and privately operated.
  - Privately owned and operated.

#### Factors To Evaluate

- Available resources such as equipment, labor, and budget to determine the local government's in-house processing capability.
- Location and accessibility of intermediate processors; for example, whether they accept unprocessed materials and whether their location is convenient for shipping unprocessed material.
- Cost of contracting to an intermediate processor or MRF operator.
- Political considerations, e.g., will local government officials favor privatization or expansion of in-house operations.

## —Session 8—

# Recyclable Materials Processing Processing Equipment and Facility Design

## Low-Technology Systems

### Characteristics

- Primarily manual sorting and or densification.
- Low-to-moderate start-up costs.
- Can add or subtract materials with relative ease.

### Typical Process For Handling Commingled Materials

1. Container materials are dumped on the floor and then pushed into an in-feed hopper.
2. Elevated by a conveyor, materials pass by staffed picking stations.
3. Person at each station picks single type of material from passing stream.
4. Separated materials are tossed into a hopper or holding bin for further processing.
5. Ferrous metals are usually separated by a magnetic separator.

## High-Technology Systems

### Characteristics

- Mechanical versus labor-intensive.
- Significantly higher initial capital costs.
- Warrants serious evaluation for high-volume processing scenarios.

### Typical Process

- Similar to low-technology process with some manual functions replaced by equipment.
- Air classification or curtain screening devices may be used to separate heavy and light materials.
- Pneumatic transport is sometimes used to move light materials to other locations.

## —————Session 8—————

# Recyclable Materials Processing

### Materials Recovery Facility Design

#### Usage Factors Affecting Facility Design

- Incoming vehicle traffic (ingress/egress) and vehicle types.
- Material types.
- Degree of materials commingling.
- Materials volume.
- Visitor traffic.
- Need for administrative offices.
- Materials flow, e.g., the path each material will take from the point of entry in the facility to the point of departure.
- Material classification (sorting) and contaminant extraction system.
- Material packaging equipment (baler, densifier, etc.).
- Loading systems for outgoing trucks.

#### Building Design Considerations Determined by Usage Factors

- Ceiling height: ceiling must be high enough if vehicle tipping occurs indoors.
- Building design: hardener for floor, pits for hoppers.
- Ventilation: must accommodate exhaust from vehicles, front-end loaders, and forklifts as well as meet OSHA regulations for airborne pollutants from processing equipment.
- Storage for incoming unprocessed material.
- Storage for sorted material awaiting packaging.
- Storage for outgoing material.
- Weighing requirements.
- Visitor observation.
- Administrative space: administration, management, employee break room, conference room.
- Flexibility: the facility should be designed to allow for increased volumes or the later addition of new materials.

## Session 8

# Recyclable Materials Processing

### Equipment Utilized in a Processing Facility

- **Glass crusher:** Breaks glass to increase density. Different machines produce variable particle sizes. Note: some machines will produce glass dust which must then be controlled to protect workers.
- **Manual sorting conveyor:** A horizontal conveyor along which staff are stationed to sort materials.
- **Inclined conveyor:** Used to elevate materials either to another level, such as to a sorting conveyor, or to feed a baler, crusher, etc. Inclined conveyors usually are cleated. Cleats are perpendicular blades that prevent materials from back-sliding on an incline.
- **Plastic perforator:** Plastic bottles are considered to have a memory in that they tend to partially return to their original form after being crushed. In bales created by low-density balers, re-forming results in an explosion of the bale. A densifier punches holes in the plastic bottles to minimize this effect.
- **Baler (vertical, horizontal, two-ram)** compresses materials into dense rectangular bales that are tied with wire. Baling assists handling, storage, and transport of materials.
- **Bale tying system, automatic or manual:** Once compressed, baled materials must be bound to prevent the bale from falling apart. High-volume balers are matched with an automatic bale tying system.
- **Baler feed conveyor:** Typically, horizontal balers are fed by a wide (usually 5- to 7-foot) steel-belted conveyor consisting of a continuous belt that traverses a floor-level pit then rises to the opening of the baler.
- **Magnetic separation:** Usually transverse, the separator is placed above sorting line conveyors to remove ferrous metals.
- **Densifier:** Compresses cans into cubes called biscuits. Usually associated with aluminum processing, densifiers are also available for steel can processing.

## —————Session 8—————

# Recyclable Materials Processing

- **Flattener/blower:** A machine which flattens aluminum and then pneumatically transfers the material to a trailer.
- **Forklift:** Used to transport and load bales and other heavy palletized materials such as gaylord boxes into trucks.\*
- **Front-end loader:** Used to load materials into feed hoppers, push materials onto floor-level belts, and load trucks.\*
- **Trommel:** A perforated rotating drum used to size or screen materials or eliminate fine contaminants. For example, aluminum cans may be processed through a trommel to eliminate crushed glass.
- **Scales:** May be tandem axle truck scales or floor scales. They are used to mark weights for incoming/outgoing vehicles and processed materials, respectively.

\* *Solid rubber tires are a necessity whenever glass is handled.*

### EPA's MRF Handbook

EPA's handbook, Material Recovery Facilities for Municipal Solid Waste, addresses the technical and economic aspects of material recovery facility (MRF) equipment and technology to assist solid waste planners and engineers at the local level. The document discusses the technical processes that can be performed, the material specifications that can be achieved, and the costs of the various manual and mechanical materials separation and recovery approaches. For a free copy of this handbook, write the United States Environmental Protection Agency, Center for Environmental Research Information, Cincinnati, OH 45268-1072. Specify EPA/625/6-91/031, Sept. 1991.

# — Session 8 —

## Recyclable Materials Processing

### Mixed Waste Processing

#### Description

In contrast to MRFs which separate and process source-separated or commingled recyclable materials, mixed waste processing facilities separate certain recyclable materials from mixed loads of solid waste and may produce a compostable or combustible product with much of the remains. Like MRFs, mixed waste processing facilities may be labor-intensive or employ a high level of automation. The primary outputs of mixed waste processing facilities include:

- Recyclable materials.
- Compostable materials.
- Refuse-derived fuel (RDF).
- Non-recoverable elements, i.e., residues requiring disposal.

#### Advantages of Mixed Waste Processing

- **Reduces recycling collection costs** because expensive collection routes can be eliminated.
- **Achieves considerable diversion of solid waste from landfill** because it does not depend on citizen participation.
- **Shows promise as a lower cost method of meeting 15- to 30-percent recycling goals.**

#### Disadvantages

- **Greater potential for contamination than recyclables separated at the source (source reduction).**
- **Limitations to maximum recovery of recyclables during processing.**
- **Substantial glass breakage.**
- **Paper often contaminated beyond recovery when mixed with putrescible waste.**
- **May reinforce "throw-away" attitude.**

## ————— Session 8 —————

# Recyclable Materials Processing

### **Poor Markets for Refuse Derived Fuel (RDF) From Mixed Waste Facilities**

Most boilers were not designed to burn RDF. Many RDF-producing mixed waste processors have stockpiled quantities of RDF in anticipation of a market to develop. There are also permitting considerations. Industrial boilers may have to modify air quality permits to burn RDF. Permitting can be expensive and time consuming.

### **Compost Must Be High Quality To Be Marketed**

(see Session 11 for details on yard waste management)

For optimum product acceptance, it is essential to market high-quality compost that has identifiable attributes and characteristics. These quality standards are a challenge for compost made from municipal solid waste. The Solid Waste Section of the Division of Waste Management, NC Department of Environment, Health, and Natural Resources, has developed quality standards and regulations concerning the use of municipal solid waste (MSW) compost products.

### **Disposal or Transfer Site Salvaging: A Form of Mixed Waste Processing**

#### **Characteristics**

- For areas in which waste disposal fees are high, such operations can be cost-effective and may significantly reduce the amount of solid waste requiring disposal.

#### **Process**

- Involves the recovery of selected recyclable or reusable material from waste loads dumped at a disposal site such as a landfill or incinerator.
- Frequently targeted materials include old corrugated containers, wood and yard wastes, lead-acid batteries, white goods, and other scrap metals.
- Waste loads containing a high percentage of each target material are diverted to a designated area of the facility.
- Contaminants are removed from the recovered material, which is then placed in storage for processing at a later time or is marketed directly.



## —————Session 8—————

# Recyclable Materials Processing

### **Wrap Up**

There are many different ways to process materials, from very low-tech, low-cost designs to expensive high-tech designs. The processing facility should move materials efficiently and quickly, allow for removal of contaminants, and prepare materials correctly for market.

**HOW WILL THIS INFORMATION ASSIST YOU IN DESIGNING A PROCESSING SYSTEM?**

**Session 8**  
**Recyclable Materials Processing**

**Materials Processing Exercise**

Using the following examples of specifications, please complete the following exercise. The instructor will assign each group a material and type of program.

**MATERIAL:** \_\_\_\_\_

**TYPE OF RECYCLING PROGRAM:** \_\_\_\_\_

How will the material be collected? (Are other materials collected at the same time, and how will the materials be separated?)

How will the materials be processed? (Address flow of the materials, contaminant control, specifications, equipment needed, education, densification, collection containers, storage capabilities, and shipping arrangements.)

—————**Session 8**—————  
**Recyclable Materials Processing**

**WHITE AND COLORED PAPER**



*Acceptable Paper Products*

- Office Paper
  - Copier Paper
  - Calculator Tape
  - Envelopes (plain or poly window)
  - Pastel Colored Papers
  - Groundwood
  - NCR Paper
  - Checkstock
- 



*Unacceptable Contaminants*

- |  |  |
|--|--|
| Adhesives on paper that is not water-soluble     | Deep-Toned Dyed Papers, goldenrod, kraft envelopes, etc. |
| Bindings, all types                              | Clean-Room Papers, latex impregnated                     |
| Coatings, all types, glossy, wax, etc.           | Ream Wrappers in which copier paper is wrapped           |
| Laminations, all types, foil, film plastic, etc. | Tyvek or woven paper                                     |
| Carbon Paper                                     | Microfiche, photos, or food-contact papers               |
| Wet-Strength Papers, blueprints, maps, etc.      |  |

# —————Session 8—————

## Recyclable Materials Processing

GRADE: WHITE AND COLORED LEDGER (WCL)  
DATE: APRIL 26, 1993

KC ITEM #737069

### SOURCE DESCRIPTION:

WHITE AND COLORED LEDGER (WCL), CONSISTS OF PRINTED OR UNPRINTED SHEETS, SHAVINGS, AND CUTTINGS OF COLORED OR WHITE SULPHATE OR SULPHATE LEDGERS, BOND, WRITING, AND OTHER PAPERS WHICH HAVE A SIMILAR FIBER AND FIBER CONTENT. THIS GRADE MUST BE FREE OF TREATED, COATED, PADDED, OR HEAVILY PRINTED STOCK. THIS GRADE IS DESCRIBED BY THIS PARAGRAPH AND THE FOLLOWING ATTRIBUTES:

ATTRIBUTE	MAXIMUM PERCENTAGE
CHECKSTOCK (POST CONSUMER)	40%
PASTEL COLORED PAPERS	25%
ENVELOPES (PLAIN OR POLY WINDOWS)	5%
GROUNDWOOD OR MECHANICAL FIBER	10%
NCR (CARBONLESS SELF-COPY PAPER)	10%
NON-IMPACT PRINT (COPY PAPER, ELECTROSTATIC, LASER, ETC)	30%

\*\*\*\*THIS GRADE MUST CONTAIN LESS THAN 2% OF ANY OF THE  
FOLLOWING IN ANY COMBINATION\*\*\*\*

1. ADHESIVES, ANY TYPE, INCLUDING PRESSURE SENSITIVE, LATEX, HOT MELT, NON REPULPABLE TAPE OR ANY INSOLUBLE ADHESIVE.
2. BINDINGS, ALL TYPES
3. COATINGS, WAX, ASPHALT, OR PETROLEUM BASED
4. INKS, METALLIC, GILT, FLORESCENT, MAGNETIC, ACRYLIC
5. LAMINATIONS, FOIL, FILM, MICROWAVE SAFE
6. PAPERS AND BOARDS, CHIPBOARD, TMP, UNBLEACHED, SEMBLEACHED, CARBONLESS, SENSITIZED (BLUEPRINT/LIGHT REACTIVE), THERMAL, PHOTOGRAPHIC, PICTURE POSTCARDS, BIBLE OR DICTIONARY PAPER, DEEP TONED BEATER DYED PAPERS
7. HARD COATINGS (HIGH-GLOSS, ULTRAVIOLET-CURED, ELECTRON-BEAM CURED, KROMEKOTE, VARNISHES)
8. WET-STRENGTH PAPERS (PAPER TOWEL, MENU STOCK, STOCK CERTIFICATES)
9. CLEAN ROOM PAPERS (LATEX IMPREGNATED)
10. UNBLEACHABLES (CHIPBOARD, GOLDENROD, KRAFT ENVELOPE, RED-ROPE FOLDERS, ETC.)
11. REAM WRAPPERS
12. TYVEK OR OTHER NONWOVENS
13. PLASTIC, FOILS, MICROFICHE, ACETATE, X-RAYS
14. EKG PAPER
15. FOOD CONTACT PAPERS
16. PHOTOS

**Session 8**

**Recyclable Materials Processing**

**Bear Island Paper Company, L.P.**

**Specifications for Old Newspaper (ONP)**

Bear Island Paper Company, L.P., is designed to use #8 Special News De-Ink Quality in its recycling facility; Institute of Scrap Recycling Industries (ISRI), PS-93

All old newspaper (ONP) must be prepared and delivered in accordance with the following specifications:

ONP must be fresh, dry, sorted newspaper. Pressroom overissues, white blank, and other news, containing not more than the normal percentage of rotogravure and colored sections, are acceptable. Magazines may comprise no more than 3% of the shipment by weight.

**OUTTHROWS & PROHIBITIVE MATERIALS ARE DEFINED AS PAPERS OR ANY OTHER MATERIAL WHICH BY THEIR PRESENCE IN THE PACKAGING MAKE THE MATERIAL UNUSABLE OR MAY BE DAMAGING TO EQUIPMENT AND ARE CONSIDERED CONTAMINANTS.**

**Maximum allowable contaminants ... 2.5 lbs per 1,000 lbs**

These contaminants will include but not be limited to the following:

Kraft Paper
Plastic Bags
Burned Paper Wet Newspaper
Computer Paper Plastics, Metals
Junk Mail Papers having non-water soluble glues and pressure stickies/labels
Corrugated Medium
Mixed Office Paper Flexographic Inks
Telephone Books
Glass, Cans
Chemicals
Styrofoam
Beater-Dyed Papers
Aged Paper (over 60 days old)
Heavily Inked Papers
Laser Printed Paper
Unbleached Papers
Wood, Sand, Rocks
Milk Cartons
Wet Strength Papers

## —————**Session 8**—————

# **Recyclable Materials Processing**

Baled ONP must be dense, solid and capable of stacking 5 bales high. Bales should be uniform in size and have a minimum of 4 wraps, wire only. Shipments must be loaded to facilitate unloading without damage to bale integrity or trailers.

Loose shipments are acceptable with pre-approval. Self unloading, walking floor trailers are preferred.

# Session 8

## Recyclable Materials Processing

Date Issued: May 17, 1993

WELLMAN INC.  
The Recycling Division

Curbside PET Specifications

### Definitions

**Beverage Container:** PET containers used for carbonated and noncarbonated (water, juice, sports drink, alcohol, etc.) liquid drinks

**Custom Containers:** PET containers with a screw-neck lid or cap used to hold food (peanut butter jars, salad dressing bottles, cooking oil, etc.) personal care products (mouthwash, deodorant, shampoo, etc.), or household cleaning products (window cleaners, dishwashing detergent, floor cleaners, etc.) Containers must be emptied, rinsed, and have caps removed.

**Rigid Containers:** Container with a screw-neck top.

**Resin:** Polyethylene Terephthalate - coded with the "PET" or "PETE" identification code (#1.)

**Color:** Clear or transparent green.

**Container Type:** Rigid, 12 oz. or greater. 3 liters or smaller.

**Description:** PET beverage containers and PET Custom Containers.

### Bale Specifications

**Dimensions** 3'X4'X5" - Ideal but not required.

**Max dimensions** 3"X4'X6' -Bales with larger dimensions must be discussed with your recycling coordinator or QA/Tech Service Rep.

**Bale Density** 10 - 15 lbs/cubic ft.

**Bale Wire** Non-rusting galvanized metal wire, wire should be of adequate diameter in relation to the bale density (ideal: 12 gauge). Metal strapping not allowed. Wire wrapped in one direction. No more than 8 wires per bale.

**Bale Integrity** Integrity must be maintained throughout shipping, unloading, and storage.

**CONTAMINATION MAXIMUM:  
2% OVERALL CONTAMINATION BY WEIGHT.**





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## Session 9

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# Promotion and Education

### Session Preview

A high level of participation and support for a recycling program is related directly to effective communication with the audience. An education program may be the single most important component of a waste reduction program. This session will give guidance on integrating promotion and education into a waste reduction program to motivate the audience successfully.

### Importance of Promotion and Education

Promotion and education are basic components of initiating or expanding an integrated solid waste management program. These communication activities help create awareness, action, excitement, and understanding. They enable create channels to be created that reward participation and help individuals feel that they have a personal stake in waste reduction and recycling. The success of any waste reduction and recycling program depends on involvement and participation. Participation is developed and increased through publicity and education.

#### Definitions:

**Promote:** To motivate; to increase the attention or focus on an activity.  
**Educate:** To impart knowledge; to inform.

Many solid waste education and promotional activities take place simultaneously.

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## Session 9

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# Promotion and Education

### Promotion and Education Program Planning

The plan for a public education and promotional program involves the "6 Ws"

1. **WHY** is a educational program necessary?
2. **WHO** is the chosen audience?
3. **WHAT** will the message be?
4. **HOW** is the message to be conveyed?
5. **WHERE** will the message be delivered?
6. **WHEN** is the best time to deliver the message?

**Question 1.**            **WHY is a educational program necessary?**

**Answer.**            **To achieve program goals.**

As a recycling coordinator plans and implements a recycling or waste reduction program, there will be many goals to achieve along the way. To assure that the goals will be met, the coordinator must make certain that participants, staff and volunteers, along with upper management and local officials, understand the program.

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## Session 9

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### Promotion and Education

**Question 2.**

**WHO is the audience?**

**Answer.**

**Anyone who may be asked to participate in the program, make decisions about the program, or be directly involved in operating the program.**

- Employees
- General public (urban, suburban or rural)
- Teachers and school administrators
- School children
- Government employees
- Industrial and manufacturing firms
- Media business executives
- Competitors, buyers, and suppliers in the waste management industry
- Block leaders
- Consumers
- Participants in specified recycling programs
- Environmental, neighborhood, and civic groups and other non-profit organizations
- Opinion leaders
- Other local governments
- Multi-unit housing residents

Audiences can be categorized into three groups, with sub-groups in each.

1. Decision-Makers
2. Staff and Volunteers
3. General Public, Employees

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## **Session 9**

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# **Promotion and Education**

### **Why Educate Decision-Makers?**

Local officials, upper management, and executives who understand the importance of the proposed recycling program can offer support. This support can reduce administrative barriers, problems with participation, low financial commitment; this support also can enhance decision-making.

Decision-makers can help:

- Secure funding for program.
- Reduce administrative problems.
- Allocate resources, including labor.
- Serve as role models for other staff members.

### **Why Educate Staff and Volunteers?**

It is essential that the recycling program staff and volunteers who will be helping to promote, administer, or provide physical labor for the program fully understand all aspects of the program. These people, the "front-line" of the program and the most visible, can contribute in the following ways:

- Aid in recruiting employees/participants.
- Encourage sense of community.
- Increase control of environmental factors.
- Instill pride.
- Offer community outreach and sense of "making a difference."
- Help deliver consistent program messages.

### **Why Educate the Public and Employees?**

- To prompt desired behavioral change.
- To increase quality of materials separation to ensure marketability of recyclables.
- To credit the work of recyclers.
- To improve program public relations.
- Unite the community or workplace to achieve a common goal.

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## Session 9

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### Promotion and Education

**Question 3.**

**"What" is the message?**

**Answer.**

The message can be information about the benefits of recycling; program slogans, goals and objectives; "how to" messages directing specific actions such as "rinse and color-sort glass containers"; and announcements.

The message should be concise and attention-grabbing and in language appropriate to the target audience.

**Question 4.**

**"How" will the message be conveyed?**

**Answer.**

There are many vehicles for promotion and education including:

- Paid and free advertising
- Printed materials
- Direct contact
- Word of mouth

### Using the Media

In decisions about media coverage for the education/promotion program, cost becomes a deciding factor. Funding restrictions can be offset by free media coverage such as news stories, editorials, and public service announcements (PSAs), as well as by paid advertisements. Although the size of the communications budget often dictates the approach to be taken, there are potential drawbacks with free media coverage:

- Lack of control over the content of the information released;
- The extent of media coverage provided;
- The timing of such coverage.

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## **Session 9**

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# **Promotion and Education**

### **Printed Materials, Direct and Indirect Mail**

The distribution of mail either directly or indirectly (for example, in fact sheets, utility bills, or newspaper inserts) will permit coordinators to select the exact product to be delivered; it will also target the audiences that will receive it. The use of direct mail is particularly appropriate when the audience is a subset of the community at large.

“E-Mail” can be used in the workplace to deliver reminders and instructions.

### **Other Printed Materials**

If they are carefully designed and effectively distributed, informational and promotional items such as brochures, booklets, flyers, grocery bags, refrigerator magnets, employee handbooks, and other premium materials can be very effective for promoting the program and ensuring proper participation.

A realistic distribution plan and timetable should be prepared before printed materials are published so that content is kept current throughout the distribution period and the appropriate quantity is printed.

### **Direct Contact**

Direct, one-on-one communication is vital when two-way exchange of information is required. Personal communication is highly effective for eliciting individual support and motivating individuals to take action. Communities may institute a “block leader program” in which one person from each street is trained to talk to all the neighbors about the program. Businesses may wish to designate a recycling contact in each division, program, or office who will teach small groups of employees about the recycling program.

Communities and businesses can establish a recycling hot-line, a popular form of direct communication, as a mechanism for individuals to get prompt answers to their recycling questions.

## — Session 9 —

### Promotion and Education

However, one-on-one communication is time consuming and labor intensive. These drawbacks are especially apparent in light of the high public interest in recycling. Problems commonly encountered with hot-lines include the inconvenience and possible risk of publicizing one's telephone number and the public's unrealistic expectations about the type and degree of assistance it can receive. Both these problems result in circumstances in which demand for service exceeds the response capabilities of the recycling coordinator. As a result, personnel resources are overtaxed, and those desiring service are frustrated.

Although such situations cannot always be avoided, the following strategies can help to alleviate the problem:

**Exercise caution** before address and telephone information is publicized. Make sure that the information requested by respondents is available for distribution and that adequate resources are on hand to get the information out in a timely fashion.

**Prepare printed materials** whenever possible to meet information needs of a large number of inquirers. If information is printed, the range of distribution is increased and less staff is required.

**Inform and train personnel** in advance to handle changes in the nature and/or quantity of information requests expected.

**Establish a speakers bureau** of trained volunteers or staff. Such a group will free up recycling program staff and enable groups of people rather than individuals to be reached. Slide/audio presentations can take a burden off speakers and deliver accurate information in an entertaining fashion. Fact sheets can help the speakers field questions after the presentations.

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## Session 9

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### Promotion and Education

**Question 5.**

Answer.

**"Where" are the messages received?**

At home, work, school, public buildings, malls and stores, special events, sporting events, etc.

**Question 6.**

Answer.

**"When" are the messages conveyed?**

According to the scheduled start-up or revamping of the program. Time frames and deadlines affect implementation of education and promotion programs.

It is very important to carefully plan the time the message is delivered to the participants. If the message is given too early, the participants will forget what they are supposed to do; and if the message is delivered after the start of the program, the participants may be confused and recycle incorrectly. Also, it is most effective to repeat the message a few times.



# Session 9

## Promotion and Education

### Sample Schedule for Promotion and Education of a New Recycling/Reduction Program

Time Frame	Activity
1 year to 6 months prior to program starting	Formulate initial plan, ongoing research
6 months prior to program starting	Set program goals, strategies, phase-in of program
2 to 3 months prior to program start-up	Place general articles about the program in the newspaper, employee newsletter, or on bulletin board; begin planning start-up events and schedules and timelines; design and layout materials or hire a graphics firm; form committees; obtain volunteers; determine preliminary task assignments; begin designing a "theme" and/or logo.
8 weeks prior to program start-up	Send a direct contact printed piece to all participants; issue media announcements; write a follow-up article for newsletter or newspaper that clearly states reasons this program is necessary.
7 weeks prior to program start-up	Finalize "theme" and/or logo for the program; schedule start-up events.
6 weeks prior to program start-up	Develop and finalize materials such as press releases, brochures, posters, signs, banners, etc., stating the "how-to's" of the program.
5 weeks prior to program start-up	All materials to printer.
4 weeks prior to program start-up	Schedule presentations, training sessions, and seminars
3 weeks prior to program start-up	Place newspaper and newsletter articles, memos and advertisements describing details of the program; mail/distribute materials to participants; put-up posters.
2 weeks prior to program start-up	Deliver collection containers, brochures, magnets, cups, tee-shirts, and other premiums; have some one available to answer phone calls and questions; have volunteers, staff and others give presentations to participants.
Week of program start-up	Host a kick-off event with the Mayor or other public officials, the company CEO or other official; place announcements in the media, on public address systems, E-mail; hang banners in the town, at the drop-off center, over the front door of the building. Hand out more brochures.
2 weeks after program start-up	Begin evaluation and announce the success of the program!
On-going after start-up	Keep records and publicize progress; periodically provide participants with reminders of "how-to," and, to explain why some items are not accepted, provide information about contaminants.

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## Session 9

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# Promotion and Education

### Program Implementation

Strategies for implementing a comprehensive public education and promotion program should address one or more of the following objectives:

- Capturing the attention of target audience(s);
- Effectively delivering communication message(s) in the target audience's own "language;"
- Motivating the audience to take action;
- Providing feedback and reinforcing behaviors; and
- Receiving useful input/feedback from program participants.

### Working With Other Organizations: Help is Available!

A wide array of communication strategies is available. The difficulty lies in selecting the techniques that will most effectively accomplish each objective within the available resource limits.

**Local Organizations:** A local government's resources can be expanded through effective coordination of activities with those of other organizations involved in promoting integrated solid waste management. Such coordination also helps to avoid duplication of efforts and enables volunteer assistance to be shared where appropriate. Local organizations that are often involved in solid waste management education and promotion activities include Keep America Beautiful and Clean Community groups, Cooperative Extension offices, and environmental organizations such as the Sierra Club. Garden clubs also are often active players.

**The Private Sector:** Local governments may seek private sector contributions for printed materials, advertisements, and other such products.

**State Government Assistance:** The Division of Pollution Prevention and Environmental Assistance and the Solid Waste Section of the NC Department of Environment, Health, and Natural Resources have publications available for distribution. The North Carolina Recycling Association also has resources available.

## —Session 9—

# Promotion and Education

Once specific implementation strategies are identified, they should be collectively assessed to determine an overall schedule, to set up a budget for implementation, and to decide on the procedure to be used for evaluating the effectiveness of the program.

### **Additional Incentives**

Effective communication of the need for and benefits of specific solid waste management programs usually motivates most people to participate, if they are given a convenient means of doing so. However, the remaining targeted participants may need additional incentives. Once motivated initially, some typically will continue to participate. Others will need incentives on an on-going basis, and a small minority may not ever be motivated unless such behavior is mandated and enforced.

To avoid the common pitfalls of promotion campaigns, coordinators should focus promotion efforts on motivating target populations that have a convenient means to participate instead of directing the message to the public at large. As with marketing of any product or service, a key to success is carefully identifying each target audience and selecting incentives likely to be effective for each group.

A wide variety of recycling promotion incentives are available, and a decision must be made whether to provide them on only an initial or on a continuous basis.

- An example of a monetary incentive is to pay suppliers for the recyclables they bring in to a recycling center. One initial incentive is to publicly award prize money to recycling individuals chosen on a random basis from the entire pool of recycling participants.
- Other kinds of incentives also work well to encourage participation. Awards, public recognition, feature news articles, and letters of appreciation are a few ways to stimulate participation.

It may not be clear that these incentives have actually accomplished their purpose, that is, modifying behavior. Beware of removing monetary or other incentives before behavior change has taken place and new habits have been ingrained.

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## **Session 9**

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# **Promotion and Education**

### **Wrap up**

A highly visible public education campaign is essential to keep enthusiasm for waste reduction and recycling programs high. Use multiple avenues to reach your targeted audiences to tell participants the "why," "who," "what," "how," "when," and "where" parts of your program.

**HOW MANY PROMOTIONAL AND EDUCATIONAL ELEMENTS DOES YOUR PROGRAM EMPLOY?**

## —Session 9—

# Promotion and Education

### Exercise: Curbside Promotion and Education

You have just been hired as Recycling Coordinator of Flounderville, population about 55,000. There are 17,000 single family households; one retirement village with 30 private units; two exclusive townhouse complexes with 100 units, all with private driveways; one public housing development with 200 single-story units; and one apartment complex comprised of 4 buildings, each 5 stories high and with 25 apartments in each building. The mayor of Flounderville wants her citizens to have curbside recycling. You have to decide who will have curbside, what they will recycle, when they will recycle it, and how you will educate the participants and promote the program.

There are markets in the area for ONP; clear, brown, and green glass bottles and jars; milk jugs; soda bottles; custom PET bottles; OCC magazines; office paper; drink boxes (aseptic packaging); and aluminum and steel cans. You have \$3,000 to spend on the start-up of the education and promotion program.

1. What materials will be recycled curbside?
2. Who will have access to curbside recycling?
3. How often (when) will materials be collected?
4. How will materials be prepared?
5. How will the materials be collected?
6. Why is the town collecting recyclable materials curbside? List at least 3 program goals.
7. How will the message (or messages) be conveyed?
8. What is the message? Draft or give an example of one educational or promotional piece that is in your plan.
9. Where can you go if you need help with drafting or designing recycling education/promotion materials?

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## Session 9

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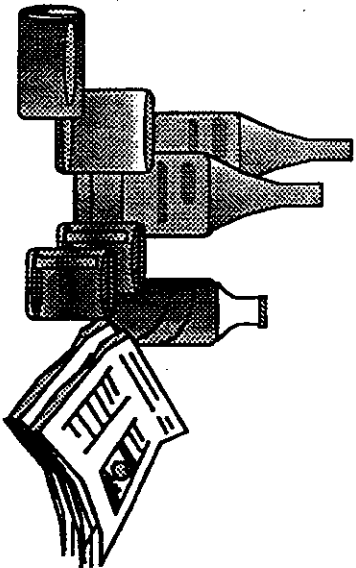
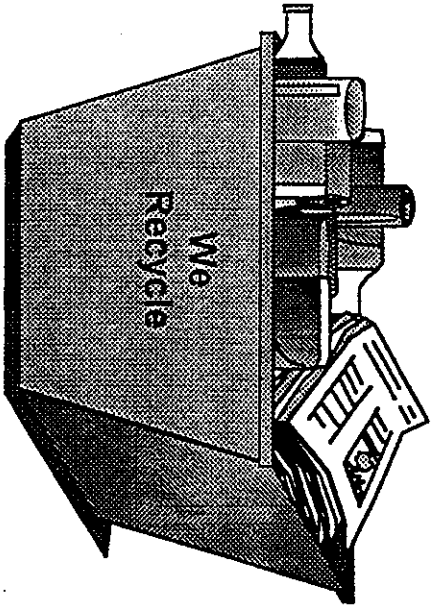
# Promotion and Education

### Exercise: Business Recycling

You have just been hired as Recycling Coordinator of the Proud Oak Furniture Company in Flounderville, NC. The Proud Oak manufactures office furniture - bookshelves, desks, computer tables, etc. The Proud Oak employees 400 people, has four manufacturing buildings, one cafeteria building, and one office building. You have contacted businesses listed in your Recycling Markets Directory from the Division of Pollution Prevention and Environmental Assistance and by your local government recycling coordinator, and you have found markets for aluminum and steel cans, OCC; ONP; clear, brown and green glass bottles and jars; HDPE; PET; office paper; and drink boxes (aseptic packaging). You have looked in the dumpster and found that it is mainly OCC, office paper, junk mail, old broken pallets, scrap lumber, and treated lumber, along with corroded 50-gallon drums, various plastic containers, aluminum cans, PET bottles, and food waste. The cafeteria washes dishes and silverware, although drinks are sold in aluminum cans or PET bottles.

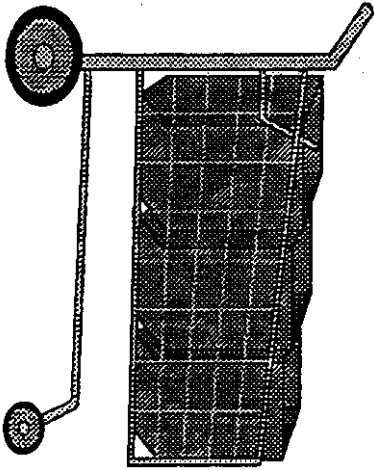
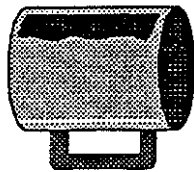
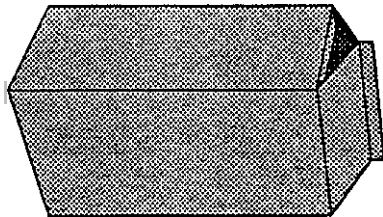
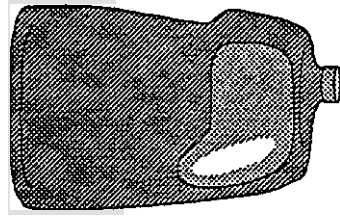
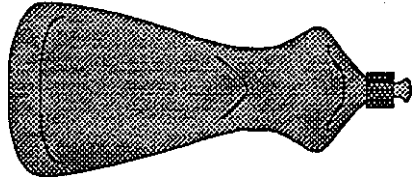
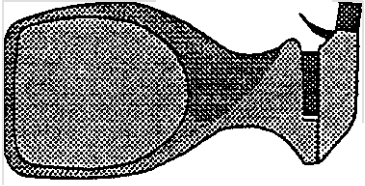
1. What are your program goals?
2. What will the Proud Oak Furniture Company recycle?
3. How should materials be prepared?
4. How will materials be collected?
5. How will the message(s) be conveyed? You have a start-up education and promotion budget of \$2,000.
6. What is the messages? Draft or give an example of one educational/promotional item.
7. Where can you go for help?

# Clip Art

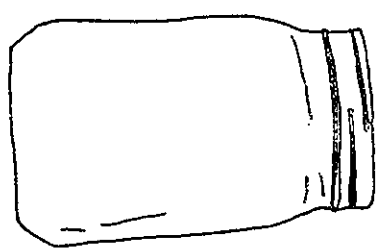
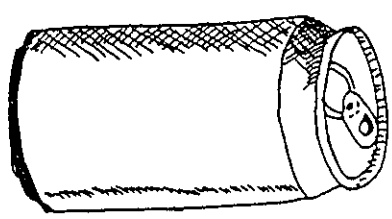
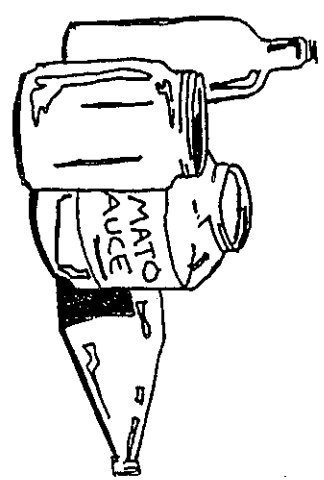
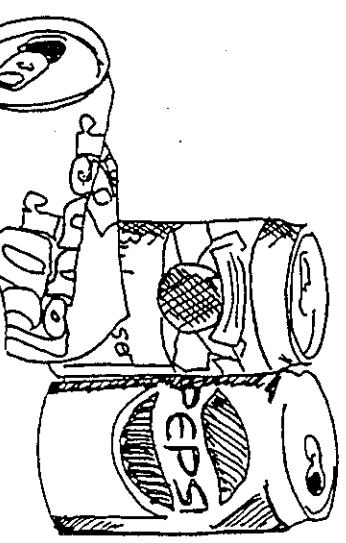
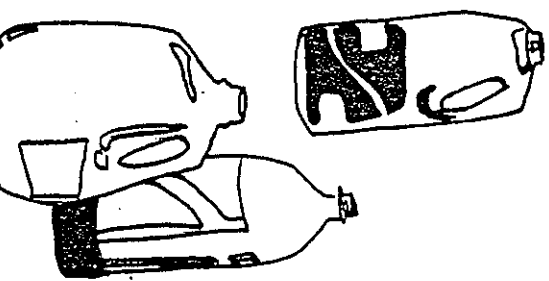
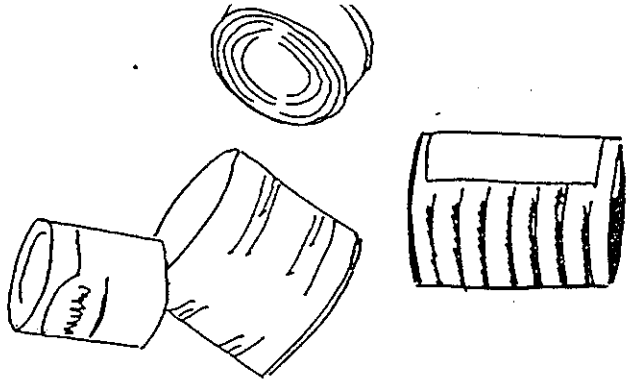
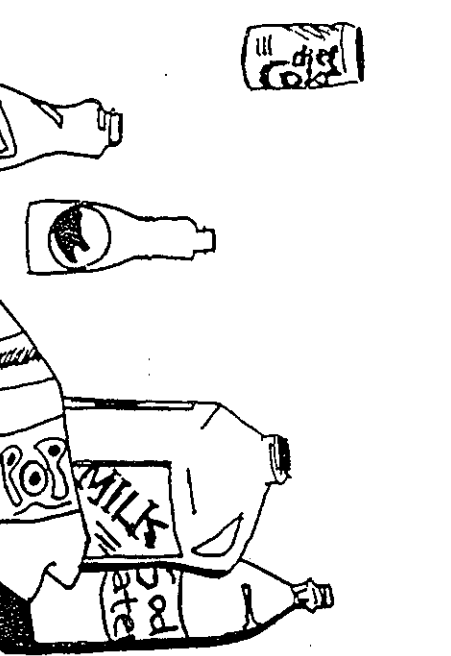














# RECYCLING LOGOS--WHICH ONE TO USE?

Are you confused about what recycling logo to use when?  
Let us explain.

The most commonly used recycling logos are variations on the "chasing arrows" such as these:



Is there a difference? Well, this recycling logo:



means that the paper it is printed on was made partly or entirely from recycled paper.

But these recycling logos:



simply encourage individuals to recycle paper when they discard it. They do not mean that the paper they are printed on is recycled paper.

**It is recommended that the words, "PRINTED ON RECYCLED PAPER," be used alone or in addition to the symbol on any item that you print on recycled paper, because so few people know about the distinction between recycling logos.**

North Carolina General Statute 143-170.1(a2) declares, "Whenever a public document that is published by an agency of this State is printed on recycled paper, the document shall contain a printed statement or symbol indicating that the document was printed on recycled paper." Although the law states that either a statement or a symbol may be used, the Office of Waste Reduction recommends the statement be used alone or in conjunction with the symbol whenever feasible.

The law only applies to state agencies, but it's also a good idea for businesses, schools, local governments, and others who print documents on recycled paper to indicate that fact. This will let anyone who sees the document know about your commitment to buying recycled products.

**Some people have asked whether they can use the "NC Reduce, Reuse, Recycle" logo to indicate that a document is printed on recycled paper. The answer is NO! That's because this logo is meant simply to encourage people to reduce, reuse, and recycle in their daily lives:**



We hope you will want to print the "North Carolina Reduce, Reuse, Recycle" logo on all your publications, and display it in many places. However, this should be done in addition to any statement you make about whether an item is printed on recycled paper.



Office of Waste Reduction  
Department of Environment, Health, and Natural Resources  
3825 Barrett Drive, Suite 300 Raleigh, NC 27609  
(919) 571-4100 or 1-800-763-0136

The North Carolina Office of Waste Reduction provides free, non-regulatory technical assistance and education on methods to eliminate, reduce, or recycle wastes before they become pollutants or require disposal.



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## CAMERA READY LOGOS

### 100% Recycled Paper Products

The 100 Percent Recycled Product Symbol, which includes the legend, is reserved for use *only* on those products that are manufactured with 100 percent recovered paper fiber. Paperboard has been used as an example in the options shown below.

### Recycled Content Paper Products

The Recycled Content Product Symbol, which includes the legend, may be used with paper and paperboard products which contain some recovered paper fiber. Options are shown below. The term *total recycled fiber* or *total recycled paper* may be used in place of *total recovered fiber* in the recycled content paper symbol legend.

Vertical Option



**100%**  
**RECYCLED PAPERBOARD**  
**YY% SUBSIDIARY CLAIM**

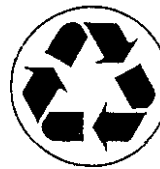


**XX%**  
**TOTAL RECOVERED FIBER**  
**YY% SUBSIDIARY CLAIM**

Horizontal Option



**100%**  
**RECYCLED PAPERBOARD**  
**YY% SUBSIDIARY CLAIM**



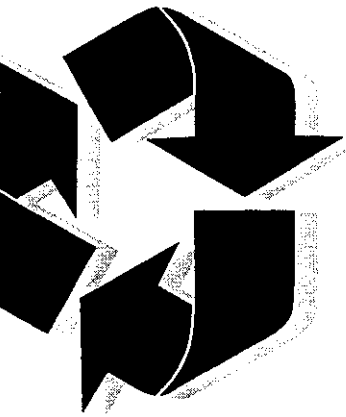
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**TOTAL RECOVERED FIBER**  
**YY% SUBSIDIARY CLAIM**

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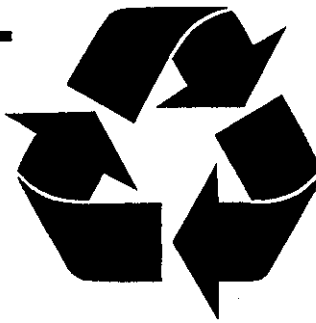


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Reduce Reuse Recycle

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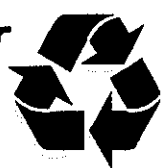
Reduce Reuse Recycle

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Reduce Reuse Recycle

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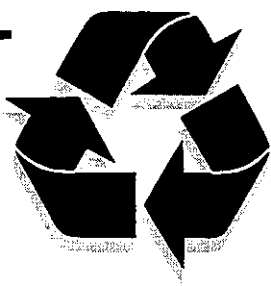
Reduce Reuse Recycle

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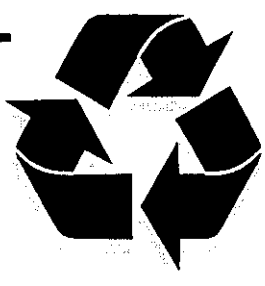
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Reduce Reuse Recycle



# —————Session 10—————

## Working With The Private Sector

### Session Preview

Participants in this session will gain an understanding of the importance of privatization and the impact it can have on waste reduction and recycling goals and program development and implementation. Privatization, as used in this discussion, is defined as the delivery of public services by the private sector through contracts, franchising, or other financial or mutually agreed-upon arrangements. Businesses may also find that by contracting with a private waste management organization, integrated waste management throughout the organization is enhanced.

### 1. Importance of Working with the Private Sector

The transition from a disposal-oriented solid waste management system to an integrated solid waste management program approach requires additional operations and facilities.

- With the increasing complexity of the solid waste system, personnel are becoming more highly trained and more specialized.
- The design, development, and operation of solid waste management and recycling facilities and programs require more diverse skills and disciplines than in the past.

### Why Contract Out Services?

- Private haulers and recyclers may be offered contracts for the following reasons:
  - They have experience and expertise in delivering services.
  - They are more efficient or capable than public providers of service.
  - They are willing to assume marketing risks.
- The private recycling industry is helping communities to meet local, State, and Federal waste reduction and recycling goals by filling in gaps in infrastructure and programs. The industry is also helping to stimulate the demand for recyclable materials.

## —————Session 10—————

# Working With The Private Sector

- Privatization can be a win-win situation. *Example:* In relieving a local government or large business of the financial and staff burdens associated with storing and marketing materials, a private contractor may be able to increase its capability to secure overseas materials markets.

## Contracting Considerations

### Political and Legal Conditions

The local government or business must have the legal authority to contract. The use of contracting must be consistent with special procedures tied to funds.

Contracting must not be restricted by labor agreements.

The local government or business must have the appropriate motivation to consider contracting.

The local government body must support the concept of contracting.

Personnel regulations must be flexible to permit any changes needed.

Contracting should not negatively impact other programs.

Current staff must have capability to administer projects and contracts.

Safeguards against corruption and conflict of interest must be in place.

The contracting must be economically feasible.

### Business and Economic Considerations

Privatization should be considered when public services are similar to business operations, are equipment-intensive, and require little public contact. If privatization is initiated at the start of new services or the expansion of old ones, employee displacement will be minimized. Privatization is the best course if cost savings are significant. However, local governments or businesses are cautioned against entering into any agreements if performance measures for the contractor cannot be quantified and verified. Privatization costs also include those for administering the contract, but it is well to consider that the cost of a future contract will be escalated. It is also very important to determine if the public or upper management is supportive of private operation and to make provisions to continue services if the contractor reneges.

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# Working With The Private Sector

### Other Considerations

- Be prepared to support the move to privatization with information to back up the decision.
- Understand that privatization requires that some control will be relinquished. This change must be acceptable, or the contract must be written to minimize this loss.
- Private sector providers may be more likely than public providers to provide services that require unskilled or semi-skilled labor at a lower cost.
- Public providers are often more likely to provide services that require skilled labor at a lower cost.

### **Public-Private Partnerships: A Self-Help Guide**

The EPA publishes a booklet to help local government officials develop innovative financing approaches through public-private partnerships. Public-Private Partnerships for Environmental Facilities: A Self-Help Guide for Local Government describes (1) the benefits of working with the private sector; (2) an action checklist that explains procedures for building a partnership; (3) a review of financing, procurement, and the service agreement that binds public and private interests; and (4) a list of potential contacts and information related to municipal services, finance, and public-private partnerships. The guide also provides resources for assistance and case studies. More examples of public-private partnerships are described in EPA's Public-Private Partnership Case Studies: Profiles of Success in Providing Environmental Services. For free copies of these publications, write the United States Environmental Protection Agency (H-3304), Washington, D.C. 20460.

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## Working With The Private Sector

### 2. Role of the Private Sector

As coordinators decide if private sector involvement will fit into their operations, they should take the following steps:

- 1) **Study other cases in which a similar service has been privatized.** If there is a contract administrator on staff, ask him/her for advice.
- 2) **Create an explicit definition of the service including purpose, organization, and field operations.** Clarify expectations on the part of both parties concerning:
  - Risk sharing.
  - Revenue sharing.
  - Ownership.
  - Marketing responsibilities and flow control.
- 3) **Stipulate a quantifiable performance level that is based on a verifiable method of evaluation.**
- 4) **Establish a time period for the contract that is sufficient for the contractor to recoup start-up costs and provides incentive for bids to be submitted.** However, the time period must not be so long that the contractor loses the incentive to run an efficient operation.
- 5) **Create an internal review process to monitor the contractor's work.** Some localities have set up a separate auditing department for this purpose while others have simply assigned a contract administrator. Technical knowledge is not as important for contract administration as the management skills to interpret contracts and work with contractors.
- 6) **Request that bid proposals include a transition plan for the service and possible provision for the use of public employees that will be displaced.**

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## **Working With The Private Sector**

### **Guidelines for Selecting Vendors**

#### **Criteria for Contractor Selection**

Regardless of the nature of the services to be contracted--consultant services, collection services, or facilities design and construction--**criteria for selecting a qualified contractor should be established even before the Request for Proposals (RFP) is drafted and should include, at a minimum, the following:**

- Track record of successful similar projects.
- Appropriately experienced professionals.
- Availability of key personnel.

This information can be obtained directly from the private sector firm through its literature or by meeting with the firm to learn about its services. Other sources of information about private sector firms may be found in trade journals and the mass media. These resources will help build the list of firms that will receive the RFP.

#### **Issues To Be Alert For and Avoid in Selecting Contractors**

- Hard sell tactics.
- Conflict of interest; for example, design consultants who also represent particular technologies.
- Conflicting waste management philosophies.

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## **Working With The Private Sector**

### **Preparing a Request For Proposals (RFP)**

The best way to receive the best possible proposal for a specific project is to generate competition for the job. Proposers must be aware that another provider may submit a better bid or proposal.

Before preparing the RFP, the coordinator should have a clear understanding of the following:

- **Goals of the project.**
- **Desired scope of work.**
- **Project schedule.**
- **Anticipated trouble areas.**

### **Basic Strategies for Preparing an RFP**

- **Request a proposal for the scope of all services that will be provided for a fee specified in RFP.**
- **Request a proposed cost of performing a given scope of services specified in the RFP.**

### **Basic Contents of the RFP**

The RFP should request a detailed scope of services that requires the proposing firms to demonstrate their understanding of the project and present a creative approach to addressing the project.

**Any physical, legal, political, budgetary, and schedule restraints that would impact the project should be indicated in the RFP.**



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# **Working With The Private Sector**

### **Recipients of the RFP**

A list of qualified vendors to receive the RFP may be prepared from the following:

- Vendors pre-qualified by the purchasing office.
- Personal list of vendors known to be qualified.
- Recommendations from other local government officials who have contracted for similar work.
- Advertisements in trade journals and telephone books.

### **Screening Proposals**

Selection of a qualified firm is a ranking process. These steps will help with this procedure:

- 1) Examine each firm's recent (past two years) solid waste experience for relevancy to work at hand.
- 2) Consider higher ranks for those firms with experience with regulatory bodies and other local government clients in the state.
- 3) Call the references provided for those firms that are relatively unknown, particularly those with no in-state experience. References to check include:
  - Previous clients.
  - Regulatory bodies in other states where they have worked.

### **How To Read a Proposal**

While it is important that proposal readers be familiar with the qualifications of the proposing firms, the emphasis should be on the specific problem at hand and the approaches proposed to handle it.

A firm's stated qualifications may not always accurately reflect its capabilities on a specific project. Along with the proposer's statement of qualifications, evaluators should rank the proposer's capabilities according to his/her understanding of the project objectives and the technical soundness of the proposed approach to the scope of work.

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# **Working With The Private Sector**

### **The Selection Process**

The pool of respondents should be narrowed to two or three firms that will be evaluated further in an interview setting. The selection process should be based on the following criteria:

- Experience.
- Technical soundness.
- Cost.
- Accuracy of response to RFP.

The experience of the contractor in the service area should be considered. Many factors may be more important than that the provider is the lowest bidder. These factors may be more important than price:

- Financial stability.
- Experience, expertise, and capabilities of personnel assigned to the project.
- Management structure.
- Ability to perform the required scope of work.

**Fee should be considered in the final selection, but it should not be the primary basis for the selection.**

The key is to identify the firm that is most suitable not only for current but also for future service needs.

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# **Working With The Private Sector**

### **Wrap Up**

To contract out some aspects of your program can yield significant benefits. As with any other program component, privatization must be assessed in terms of its fit into the budget, political, and legal goals of your program. The guidelines outlined in this session will provide the basis for these decisions.

**HOW HAS THIS SESSION HELPED YOU TO UNDERSTAND CONTRACTING FOR SERVICES?**

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**Working With The Private Sector**

**COUNTY OF BLOOM  
OFFICE OF COUNTY MANAGER  
Post Office Box 1020  
Bloomfield, NC 27777**

**May 24, 1994**

Dear Sir/Madam:

On May 22, 1994, the County Board of Commissioners took the action of instructing me to seek Requests for Qualifications and Proposals from solid waste management consultants for the purpose of siting a landfill and recommending alternate means of disposal and waste stream reduction.

The successful firm will demonstrate by example, client references, and its approach to completing the scope of work. The firm must also demonstrate accomplishments and capabilities in solid waste management. The firm must show that it is a product-oriented, conservative organization with a hands-on management style that results in low project overhead and lean management staff. Each proposal shall contain chapters devoted to each of the headings listed below in the order shown:

- I. Overview of the Firm and Company Philosophy
- II. Experience
  - A. Similar Projects
  - B. Vendor Experience
  - C. Project Experience From Initial Feasibility to Operation
  - D. Involvement in Marketing of Refuse Derived Fuels, Compost, and Recyclable Materials
  - E. Landfill Siting Experience and Method Technology Used
  - F. Alternative Waste Management Facility Experience
  - G. Experience With Project Financing Techniques and Capability
  - H. Use of Public Relations Techniques and Successes in Landfill Siting and Waste Management Facility Siting
- III. Size of Company
  - A. Organizational Depth
  - B. Staff Experience in Multiple Disciplines, i.e., environmental engineers, civil engineers, mechanical engineers.

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## Working With The Private Sector

- IV. Key Personnel
  - A. Commitment of Personnel to Project
  - B. Demonstration of Hands-On Project Management
  - C. Demonstration of Staff Commitment to Low Overhead and Lean Management
- V. Reputation
  - A. Other Project References
  - B. Conservative Bent of Firm and Staff
  - C. Negotiating Skills for Successful and Expeditious Job Achievement
- VI. Cost and Schedule of Services
  - A. Cost for Service
  - B. Schedule of Work
- VII. Accessibility
  - A. Proximity to Community
  - B. Client Accessibility to Project Management
- VIII. Conflict of Interest: Independent and Unbiased Association With Vendors
- IX. Project Privatization Experience and Privatization Successes
- X. Other Pertinent Information

The landfill and the alternative waste disposal facility may be co-located or separately located as a project. A privately operated, County-inspected landfill and solid waste management facility shall be studied and compared to a County-operated landfill and solid waste management facility in order to demonstrate the advantages and disadvantages of each. The Consultant would then make a recommendation for the County's consideration.

### Scope of Work

The site selection phase of the study shall provide a complete evaluation of all potential landfill sites within the county that are suitable for use. This evaluation will include all criteria up to but not including test borings.



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## **Local Policy Initiatives and Issues**

### **Session Preview**

An important yet overlooked role of the program coordinator is to assess the need for and establish local policy measures that facilitate more effective recycling and waste reduction programs. This session provides participants with background on some of the more critical policy issues facing local government programs today and insight into some of the more controversial issues and gives participants an opportunity to experience the different sides of these controversial issues. The private sector must understand public policy measures before it can either support and oppose proposed policy.

### **Importance of Policy in Waste Reduction Programs**

#### **The Double-Edged Sword of Policy and Policymakers**

##### **Positive**

- Effective policies can provide assistance to waste reduction and recycling programs.
- Effective policies can provide incentives to individuals and businesses to take an active role in waste reduction efforts.
- Educated policymakers can divert attention, resources, and participation to make policies work.

##### **Negative**

- Poor policy may create barriers to waste reduction and recycling programs.
- Poor policy may create undue hardships for certain citizens and/or businesses.
- Overzealous policymakers may advocate inappropriate policies that result in actions which overcommit resources and/or are poorly timed.

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## Local Policy Initiatives and Issues

### Strategy

Recycling Program Coordinators can use policy to attain program goals:

- Understand the policies that can aid or impede program success.
- Get to know local policymakers and work with them to boost good programs or retard programs that are premature or unnecessary.

### Policy Tools and Definitions

#### 1. Flow Control

Flow control, in simple terms, is the ability to control the destination of different types of waste. Many communities have used flow control as a way to guarantee that revenue from tipping fees will offset costs of municipal solid waste (MSW) collection and recycling programs. Flow control can also help local governments keep authority over the MSW and may help them meet the State's waste reduction goals. On the other hand, waste haulers claim that flow control prohibits them from using facilities whose tipping fees are less expensive. On May 17, 1994, the U.S. Supreme Court determined in the case of *C&A Carbone vs. Town of Clarkstown, N.Y.*, that out-of-state flow control is a violation of the Commerce Clause of the U.S. Constitution.

#### Reasons for Flow Control

- To prevent use of scarce landfill capacity.
- To ensure that problematic waste is managed appropriately.
- To ensure that potentially harmful waste is properly disposed.
- To ensure that adequate materials flow reaches facilities so that a revenue stream through tip fees is guaranteed. A guaranteed revenue stream is often a financing requirement.
- To control flow into specific facilities according to tonnage or loads/hour of waste so that facility throughput capacity is not exceeded.
- To control type of material sent to specific facilities in accordance with purpose, e.g., diversion of old corrugated cardboard (OCC) -rich loads to a dump-and-sort operation.



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### **Local Policy Initiatives and Issues**

- To ensure that adequate materials are available to meet a market contract or to validate construction of a solid waste management facility.
- To ensure that recycling and waste reduction goals are met.
- To provide better accountability for the management of waste.

#### **The Downside of Flow Control**

- Operations relying upon waste materials or recyclables for their economic viability may be negatively impacted by flow control measures.
- Although flow control is intended to assure adequate supply of materials to a specific facility, the policy can prevent the separation of otherwise recyclable materials by requiring that they be delivered to a waste-to-energy facility.
- Customers may have to pay more for services.
- Competition in the free market for solid waste disposal services is restricted.

#### **Legal Authority of Local Governments To Institute Flow Control**

North Carolina General Statutes 130A-294(5b) grant the Department of Environment, Health, and Natural Resources the power to authorize local governments to control solid waste flow by ordinance.

Limits to local government ordinances to control the flow of waste:

- Local governments may not prohibit the source separation of materials.
- Local governments may not prohibit collectors of solid waste from recycling materials.
- Local governments may not limit access to recyclable materials.

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## Local Policy Initiatives and Issues

Senate Bill 58, passed in the 1990 short session as an Act To Provide for the Creation of Regional Solid Waste Authorities, grants the power to any authority formed under this section, the control over solid waste and recyclable materials generated within the Authority's service area.

### 2. Zoning Ordinances

#### **Advantages to Recycling Programs From Zoning Ordinances:**

- They regulate location of recycling facilities.
- They control operating conditions of a recycling center.
- They require waste reduction recycling plans for new development.
- They ensure compatibility between development and recycling.
- They require developers to mitigate waste generation impacts.
- They protect surrounding land uses.

#### **Possible Barriers to Recycling Program From Zoning Ordinances:**

- Zoning ordinances predate citizen-based recycling activities and, hence, were written without accounting for them.
- Zoning ordinances classify recycling centers as junkyards or scrap yards and, thus, limit them to light or heavy industrial zones.
- Zoning ordinances prohibit outdoor operations or storage, which are often necessary for recycling facilities.
- Zoning ordinances require planners to approve only permitted uses; recycling facilities are not listed among permitted uses.
- Zoning ordinances require costly conditional or special use permits for recycling facilities.

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## Local Policy Initiatives and Issues

### Methods for Overcoming Zoning Barriers

- Require local planners to remove from zoning ordinances all barriers to recycling development.
- Require governing board to remove prohibitions on use by special exception or approved map amendment.
- Provide planners with the tools to assess the real impacts of recycling facilities; develop local conditions to mitigate negative impacts; and encourage appropriate, uniform standards.
- Develop procedures for zoning recycling facilities that will provide the appropriate level of protection to the community and that do not bring undue hardships on the facility developers or operators. This activity could take the following approaches:
  1. Identify categories of facilities for different zoning treatment according to impacts.
  2. Identify problems that could occur at each category of facility if it is improperly operated.
  3. Develop operating specifications to be incorporated into the ordinance to prevent these problems.
- Suggest that different types of recycling facilities be matched to common use types:
  1. Small collection sites (less than 500 square feet) matched as an accessory to existing commercial or community service facility.
  2. Large collectors (permanent, larger than 500 square feet) matched with commercial or light industrial zones.
  3. Light processing (for example, smaller than 45,000 square feet with two or fewer shipments per day) matched with heavy commercial or light industrial zones.
  4. Heavy processors matched with industrial zones.

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## Local Policy Initiatives and Issues

**If existing ordinances are prohibitively restrictive:**

- Have the area in question rezoned.
- Have the intended use reclassified.
- Seek a zoning variance or conditional permit.
- Establish provisions or performance standards in the ordinance to reduce these possible negative impacts of recycling facilities:
  - Litter
  - Inadequate parking
  - Noise
  - Unattractive appearance

### **Zoning for Recycling**

Local governments can require developers to submit waste reduction and recycling plans for waste that is generated from major building and demolition projects.

### **Building Codes**

Developers can be required through building codes to make allowances for recycling in site development and in building and facilities design; for example,

- They can be required to designate areas for recycling collection in single- and multi-family housing projects.
- They can be required to allow adequate access around buildings and streets for recycling collection operations.
- They can be required to prepare a complete recycling plan that includes education of tenants for large housing and commercial complexes.

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# Local Policy Initiatives and Issues

Construction codes and guidelines can be revised to encourage the use of recycled and reclaimed materials in building projects, when such use is safe and practical, and to eliminate disincentives for such.

### 3. Anti-Scavenging Ordinances

Anti-scavenging ordinances are generally intended to deter individuals from removing recyclable materials from the waste stream before they reach their intended or contractual destination. Anti-scavenging ordinances are aimed at three basic targets:

#### 1. Removal of Recyclable Material From Collection Containers

##### Reasons for Ordinance

- Scavenging can be a critical issue if a hauler or recycling facility depends upon revenues from the sale of the materials. This type of anti-scavenging ordinance is intended to protect the recycling operators from theft of materials and is basically non-controversial.

##### Options

- Enforcement should consist of a clear message to the perpetrator and the public.

#### 2. Removal of Materials Discarded for Disposal

##### Reasons for Ordinance

- To prevent scavenging from dumpster boxes, which is common at most unstaffed convenience centers as well as at commercial and institutional establishments.
- To target "dumpster divers," those who remove salvageable materials from publicly and privately owned dumpster boxes for their own use or to market and/or those who leave materials on the grounds for other scavengers.
- To avoid liability resulting from injuries.

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### Local Policy Initiatives and Issues

- To prevent associated littering.
- To reduce public health risk to high risk group.

#### Options

- One option for controlling scavenging while preserving its benefits is operating in Orange County. A staffed salvage center provides a repository for salvageable items. Items are directed away from dumpsters and made available to citizens. The benefits of this option include:
  - Salvageable materials are separated before they end up in the landfill.
  - Reuse messages are reinforced to the public.
  - Low-income citizens will have access to needed goods.

### 3. Scavenging on the Face of the Landfill

North Carolina Rules Title 15 Subchapter 13B .0505(10) (d) states “the removal of solid waste from a sanitary landfill is prohibited unless the owner/operator approves and the removal is not performed on the working face.”

- Scavenging at the landfill face can be a problem for the following reasons:
  - Risk of injury from dangerous materials or landfill machinery.
  - Disturbances and hardships imposed upon landfill operators.

#### Options

- Dump-and-sort type salvage operation at the landfill operated by landfill staff for the removal of salvageable goods and recyclables.
- A salvage center as discussed above.

### 4. Mandatory Participation

Local governments and public and private institutions may elect to increase the volume of materials recovered from the waste stream by mandating public participation. Mandatory

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## Local Policy Initiatives and Issues

participation has proven to be effective in several states as a way to increase public participation in recycling programs.

### Reasons for Mandate

- To increase participation.
- To improve levels of material recovery and service cost-effectiveness.
- To reduce dependency on landfilling.
- To generate publicity for the program.
- To indicate the seriousness of recycling effort.

### Legislative Authority

Senate Bill 113, passed in 1989, provides the following authority to local governments:

- They may require separation of materials set out for collection.
- They may require participation by citizens in a recycling program if the program is approved by the elected board.

### Decisive Factors for Successful Mandatory Programs

- Foundation of a successful voluntary program.
- Peer pressure.
- Respect for the law.
- Fear of the consequences for non-compliance.

Mandatory participation should be accompanied by programs that provide convenient, comparably priced participation options.

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## Local Policy Initiatives and Issues

### Enforcement Methods for Mandatory Program

- Citations
- Fines
- Terminate garbage collection

### 5. Disposal Bans

Disposal bans have been applied statewide to certain materials in North Carolina including white goods, whole tires, lead-acid batteries, and yard waste. Other materials such as old corrugated cardboard (OCC) have been banned locally from landfills. Disposal bans can include other problematic or recyclable materials. Some localities are attempting to ban waste that comes from outside a specific jurisdiction. For a list of some local disposal bans, please refer to the *Local Materials Ordinance List* at the end of this section.

### Reasons for Disposal Bans

- To prevent groundwater contamination.
- To reduce operational problems.
- To conserve natural resources through recycling.
- To encourage recycling.
- To preserve landfill capacity.

One serious side effect of material bans if they are not planned properly is an increase in illegal dumping.



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### **Local Policy Initiatives and Issues**

#### **Effective Bans Require Companion Programs:**

- Convenient, comparably priced alternative management.
- Vigorous education program.
- Monitoring program.
- Enforcement program.

#### **Wrap Up**

This session has shown that local policy initiatives can help or hurt your program. As a business person in the community, what types of policy measures would you support?

**CAN YOU GIVE AN EXAMPLE OF THE IMPACT OF A POLICY INITIATIVE IN YOUR COMMUNITY?**

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## Local Policy Initiatives and Issues

### Local Policy Exercise

In this exercise, participants will be divided into four groups. Each group will need to speak to the “county commissioners” to voice their concerns. Groups will have 10 minutes to prepare their case.

**Group A** is Citizens for the Preservation of Coat Hangers. This group wants to see all metal coat hangers banned from the landfill.

**Group B** is Citizens Against Any and All Bans; it thinks that the coat hanger ban is unnecessary.

**Group C** is Americans Waste - NOT! It wants to see mandatory recycling of ONP, Aluminum beverage containers, Glass bottles and jars, HDPE and PETE beverage containers, and OCC.

**Group D** is the Keep American Citizens Free Association; it is against mandatory recycling.

## Business and Industry Solid Waste Assessment

### Business and Industry Solid Waste Assessment

A solid waste assessment is an essential step to establish an environmentally and economically sound solid waste management program in a business or industry. An assessment of the facility's solid waste generation activities allows company personnel to be aware of the ways, the occasions, the places, and the reasons the wastes are created and helps them identify wastes that can be eliminated, reduced, reused, or recycled. Data gathered from the assessment also enables the facility to determine the quantities of wastes generated and associated waste management costs and provides a baseline for measuring results of source reduction and recycling strategies.

While the responsibility for planning waste reduction and recycling programs in these sectors is often given to facility management, local government waste reduction coordinators can provide significant guidance, networking, and assistance. A waste assessment is most effective when performed by a team. Team members should include company personnel and at least one of the following supporting groups:

- Waste assessment consulting firms.
- Private waste assessors.
- Local/state government waste reduction or recycling staff.

The waste assessor does not have to be an expert on all operations of the facility; rather, the *assessor acts as a catalyst* to stimulate awareness about waste generation, associated waste management and lost product costs, environmental impacts, and waste reduction options. However, the company is responsible for determining and implementing the most beneficial waste reduction strategies for its operations.

### Steps for Conducting an Industry and Business Solid Waste Assessment

The following provides the assessor with background information necessary for performing a solid waste assessment. The following seven steps outline each task the waste assessor team should expect to conduct.

1. Identify key personnel and schedule a meeting.
2. Confirm meeting and plant walk-through date and request background information.
3. Meet with designated personnel to discuss plant operations and to review solid waste generation data and the company's current waste reduction efforts.
4. Conduct facility walk-through including a dumpster viewing.
5. Identify source reduction opportunities.
6. Conclude the walk-through with a brief meeting to discuss the findings of the assessment.
7. Prepare follow-up report with suggested reduction opportunities.

## Business and Industry Solid Waste Assessment

### 1. Identify key facility personnel

*Establish Commitment.* Generally, *commitment by corporate executives or the business owner is essential* to any successful waste reduction program. These efforts require support (i.e., time, financing, etc.) from upper management for development, implementation, and maintenance. A waste assessor should make every effort to meet with key management personnel such as the plant manager, the production manager, the maintenance supervisor, the purchasing agent, and any others with duties related to or influencing solid waste management.

*Involve Solid Waste Personnel.* The waste assessor should confirm that the facility has/has not a staff position responsible for solid waste management. At large facilities, this position may be a dedicated environmental coordinator who is responsible for solid waste management along with other environmental compliance, permitting, and reporting duties. In smaller companies, an employee in the maintenance department may be in charge of the company's solid waste management, or the owner may be the point of contact. Whether a designated solid waste coordinator or departmental manager, this individual should be on the assessment team since he/she knows the facility's solid waste generation and the way(s) it is recycled/disposed.

*Include the Team.* In a facility that has an established waste reduction team, the meetings and assessment should also *include the team leader and other team representatives*. The waste reduction team will likely consist of representatives from purchasing, maintenance, finance, engineering, manufacturing, management, and others interested in waste reduction. Information from these areas is critical in evaluations of the current solid waste generation and identification of potential areas of reduction.

### 2. Confirm meeting and plant walk-through date and request background information.

The waste assessment should be *conducted during normal plant/office hours* so that the processes or functions generating the waste can be observed while in operation. In certain industries such as food processing, a large quantity of solid waste is generated during the second or third shifts when clean-up operations are performed. The waste assessor needs to confirm the process/manufacturing and clean-up (i.e., sanitation) times with the facility and schedule the walk-through accordingly. In addition, seasonal variations in waste generation should also be considered for optimum scheduling of the assessment.

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# Business and Industry Solid Waste Assessment

The assessor should confirm the time, purpose, and duration of the meeting and facility visit by letter. In addition, certain background information should be requested and, if possible, collected prior to the meeting. An example of the type of background information to collect is in Parts 1 through 9 of the Business Waste Reduction Assessment Worksheet included in the appendix. This information includes:

- Brief description of the facility's operations including process flow diagrams, waste volume(s), hauling methods, and disposal costs.
- Waste handling procedures (internal and external).
- Waste composition.
- Purchase records of regulated materials.
- Raw material and finished product storage, handling, and transport procedures.
- Current waste reduction activities and policies.
- Any solid waste stream analysis previously collected.

To increase efficiency during the assessment and provide a baseline for measuring waste reduction efforts, this comprehensive information should be gathered *in advance* of the initial meeting. Company personnel are often unaware of the many costs associated with solid waste management. Typically, waste management is viewed as an activity ancillary to the production process and is budgeted as a fixed overhead cost. Collection and review of this information can be a first step in managing waste generation as an integral component of the plant's processes. Additionally, the background information helps the assessor understand facility operations and target specific areas to investigate for source reduction opportunities.

### 3. Meet with designated personnel

The waste assessor should meet with the facility's key personnel or the solid waste management team, including upper management. In most cases, it is more productive to meet and discuss general background information on waste management and plant operations before walking through what may be a noisy and complex facility. During the meeting, the assessor will discuss information on the Assessment Worksheet and add any missing data. This information will be valuable for determining the feasibility of implementing waste reduction alternatives. In addition, the assessor asks questions such as the following about each individual waste stream:

- If the generation of a particular waste stream varies throughout the day, when is the peak time?

## Business and Industry Solid Waste Assessment

- If the generation of a particular waste stream varies seasonally, what is the peak season?
- Who supplies the process material that eventually becomes a waste?

A sample waste assessment survey form to record this information is also included in the appendix. This form differs from the Assessment Worksheet in that information for each specific waste stream can be identified and noted. During the facility walk-through, the assessor can use this form to track the generation of specific solid waste streams. For example, packaging waste may be generated from a variety of operations within a facility. The survey form allows information from all areas to be compiled onto one sheet for future reference.

Also during the meeting, the assessor should determine the awareness level of company personnel with respect to solid waste management and should provide current information about the needs for implementing source reduction at the facility. The assessor can provide the following information:

- Projections of future solid waste "tipping" fees. Explanations for increased solid waste disposal costs include the effects of Resource and Conservation Recovery Act (RCRA) subtitle D regulations on local disposal costs, old landfill closure costs, new facility siting, and construction and operation costs.
- Any current or proposed disposal restrictions/bans on materials.
- Information on waste reduction assistance (e.g. information clearinghouses, workshops, grants, waste exchanges, etc.) provided by the local government, non-profit agencies, or other sources.

In cities or counties in which local waste reduction and recycling programs have only recently begun, many businesses may be uninformed about the local solid waste management situation and will welcome any information the assessor can provide. The assessor should give the facility contact information for the local government waste reduction staff and other solid waste information.

#### **4. Review the company's current waste reduction efforts**

The assessor should request the company's solid waste reduction policy statement/plan, if available. If a source reduction program is in place, the activities and any associated problems should be discussed. Facilities may have comprehensive waste reduction plans that address air emissions, wastewater discharges, storm water contamination, and solid wastes. For example, large

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# Business and Industry Solid Waste Assessment

quantity hazardous waste generators are required to have programs to reduce the volume and/or toxicity of the hazardous waste generated.

In facilities in which waste reduction programs are established, the assessor may want to ask questions such as the following:

### What are the motivating factors in the program?

- Is there a team approach to the program?
- What is the range and depth of employee training (i.e., are employees aware of the waste reduction program)?
- Are waste reduction suggestions solicited from employees and are they rewarded?
- What are the forms of communication used (e.g., newsletters, posters, charts, paycheck inserts, company picnics)?
- How is management supporting the waste reduction initiatives?
- What is the primary focus: cost, waste generation, product quality, environmental regulations, etc.?

### Are any numeric waste reduction goals established?

- What waste reduction practices are currently institutionalized and what is the reduction goal for each (i.e., XYZ company will reduce the amount of paper purchased by at least 35 percent by requiring that all reports are printed double-sided, etc.)?
- Are there future initiatives to reduce waste?
- If a company has made progress in reducing solid waste, how were the reductions achieved?
- What procedures are in place to monitor and report progress toward the goals?

If a company does not have a waste reduction program in place, the assessor needs to determine the facility-wide programs already existing such as "quality circles," "cost-cutting teams," or employee suggestion programs. A waste reduction program can often be integrated with existing ones or utilize existing lines of communication and educational activities.

#### **4. Conduct facility walk-through**

After the initial meeting, a walk-through of the facility is in order. The assessor should be aware that a walk-through assessment will provide only a snapshot of the waste stream generated at that current time. The waste assessor may suggest that the solid waste be followed to the landfill to identify the actual amount disposed. A photograph of the waste disposed may help to determine the materials to investigate for reduction opportunities.

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*Route of the Walk-Through.* Usually, the best place for the walk-through to start is at the "receiving area" and continue step-by-step with the flow of raw materials into manufacturing to final product packing and shipping. The facility's process flow diagram(s) should follow this same route. Areas to investigate for waste reduction include:

- Material Receiving and Inventory
- Production
- Final Product Packing, Shipping, and Storage
- Waste Disposal
- Reuse/Recycled Material Collection and Storage
- Cafeteria/Break Rooms
- Offices
- Ancillary Operations (e.g., laboratories, maintenance, waste treatment)
- Outside Storage

*During the Walk-Through.* During the walk-through, the assessor should not only look at the specific sources of solid waste generation but also for opportunities for waste elimination, reduction, reuse, and recycling. The assessor should ask questions about the reasons, the ways, and the places the wastes are generated. During the walk-through, the assessor can ask the employees about material handling within the facility. The assessor should make note of a general impression of the facility (e.g., orderly housekeeping, good employee/management communications, etc.). The Waste Audit Data Sheet included in the Commercial Appendix will be a useful tool for organizing information about each waste stream.

The assessor should speak to plant employees that work in different areas to understand their perspectives on waste generation and handling. Often, the waste generators or handlers not only provide the most accurate information on waste management practices, they also have innovative ideas for eliminating or reducing that waste. Therefore, employees should be asked for any suggestions they have on waste reduction. If the waste assessor solicits ideas from employees, management may give these ideas more consideration than if the ideas came from the assessor.

The assessor should also note if solid wastes are being transferred to or from other media. Efforts taken to reduce or reuse solid waste could help minimize pollution to other media (air, water, soil). For example, in the food processing and preparation industries, inedible food waste is often washed down the drain with water hoses. This practice not only increases the use of water at the facility but also may lead to wastewater problems such as elevated Biological Oxygen Demand (BOD) or Total Suspended Solids (TSS). On the other hand, dry clean-



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up methods (e.g., vacuuming and sweeping) collect food waste for reuse as hog feed or composting. By separating and collecting the solid waste, businesses can likely prevent a transfer of wastes to other media.

In addition, solid waste generated from other media through the use of pollution control devices can be reduced through a multimedia source reduction program.

Solid wastes that potentially can be reduced by a multimedia source reduction program include:

- Wastewater treatment sludges.
- Wastewater filtration media such as sand, diatomaceous earth, activated carbon, etc.
- Particulates and spent filters from air pollution control devices.
- Spill residual and absorbent media.

Therefore, an investigation of all types of waste generation can help the company reduce its solid waste stream.

### **Dumpster Viewing**

An assessment may include a "dumpster-viewing " to estimate the percentages of various materials in the waste stream. Many businesses have dumpsters for solid waste collection. These containers allow direct observation of the discarded waste.

Assessors are cautioned never to enter a dumpster, and safety precautions must be taken to avoid injury. If properly conducted, a waste assessment will highlight problem materials sufficiently, and the dumpster viewing will only verify information. The assessor should avoid double counting the waste and understand that a look at the dumpster contents provides only a snapshot of the waste disposed, as does a walk-through. An accurate picture of the solid waste stream at a facility requires that waste data are collected and tracked over time.

Businesses should be encouraged to set up a file in which assessment forms, data records, and current source reduction and recycling activities are stored.

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### 5. Identify waste reduction opportunities

Waste reduction opportunities may be feasible throughout the facility. These opportunities will generally fall under one of the following categories:

- Housekeeping Practices
- Employee Training and Awareness Programs
- Purchasing Procedures
- Inventory Control
- Production Process Modifications
- Product Redesign



These categories are discussed in detail in the Source Reduction chapter.

### 6. Follow-up Meeting

The assessor should have a brief wrap-up with key personnel at the facility, which will include praise for any waste reduction and recycling activities currently in place. The wrap-up should also include suggestions for improving the current waste reduction program or motivation for implementing one.

The wrap-up is also a good opportunity to gauge a company's reaction to the local government's solid waste reduction initiatives. If the waste assessment is performed by local government personnel, the assessor may want to request from the company a commitment to voluntarily develop a waste reduction and recycling policy statement and establish an action plan and solid waste reduction goals. The assessor may also be able to gauge a company's willingness or commitment to participate in other local government programs such as waste exchanges and to sponsor activities such as luncheons or focus group meetings with area businesses. Before departing, the assessor should inform the company about assistance that can be provided by the State or local government.

### 7. Prepare follow-up letter/report

If the assessor is external to the company, a follow-up letter or report should be prepared. If in house, the assessor will provide a follow-up memo to the waste reduction team and other solid waste management personnel. The report should describe current waste generation rates and associated management costs, current waste reduction or recycling activities, and the economic and environmental

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benefits of potential waste reduction or recycling opportunities. The assessor could request that company officials provide updates on source reduction or recycling activities or successful waste exchanges. In the letter or report, the assessor may include information on upcoming workshops, seminars, etc., that may help the company's source reduction efforts.

### After the Waste Assessment

After management and staff support are obtained, an assessment of the business' s waste completed, and a solid waste reduction policy developed, the waste assessor should encourage the business to implement at least one waste reduction option. The initial implementation may be small and require little or no cost. The first waste reduction technique implemented will help the business develop a method to track the savings achieved. Once a plan has been developed for implementing waste reduction activities and a program has been devised for tracking cost savings, additional source reduction activities can be implemented and measured.

### Measurement of Waste Reduction Activities

The following are benefits of measuring waste reduction activities:

- Establishes realistic goals and priorities for waste reduction programs,
- Provides cost-benefit analyses of waste reduction practices to assist in decision-making, and
- Monitors and evaluates the progress of the waste reduction efforts.

Commercial waste reduction can be measured by a *product-specific measurement* or a *facility-specific measurement*. The key to either type of waste reduction measurement is accurate recordkeeping.

**Product-specific measurement.** Product-specific measurement can be used to compare any two products designed to do the same job. Measurement data must be available both before and after the source reduction program is implemented. The waste reduction measure is then a change in the weight or volume of waste.

Limitations to this type of measurement must be addressed.

- The life of a reusable alternative under the specific conditions.
- The changes in workload for different departments as a result of implementing the source reduction activity.
- Other factors that may affect the reduction in weight of product used. For example, a decrease may occur in the number of plates used after a

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switch to reusable plates in a cafeteria because single-use plates were sometimes taken for other purposes.

**Facility-specific measurement.** Facility-specific measurement can be used when all waste leaving the facility is weighed or measured for volume. Measurement data must be available both before and after the waste reduction program is implemented. The waste reduction measure is then a change in the weight or volume of waste.

Limitations to this type of measurement must be addressed.

- Other factors such as numbers of employees, seasonal variations, or types of projects may influence the amount of waste generated. Estimates must be made to establish the changes resulting from source reduction and the changes from other factors.
- Changes in waste generation are measured for the facility as a whole; thus, individual actions taken to reduce waste are not quantified.
- Changes in the toxicity of individual products are not measured.
- Cost changes resulting from the waste reduction practices are not included.

### Wrap-Up

A successful waste assessment will provide the information needed to practice waste reduction. Waste reduction will not only save the company time, money and resources, it will also help the local government achieve its waste reduction goals.



### More Questions for the Waste Audit

1. What materials do you recycle now? \_\_\_\_\_

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2. What materials could be recycled/reduced? \_\_\_\_\_

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---

3. What equipment/personnel would be needed to do additional recycling/reduction?

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4. How would recycling/reduction be accomplished? \_\_\_\_\_

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5. Are the recyclable materials collected separately? \_\_\_\_\_

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6. Is there risk of infection with different types of materials handled in this department? If so, please list. \_\_\_\_\_

---

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7. Is there seasonal variation in your waste generation? \_\_\_\_\_

---

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# Handout

## Waste Audit Data Sheet

Waste Type	Est. Percent of Total Waste	Comments
<b>Paper:</b>		
Office Paper		
Computer		
Corrugated		
Newspaper		
Other		
<b>Glass:</b>		
Brown		
Green		
Clear		
<b>Plastic:</b>		
PETE		
HDPE		
Plastic bags		
<b>Other Packaging:</b>		
Rigid		
Flexible		
Other		
<b>Wood:</b>		
Pallets		
Construction		
Other		
<b>Linens/textiles:</b>		
<b>Food Waste:</b>		
<b>Metal:</b>		
Aluminum		
Scrap		
Precious		
Obsolete Equipment		
Other		
<b>Chemicals:</b>		
Paints:		
Cleaners:		
<b>Rubber:</b>		
<b>Waste Oil:</b>		
<b>Groundskeeping Waste:</b>		



# BUSINESS WASTE REDUCTION ASSESSMENT WORKSHEET

**Part 1. Facility Contacts**

Facility Name: \_\_\_\_\_ Date: \_\_\_\_\_ Assessor: \_\_\_\_\_

Address: \_\_\_\_\_

Main Contact: \_\_\_\_\_ Title: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Chief Exec. Officer: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Building Manager: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Custodial Supervisor: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Salvage Supervisor: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Material Handling Supervisor: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Purchasing Agent: \_\_\_\_\_ Tel. No. \_\_\_\_\_

Other Contact: \_\_\_\_\_ Title: \_\_\_\_\_ Tel. No. \_\_\_\_\_

**Part 2. Business and Facility Types**

Major Products Manufactured or Produced: \_\_\_\_\_

Annual Sales: \_\_\_\_\_ No. of Employees: \_\_\_\_\_ Year Established \_\_\_\_\_

Company Purpose for Assessment: \_\_\_\_\_

Business Type	% Space	# Empl.	Business Type	% Space	# Empl.
_____ Office	_____	_____	_____ Retail	_____	_____
_____ Manufacturing	_____	_____	_____ Shipping/Receiving	_____	_____
_____ R&D	_____	_____	_____ Warehousing	_____	_____
_____ Other	_____	_____	_____ Other	_____	_____

**Part 3. Waste Volume, Hauling Method, and Cost Estimates**

*Dumpster, Volume, & Cost Characteristics*

No.	Size	Type	Compacted?	Service/Wk	% Full	Wks/Yr	CY/Yr
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Hauler(s): \_\_\_\_\_ Hauler Confirmation? \_\_\_\_\_

Est. Tons per Year: \_\_\_\_\_ Est. Cost per Year: \_\_\_\_\_

Other Comments (continue on blank page if necessary):

**Part 4. Waste Handling Procedures and Resources**

Is waste handled in separate streams? \_\_\_\_\_

Indicate which waste streams are generated at the facility, and show any grouping of streams by current handling practices:

- |                      |                    |                                     |
|----------------------|--------------------|-------------------------------------|
| _____ Office         | _____ Public Areas | _____ Conference/Meeting Rooms      |
| _____ Kitchen        | _____ Eating Areas | _____ Snackbar Areas                |
| _____ Research Areas | _____ Restrooms    | _____ Experimental Areas            |
| _____ Manufacturing  | _____ Machining    | _____ Chemical Labs                 |
| _____ Shipping       | _____ Receiving    | _____ Material Storage/Distribution |
| _____ _____          | _____ _____        | _____ _____                         |

How many hours of custodial time is spent per week handling waste? \_\_\_\_\_

What percentage of overall custodial time does this represent? \_\_\_\_\_

What waste, if any, is not handled by custodial staff? \_\_\_\_\_

Other Comments: \_\_\_\_\_

*How waste is collected, handled and transported for disposal?*

(Example: Offices -- Once a night, custodians pull waste liners from individual waste baskets, put bags in 44 gal. barrel, and take barrel to waste dumpster at end of shift.)

*Problems, obstacles and challenges to handling waste within the building:*

*Other Comments*

**Part 5. Waste Composition**

	Offices	Production	Eating Areas	Other	Total
<i>% of Bulk CY per Week:</i>					100%
<i>Paper</i>					
Newspaper					
Books & Magazines					
Office Paper					
White, CPO					
Colored					
Filestock					
Mixed					
Cardboard					
Corrugated					
Paperboard					
Waxed					
Other Paper					
Tissue, Wrap					
Glossy					
Other					
<i>Compostables</i>					
Wood					
Brush, Trees					
Pallets					
Yard Waste					
Food					
Soiled Paper					
<i>Metals</i>					
Aluminum					
Ferrous Metal					
Other Non-Ferrous					
<i>Other Materials</i>					
Textiles					
Organic					
Non-organic					
Glass					
Clear					
Green					
Brown					
Plastics-Rigid					
HDPE					
LDPE					
Styrene					
Other					
Plastics-Film					
HDPE					
LDPE					
Styrene					
Other					
Miscellaneous					
<i>Other Materials</i>					
Stone/Clay/Sand					
Sludge					
<b>Total:</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Other Comments:</b>					

**Part 6. Current Waste Reduction, Reuse, Recycling & Composting Activities**

**Source Reduction?**                      Yes    No

- |  |   |
|--|---|
| <input type="checkbox"/> Backhauling Rejects   | <input type="checkbox"/> On-site Composting               |
| <input type="checkbox"/> Returnable Containers | <input type="checkbox"/> Reusable Dishware                |
| <input type="checkbox"/> Double-sided Copying  | <input type="checkbox"/> Electronic Mail, Bulletin Boards |
| <input type="checkbox"/> Other(s) _____        |   |

Comments:

**Reuse?**                                      Yes    No

- |  |   |
|--|---|
| <input type="checkbox"/> Pallets         | <input type="checkbox"/> Process Scrap          |
| <input type="checkbox"/> Furniture       | <input type="checkbox"/> Waste Paper            |
| <input type="checkbox"/> Packaging/Boxes | <input type="checkbox"/> Construction Materials |
| <input type="checkbox"/> Other(s) _____  |   |

Comments:

**Recycling?**                                Yes    No

- |   |   |
|---|---|
| <input type="checkbox"/> Corrugated Cardboard | <input type="checkbox"/> Glass                  |
| <input type="checkbox"/> Office Paper         | <input type="checkbox"/> Plastics               |
| <input type="checkbox"/> Metals               | <input type="checkbox"/> Construction Materials |
| <input type="checkbox"/> Other(s) _____       |   |

Volumes, Haulers & Facilities:

**Composting?**                            Yes    No

- |   |                                 |
|---|---------------------------------|
| <input type="checkbox"/> Pallets/Wood   | <input type="checkbox"/> Grass  |
| <input type="checkbox"/> Food           | <input type="checkbox"/> Leaves |
| <input type="checkbox"/> Sludge         | <input type="checkbox"/> Brush  |
| <input type="checkbox"/> Other(s) _____ |                                 |

Volumes, Haulers and Facilities:

(Continue on blank page if necessary)

Please describe any policies or procedures which particularly favor or hinder current waste reduction activities:

Describe any major problems or "lessons learned" relating to current waste reduction activities:

Describe any major successes these activities have experienced, and the reasons for these successes:

Describe the current procedure to handle confidential materials, and the concerns relating to confidentiality:

(Continue on blank page if necessary)

**Part 7. Special Clean-up, Building Features, Concerns etc.**

Describe any periodic fluctuations in waste volume and/or compositions:

Indicate building layout:

	<i>Building 1</i>	<i>Building 2</i>	<i>Building 3</i>	<i>Comments</i>
Facility Name	_____	_____	_____	
No. of Buildings	_____	_____	_____	
No. of Floors Above Ground:	_____	_____	_____	
No. of Floors Below Ground:	_____	_____	_____	
No. of Raised Loading Docks:	_____	_____	_____	
No. of Other Loading Areas:	_____	_____	_____	
No. of Truck Entrances:	_____	_____	_____	
No. of Service Elevators:	_____	_____	_____	
No. of Passenger Elevators:	_____	_____	_____	

*Please Enclose a Floor Plan, Map, or Sketch of the Facility*

Describe any particular building features which will favor or hinder recycling and other waste reduction activities:

Where are potential spaces for locations of recycling containrs, balers, compactors, etc.?

Describe any other special concerns which might affect the implementation and continuation of waste reduction activities:

(Continue on blank page if necessary)

**Part 8. Material Handling**

How are supplies received, stored and distributed throughout the facility?

How many personnel are used to receive, store and distribution supplies throughout the facility?

What materials are not handled by the normal material handling system? How are these unusual materials handled?

What is done if deliveries are off-specification, in improper quantities, damaged, sub-standard, have expired or are functionally obsolete returned to suppliers? If so, describe how these materials are returned to suppliers.

Describe the extent to which returnable containers, cardboard recycling, and other waste reduction measures are used during material handling.

How do material handling and purchasing units communicate to each other?

**Part 9. Procurement Information**

Please list the *major* supplies, equipment, and other materials procured for this facility. Indicate which materials contain recycled content. (Indicate quantities per year or per month)

Please provide a general description of the purchasing process.

When are materials ordered? who determines material specifications and conducts actual purchases?  
What determines the size of an order? What purchasing "rules of thumb" are used?

Please describe any existing procurement policies or procedures which are specifically designed to reduce waste. Are any such procurement policies or procedures planned?

Are material packaging, environmental "friendliness," reusability and recyclability criteria currently used for procurement decisions? If so, to what extent are they used. Are there plans to promote such criteria in the future?

What are the major barriers to procuring more materials with recycled content.

What resources, tools and information are needed to promote the purchasing materials with recycled contents?



**Part 10. Walk-Through Notes**

Check off Areas Examined:

<input type="checkbox"/> Waste Generating Areas	Notes:	_____
<input type="checkbox"/> Dock Areas		_____
<input type="checkbox"/> Dumpster Areas		_____
<input type="checkbox"/> Material Storage/Handling Areas		_____
<input type="checkbox"/> Kitchens		_____
<input type="checkbox"/> Eating Areas		_____
<input type="checkbox"/> Other		_____

Comments:

Waste Reduction Gameplan (See Part 11):

(Continue on blank page if necessary)

**Part 11. Future Recovery Options & Recommendations**

**Waste Reduction Goals:**

**Types of materials which should be targeted for recovery in short-term & long-term:**

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> Newspaper    | <input type="checkbox"/> Office Paper | <input type="checkbox"/> Mixed Office Paper                 |
| <input type="checkbox"/> Paperboard   | <input type="checkbox"/> Cardboard    | <input type="checkbox"/> Mixed Paper                        |
| <input type="checkbox"/> Other _____  |                                       |   |
| <input type="checkbox"/> Pallets/Wood | <input type="checkbox"/> Food         | <input type="checkbox"/> Wet Paper                          |
| <input type="checkbox"/> Yard Waste   | <input type="checkbox"/> Other _____  |   |
| <input type="checkbox"/> Metals       | <input type="checkbox"/> Glass        | <input type="checkbox"/> HDPE <input type="checkbox"/> LDPE |
| <input type="checkbox"/> Styrene      | <input type="checkbox"/> Other _____  |   |

**Management:**

- |   |   |
|---|---|
| <input type="checkbox"/> Set waste reduction goals  | <input type="checkbox"/> Put someone in charge                |
| <input type="checkbox"/> Establish a commitment to reduce waste   | <input type="checkbox"/> Develop employee suggestion programs |
| <input type="checkbox"/> Provide necessary personnel and financial resources to explore waste reduction options | <input type="checkbox"/> Establish a policy to reduce waste   |

**Office:**

- |   |  |
|---|--|
| <input type="checkbox"/> Reuse paper  | <input type="checkbox"/> Refillable pens                               |
| <input type="checkbox"/> Use recycled and recyclable paper                  | <input type="checkbox"/> Use electronic mail                           |
| <input type="checkbox"/> Provide washable mugs/cups to employees            | <input type="checkbox"/> Establish circulars and/or announcement board |
| <input type="checkbox"/> Recycle laser printer and copier toner cartridges  | <input type="checkbox"/> Return unwanted junk mail to sender           |
| <input type="checkbox"/> Remove employee names from junk mail mailing lists |  |

**Eating Areas:**

- |   |   |
|---|---|
| <input type="checkbox"/> Vary meal sizes for children and senior citizens   | <input type="checkbox"/> Use washable dinnerware                |
| <input type="checkbox"/> Refrigerate food and drink at proper temperatures  | <input type="checkbox"/> Put carry-out food in paper containers |
| <input type="checkbox"/> Use washable tableware (napkins, tablecloths, placemats)   |   |
| <input type="checkbox"/> Use washable or recycling cream dispensers, butter plates, syrup and jam jars, ketchup bottles, etc. |   |

**Production:**

- |   |  |
|---|--|
| <input type="checkbox"/> Improve quality control          | <input type="checkbox"/> Improve housekeeping                        |
| <input type="checkbox"/> Upgrade preventative maintenance | <input type="checkbox"/> Use recycled materials as production inputs |

**Maintenance:**

- |   |  |
|---|--|
| <input type="checkbox"/> Use rechargeable batteries       | <input type="checkbox"/> Use re-refined oil                            |
| <input type="checkbox"/> Use washable mops, rags, buffers | <input type="checkbox"/> Use biodegradable detergents                  |
| <input type="checkbox"/> Use electrostatic air filters    | <input type="checkbox"/> Use long-lasting light bulbs, equipment, etc. |

**Material Handling:**

- Unbox items at supplies depot and disburse items in returnable containers
- Have suppliers provide items in returnable containers
- Have suppliers backhaul empty cardboard boxes

**Procurement:**

- |   |  |
|---|--|
| <input type="checkbox"/> Buy as needed to reduce spoilage/obsolescence        | <input type="checkbox"/> Purchase items in returnable containers         |
| <input type="checkbox"/> Make sure that items are not over packaged           | <input type="checkbox"/> Make sure that packaging is reusable/recyclable |
| <input type="checkbox"/> Make sure that packaging is made of recycled content |  |
| <input type="checkbox"/> Make supplier backhaul excess product and packaging  |  |

**Other:**

- |  |  |
|--|--|
| <input type="checkbox"/> Use roll cloth-towels in restrooms  | <input type="checkbox"/> Use soap dispensers in restrooms        |
| <input type="checkbox"/> Include waste reduction suggestions in employee newsletters & bulletin boards | <input type="checkbox"/> Reward good waste reduction suggestions |

# WASTE ASSESSMENT SURVEY FORM

Date: \_\_\_\_\_

Facility Location: \_\_\_\_\_

Persons Interviewed: \_\_\_\_\_

(Title and/or Name)

## WASTE STREAM

Content	
Quantity Generated	
Frequency of Generation (seasonal changes, emergency vs normal operations)	
Generating Process	
Original Material Source/Supplier/Cost	
Current Handling/Disposal Mtds (written procedures?)	
Current Disposal Costs	
Current Waste Min. Practices (change in volume generated, written procedures?)	
Proposed/Planned/Suggested Waste Minimization Procedures (employee suggestions)	
Flow Diagram	



## APPENDIX A:

# RECYCLING TERMS AND ACRONYMS

### Recycling Terms

**biscuiting:** a methodology by which aluminum cans are densified, with the end product being a "biscuit" of aluminum, approximately 12" x 12" x 8" and weighing 20-40 pounds.

**broker:** a firm or individual that purchases secondary materials from processors for resale to consumers; a broker acts as an intermediary and typically does not take physical possession of the materials.

**brush:** wood waste with a diameter of 4" or less.

**cage:** an expanded metal container (approximately 6'x6'x6') used for the storage of cans; cans are usually fed by a conveyor through an opening in the top and exit through an opening in the bottom, destined for processing (i.e. a baler).

**capital funding:** the amount of money received to cover the cost of the building and/or equipment (this interpretation of the term only applies to its use as demonstrated on the work sheet).

**capture rate:** the amount of a material recycled as a percentage of the total amount of that material available from *participating* units.

**Cherokee truck:** a recycling collection vehicle.

**clean debris:** inert solid waste that is not a pollution threat to ground and surface waters, not a fire hazard and likely to maintain its physical and chemical structure under expected use and disposal conditions. This term includes uncontaminated concrete, steel, glass, brick and ceramics.

**co-composting:** the composting of municipal solid waste and wastewater treatment plant sludge together.

**commingling:** the mixing of secondary materials during collection; ranges from "full" (all items including paper) to "partial" (news & paper separate, plus varying combinations of container materials).

**composting:** the controlled process whereby organic materials are biologically broken down and converted into a stabilized humic material.

**consumption data:** information on waste amounts derived from resources *consumed*, e.g. a cafeteria that buys 150 cases of soft drinks each week then creates 150 cases worth of "soft drink waste" each week.

Source: Florida Recycling Coordinators Training Course: Participant's Manual

construction and demolition debris: materials generally considered to be not water soluble and non-hazardous in nature, including, but not limited to steel, glass, brick, concrete, asphalt roofing material, pipe, gypsum wallboard, and lumber from construction or destruction of a structure, and including rocks, soils, trees and other vegetative matter which normally results from land clearing or land development operations for a construction project.

contaminant: a material that is harmful or undesirable to the recycling process when included with a recyclable material.

cullet: crushed scrap glass, usually prepared in uniform, small pieces and free from contaminants.

curb (truck) sort: the sorting of recyclables into various truck compartments at curbside in a residential program.

dealer: a firm that purchases, grades and processes secondary materials for sale to brokers and/or end users.

dedicated equipment/vehicles: vehicles or equipment which are designed and used only for recyclable collection and processing.

degradable: any material which after being discarded, is capable of decomposing to components other than heavy metals or other toxic substances, after exposure to bacteria, lights or outdoor elements.

densification: a process which compacts secondary materials for shipping; includes baling, biscuiting, crushing and flattening.

depreciation term: this represents the number of years over which a building or piece of equipment depreciates.

diversion credit: a fee paid normally from a county or region to a municipality for materials *diverted* from the landfill; reflects all, or a portion, of the full costs involved in solid waste management; often related to tipping fee.

diversion rate: the amount of all materials recycled as a percentage of the municipal solid waste stream.

dump-and-pick: the recovery of secondary materials from mixed waste loads, often using manual sorting.

end market (end user): facilities where secondary materials are reprocessed into new materials, e.g. paper mills, steel mills and glass container plants.

energy from waste (waste to energy): the burning of solid waste in steam generators to produce electricity.

expansion capacity: the ability of a machine or facility to fulfill an unexpected increase in demand.

fine paper: a high grade paper which is lighter, thinner and more flexible compared to paper board; includes: bond paper, stationery, not pad paper, computer outprint paper non-glossy photo copier paper, index cards, and manila file folders.

flow control: a regulation or ordinance used by an agency to direct waste to one or more specific locations for processing.

gaylord: 1.4 cu. yd. cardboard container used to store loose materials.

generation data: information on waste amounts derived from actual waste materials produced; usually done by auditing or assessing waste bins on site.

generator: an individual, company, organization or activity that produces wastes or secondary materials.

granulated: a material that has formed or crystallized into grains or small plastic particles (granules).

gross capital costs: the actual cost of the building and/or equipment needed

household: a single family unit; e.g. a duplex would contain two households and require two storage containers.

interlocal agreement: a legal contract among governmental units (city-city, county-county, city-county) which sets out the respective responsibilities of each unit in the development and operation of a recycling program.

Labrie: a recycling collection vehicle

mandatory recycling: recycling that is required and enforced by law *at some level*; e.g., counties may be required to set up recycling programs and achieve particular diversion rates, but they may or may not require households or business to recycle certain materials, or at least remove them from the municipal waste stream.

materials recovery facility (MRF): a facility that receives, processes and markets source-separated materials; may separate commingled materials, but at least does some processing; also known as intermediate processing centers (IPC's) and regional processing centers (RPC's)

multi-material recycling: the collection of more than one material from a business, institution or household.

municipal solid waste (MSW): that portion of the solid waste stream that usually includes residential waste, commercial/institutional waste and some light industrial waste; does not include heavy industrial waste, hazardous waste, radioactive waste or bio-medical waste.

net capital cost: this value is represented by the gross capital costs less the funding received for the building and/or equipment

outthrows: all papers that are so manufactured or treated or are in such a form as to be unsuitable for consumption as the grade specified.

participation rate: the number of units (households, business, retail outlets, etc.) which participate in a recycling program as a percentage of the total number of units served by the program; *must* have a timeframe to be meaningful; most common measure is the number of units which participate at least one per month.

pass-bys: the number of structures with recycling containers on a residential collection route; one structure = one pass-by.

post-consumer waste: waste materials generated by businesses or households; does not include waste, scrap or offcuts from industrial and manufacturing processes.

processor: an operation where secondary materials are sorted, graded, cleaned, densified or packaged.

recovered materials: those materials which have known recycling potential, can be feasibly recycled, and have been diverted or removed from the solid waste stream for sale, use or reuse, by separation, collection or processing.

recovery rate: the amount of a material recovered divided by the total of the material available from the population served. If a material production amount per unit served is known, the recovery rate is the amount of a material recovered divided by the product of the amount produced per unit times the number of units.

recyclable material: those materials which are capable of being recycled and which would otherwise be processed or disposed of as solid waste.

recycling: any process by which solid waste or materials which would otherwise become solid waste are collected, separated or processed and reused or returned to use in the form of raw materials or products.

refuse-derived fuel (RDF): fuel pellets for use in certain types of waste-to-energy facilities.

residential solid waste (RSW): that portion of the solid waste stream coming from household units.

resource recovery: the extraction and use of materials which would otherwise enter or continue within the waste stream; a broad category encompassing recycling, energy from waste, methane recovery at landfills, etc.; often used to describe the production of energy from solid waste.

roll-off: a special truck which deposits and picks up a 10-to-50-cubic yard container at a site.

secondary materials: recyclable materials such as waste paper and scrap metal.

set-out rate: the number of stops where recyclables are set out at the curb, stated as a percentage of pass-bys for that route.

sludge: the accumulated solids, residues and precipitates generated as a result of waste treatment or processing, including wastewater treatment, water supply treatment, operation of an air pollution control facility and the solids and liquids pumped from septic tanks and grease traps.



source separation: the removal of recyclables from the waste stream by the consumer or generator.

special wastes: solid wastes that can require special handling and management, including but not limited to white goods, whole tires, used oil, mattresses, furniture, lead-acid batteries and biohazardous wastes.

stops: structures where recycling containers are set out on a given collection day.

structures: the actual buildings along a collection route; e.g., a duplex or 4-unit apartment each is one structure; used to calculate *passbys*.

used oil: any oil which has been refined from crude oil or synthetic oil and as a result of use, storage or handling, has become unsuitable for its original purpose due to the presence of impurities or loss of original properties, but which may be suitable for further use and is recyclable.

waste audit: an on-site assessment of the waste stream and recycling potential of an individual business or institution.

white goods: includes inoperative and discarded refrigerators, ranges, water heaters, freezers and other similar domestic and commercial large appliances.

windrowing: the placement and management of compostable material in a piled row; should be periodically watered and turned.

yard trash: the portion of the municipal solid waste stream consisting of vegetative matter resulting from landscaping maintenance and land clearing operations, leaves, grass clippings, brush, tree trimmings and garden waste.



## ACRONYMS

<b>APC</b>	American Plastic Council
<b>ASTWMO</b>	Association of State and Territorial Solid Waste Management Officials
<b>BIRP</b>	Business and Industry Recycling Program (formerly the Beverage Industry Recycling Program)
<b>BTU</b>	British Thermal Unit
<b>C&amp;D</b>	Construction & Demolition Debris
<b>C/I</b>	commercial/industrial
<b>CPO</b>	computer printout wast paper
<b>DIY</b>	do-it-yourself used oil changer
<b>DEHNR</b>	Department of Environment, Health & Natural Resources
<b>DEM</b>	Division of Environmental Management
<b>DOA</b>	Department of Administration
<b>DOT</b>	Department of Transportation
<b>EPA</b>	Environmental Protection Agency
<b>FOB</b>	freight on board
<b>HDPE</b>	high density polyethylene -#2 (a plastic resin used for containers such as milk jugs)
<b>HHW</b>	household hazardous waste
<b>ICP</b>	intermediate processing center
<b>ISRI</b>	Institute for Scrap Recycling Industries
<b>KAB</b>	Keep America Beautiful
<b>LDPE</b>	low-density polyethylene -#4
<b>MFS</b>	multi-family structure
<b>MPW</b>	mixed paper waste

<b>MRF</b>	materials recovery facility
<b>MSW</b>	municipal solid waste
<b>NAPCOR</b>	National Association for Plastic Container Recovery
<b>NARI</b>	National Association of Recycling Industries
<b>NCRA</b>	North Carolina Recycling Association
<b>NCSDA</b>	North Carolina Soft Drink Association
<b>NRC</b>	National Recycling Coalition
<b>NSWMA</b>	National Solid Waste Management Association
<b>OCC</b>	old corrugated cardboard
<b>OMG</b>	old magazines
<b>ONP</b>	old newsprint
<b>OWR</b>	Office of Waste Reduction
<b>PCB</b>	polychlorinated biphenyl
<b>PE</b>	polyethylene
<b>PET</b>	polyethylene terephthalate - #1 (plastic resin used to make soft drink bottles)
<b>PP</b>	polypropylene - #5
<b>PPP</b>	Pollution Prevention Program
<b>PPE</b>	promotion and public education
<b>PS</b>	polystyrene - #6
<b>PSI</b>	Paper Stock Institute of America
<b>PVC</b>	polyvinyl chloride - #3
<b>RCRA</b>	(federal) Resource Conservation and Recovery Act
<b>RDF</b>	refuse-derived fuel
<b>RFB</b>	request for bid
<b>RFP</b>	request for proposal

<b>RFQ</b>	request for qualifications
<b>RPC</b>	regional processing center
<b>RSW</b>	residential solid waste
<b>SRI</b>	Steel Recycling Institute
<b>SIC</b>	standard industrial classification (code)
<b>SWANA</b>	Solid Waste Association of North America
<b>SWS</b>	Solid Waste Section
<b>TDF</b>	tire-derived fuel
<b>TPD</b>	tons per day
<b>TPW</b>	tons per week
<b>TPY</b>	tons per year
<b>TSCA</b>	Toxic Substance Control Act
<b>UBC</b>	used beverage container
<b>WRRC</b>	Waste Reduction Resource Center
<b>WTE</b>	waste-to-energy facility

Source: Florida Recycling Coordinators' Training Course: Participants' Manual



## APPENDIX B:

### NATIONAL & STATE RECYCLING CONTACTS

#### Federal Government

Environmental Protection Agency  
Municipal Solid Waste Program  
401 M Street, SW  
Washington, DC 20460  
202-382-3345

#### State Government Agencies

Office of Waste Reduction  
NC Dept. of Environment, Health, and  
Natural Resources  
3825 Barrett Drive, PO Box 27687  
Raleigh, NC 27611-7687 919-571-4100

Solid Waste Section  
Division of Solid Waste Management  
NC Dept. of Environment, Health, and  
Natural Resources  
PO Box 27687  
Raleigh, NC 27611-7687 919-733-0692

Energy Division  
NC Dept. of Economic and Community  
Development  
PO Box 25249  
Raleigh, NC 27611 919-733-2230

NC Keep America Beautiful  
Office of the Governor  
116 W. Jones St.  
Raleigh, NC 27611 919-733-5017

Adopt-A-Highway Program  
NC Dept. of Transportation  
PO Box 25201  
Raleigh, NC 27611 919-733-2520

#### State Professional & Trade Associations

NC Recycling Association  
7330 Chapel Hill Rd. Suite 207  
Raleigh, NC 27607 919-851-8444

NC Chapter of SWANA (Solid Waste Assoc.  
of North America, formerly GRCD)A)  
City of Charlotte  
600 E. Fourth St. - 7th Floor  
Charlotte, NC 28202 704-336-2176

NC Association of County Commissioners  
PO Box 1488  
215 N. Dawson St.  
Raleigh, NC 27602 919-832-2893

NC League of Municipalities  
PO Box 3069  
215 N. Dawson St.  
Raleigh, NC 27602 919-834-1311

NC Rural Economic Development Center, Inc.  
201 New Bern Avenue  
Raleigh, NC 27601 919-821-1154

National Assoc. for Plastic Container Recovery  
(NAPCOR)  
4828 Parkway Plaza Blvd. Suite 260  
Charlotte, NC 28217 704-357-3250

Carolinas Glass Recycling Program  
908 South Tryon Street Suite 2200  
Charlotte, NC 28202 704-332-2030

Keep North Carolina Clean & Beautiful, Inc.  
St. Mary's Place  
887-A Washington St.  
Raleigh, NC 27605 919-834-9869

University/College Departments &  
Research Institutes

Southeast Waste Exchange  
Urban Institute  
Department of Civil Engineering  
UNC-Charlotte  
Charlotte, NC 28223 704-547-2307

UNC Institute for Environmental Studies  
315 Pittsboro St. CB#7400  
UNC-Chapel Hill  
Chapel Hill, NC 27599-7400 919-966-2358

EPA Ctr. for Waste Minimization & Mgmt.  
Department of Chemical Engineering  
Box 7905  
NC State University  
Raleigh, NC 27695-7905 919-737-2325

Cooperative Extension Service  
Office of the Director  
Box 7602  
NC State University  
Raleigh, NC 27695-7602 919-515-2811

East Carolina University  
Dept. of Environmental Health  
Greenville, NC 27858 919-757-4434

Center for Improving Mountain Living  
Western Carolina University  
Cullowhee, NC 28723 704-227-7492

Non-Government: National

Aluminum Recycling Association  
1000 16th Street, NW Suite 603  
Washington, DC 20036 202-785-0550

American Iron and Steel Institute  
1000 16th Street, NW  
Washington, DC 20036 202-452-7100

American Paper Institute  
260 Madison Avenue  
New York, NY 10016 212-340-0600

Asphalt Rubber Producer's Group  
3336 North 32nd Street, Suite 110  
Phoenix, AZ 85016  
602-955-1141

Non-Government: National (cont.)

Association of Petroleum Re-refiners  
PO Box 427  
Buffalo, NY 14205 716-855-2212

Association of State and Territorial Solid Waste  
Management Officials  
444 North Capital Street, NW Suite 388  
Washington, DC 20001 202-624-5828

Automotive Dismantlers and Recyclers Ed. Found.  
1133 15th Street, NW  
Washington, DC 20005 202-293-2372

Can Manufacturers Institute, Inc.  
1625 Massachusetts Avenue, NW  
Washington, DC 20036 202-232-4677

Center for Renewable Resources  
1001 Connecticut Avenue, NW  
Suite 510  
Washington, DC 20036 202-466-6880

The Council of State Governments  
Iron Works Pike  
PO Box 11910  
Lexington, KY 40578 606-231-1866

The Council for Solid Waste Solutions  
1275 K Street, NW Suite 400  
Washington, DC 202-371-5319

Environmental Defense Fund  
257 Park Avenue South  
New York, NY 10010 212-505-2100

Flexible Packaging Association  
1090 Vermont Avenue NW, Suite 500  
Washington, DC 20005 202-842-3880

Glass Packaging Institute  
1801 K Street, NW Suite 1105-L  
Washington, DC 20006 202-887-4850

Governmental Refuse Collection and  
Disposal Association  
PO Box 7219  
Silver Spring, MD 20910 1-800-456-GRCD  
301-585-2898



Non-Government: National (cont.)

Institute of Scrap Recycling Industries  
Southeast Chapter  
3340 Peachtree Road, NE  
Suite 1700  
Atlanta, GA 30326 404-262-1453

Institute of Scrap Recycling  
Industries, Inc.  
1627 K Street, NW  
Suite 700  
Washington, DC 20006 202-466-4050

National Association for  
Plastic Container Recovery  
PO Box 7784  
Charlotte, NC 28241 704-523-8543

National Oil Recycler's Association  
2600 Virginia Avenue NW, Suite 1000  
Washington, DC 20037 202-333-8800

National Recycling Coalition  
1101 30th St. NW Suite 305  
Washington, DC 20007 202-625-6406

National Soft Drink Association  
1730 Rhode Island Avenue NW  
Washington, DC 20036 202-463-6732

National Solid Wastes Mgmt. Assoc.  
1730 Rhode Island Avenue, NW  
Suite 1000  
Washington, DC 20036 202-659-4613

National Tire Dealers and  
Retreaders Association  
1250 I Street, NW  
Washington, DC 20005 202-789-2300

Paperboard Packaging Council  
1101 Vermont Avenue, NW  
Suite 411  
Washington, DC 20005 202-289-4100

Rubber Manufacturers Association  
1400 K Street, NW  
Washington, DC 20005 202-682-1338

Society of the Plastics Industry  
1275 King Street, NW  
Suite 400  
Washington, DC 20005 202-371-5200

Technical Association of Pulp and  
Paper Industries  
PO Box 105113  
Atlanta, GA 30348 404-446-1400

Textile Fibres and By-Products Association  
PO Box 11065  
Charlotte, NC 28220 704-527-5593

Tire Retread Information Bureau  
26555 Camel Rancho Boulevard  
Suite 3  
Camel, ICA 93923 408-625-3247

The US Conference of Mayors  
1620 I Street, NW  
Washington, DC 20006 202-293-7330



**APPENDIX C:**  
**RECYCLING PERIODICALS**

**BIOCYCLE** (monthly)  
Journal of Waste Recycling  
Box 351  
Emmaus, PA 18049 215-967-4135

**GARBAGE** (bi-monthly)  
PO Box 51647  
Boulder, CO 80321-1647

**PLASTICS RECYCLING UPDATE** (quarterly newsletter)  
Resource Recycling, Inc.  
PO Box 10540  
Portland, OR 97210 503-227-1319

**RECYCLING COORDINATOR**  
76 North Maple Avenue, Suite 152  
Ridgewood, NJ 07450

**RECYCLING TODAY!** (monthly)  
4012 Bridge Avenue  
Cleveland, OH 44113-3320 216-961-4130

**RESOURCE RECYCLING** (7 times/yr)  
PO Box 10540  
Portland, OR 97210 503-227-1319

**RETURNABLE TIMES** (quarterly newsletter)  
Environmental Action Foundation  
1525 New Hampshire Avenue, NW  
Washington, DC 20036 202-745-4870

**WASTE AGE** (monthly)  
1730 Rhode Island Ave. NW Suite 1000  
Washington, DC 20036 202-861-0708

**WASTE AGE** (bi-weekly)  
Recycling Times  
The Newspaper of Recycling Markets  
5615 W Cermak Road  
Cicero, IL 60650 202-861-0708

**WASTE ALTERNATIVES** (published quarterly)  
1730 Rhode Island Ave. NW Suite 1000  
Washington, DC 20006 202-861-0708

**WORLD WASTES** (monthly)  
6255 Barfield Road, Atlanta, GA 30328 404-256-4800



## APPENDIX D

### ENVIRONMENTAL BULLETIN BOARDS

Publications & Info

Message Center

Calendar of Events

Training Courses

NAME

MODEM PHONE

TECH SUPPORT

INFO

SPONSOR

			NAME	MODEM PHONE	TECH SUPPORT	INFO	SPONSOR
X	X		ENVIRONET	415-512-9108	415-512-9025	Environ. Issues Info exchange	Greenpeace Action
X	X	X	ORD Office of Research & Development	513-569-7610		Hazardous Material Research Projects	EPA Office of Research & Development
X	X	X	OSWER Office of Solid Waste & Emergency Response	301-589-8366	301-589-8368	Solid Waste	EPA Office of Waste & Emer. Response

Publications & Info  
 Message Center  
 Calendar of Events  
 Training Courses  
 NAME

MODEM PHONE

TECH SUPPORT

INFO

SPONSOR

X X X X

PIES (PPIC)  
 Pollution Prevent.  
 Clearinghouse

703-506-1025

703-821-4800  
 202-475-7161

Technology  
 Transfer

EPA Office of  
 Envir Eng &  
 Technology

X X X X

SEWE BBS  
 Southeast  
 Waste Exch.  
 Bulletin Board  
 Service

704-547-3114

704-547-4289

Waste Exch  
 Recycling  
 Info

NC Energy Div.  
 DECD

X

SWICH  
 Solid Waste  
 Info  
 Clearinghouse

301-585-0204

800-677-9424

Recycling  
 Source Red.

EPA/SWANA

# APPENDIX E : SCHOOL WASTE REDUCTION ASSESSMENT WORKSHEET

This worksheet is designed for use at one school site. If needed, make one copy for each school involved

Name of School

Number of Buildings

Address:

## Part I. Contacts

### Waste Reduction Team Members

Phone #

Principal or Main Contact:

Custodial Supervisor:

Cafeteria Manager::

Nutritional Specialist:

PTA President:

Teacher/Staff Contacts:

Student Volunteers:

County or Municipal Recycling Coordinator:

## Part II - Background Information

Total Student Population:

Total Teacher/Staff Population:

Number of classrooms:

Number of Offices:

Cafeteria, with a kitchen (Y/N)\*

Concession Stand (Y/N)

Vending Machines - How many and where are they located?

Number of restrooms:

Number of Teachers/ Staff Break-rooms:

What types of special or hazardous wastes are produced by the school? i.e. in the Art rooms, Ceramics Lab, Jewelry Making Shop, Wood Shop, Automotive Shop, Photography Lab, Vocational Labs, etc.?

List each special waste, estimated tonnage/year, and method of disposal/or reclamation

### Part III - Custodial Information

How many hours of custodial time is spent per week handling waste?

What percentage of overall custodial time does this represent?

What waste, if any, is not handled by the custodial staff?

### Part IV - Identify the different waste streams

Identify each waste stream from point of generation to placement in the dumpster.

*EXAMPLE*

*Waste Stream A-*

*cafeteria to dumpster*

*All cafeteria dry waste is placed in 4 large 44 gallon roll-out garbage cans (3 cans are in the cafeteria, by the exit doors and one can is in the kitchen), All 4 cans are rolled out and emptied into the dumpster daily by the cafeteria staff. note: wet (food) waste is rinsed down the garbage disposal*

*Waste Stream B -*

*classrooms to dumpster*

*Teachers are responsible for emptying individual cans as they become full. Usually the teacher designates a student "helper of the week" who empties the can into the dumpster every afternoon.*

Waste Stream #1



Waste Stream #2

Waste Stream #3

Waste Stream #4

(list additional waste streams on a separate sheet of paper)

### Part V - Dumpsters

How many dumpsters are located at the school?

Fill in the following information for each dumpster.

Dumpster # Location	Size	Type	Service/Wk	% Full	Cost per service
<i>Example:</i> #1 - Behind bleachers	40 yd	Top Loading Roll - Off	Once	60% full during football season	\$32.50

Hauler Information:

Contact Person Address, Phone #,

Est. Tons per year

Est. Cost per year

### **Part VI - Dumpster contents:**

**Do not dive or go into dumpster**, there may be hazards that you can't see.. Note if there is anything special or different about this week, like a big football game, finals week, open-house, or just after a vacation etc. You can do a quick look at the contents, using a large stick to stir contents around. Estimate the types of materials in the dumpster, and guess the percent of the total that they may make-up.

OR

Empty the contents of the dumpster on the ground. Separate into piles of white paper, colored paper, computer paper, cardboard, chipboard, food waste, aluminum, glass, plastic (by types), old wood waste, etc. Weigh each pile, estimate percent of volume

Record your findings here:

## Part VII - Cafeteria Information

How many meals are served daily?

Breakfast:

Lunch:

Is the food offered or served? (see the Cleveland County School System Case Study)

How are drinks served? (in paper-cartons, plastic jugs, glass, polystyrene, washable containers etc.)

Does the cafeteria use polystyrene trays? If yes, how many per day?

Are drinking straws provided?

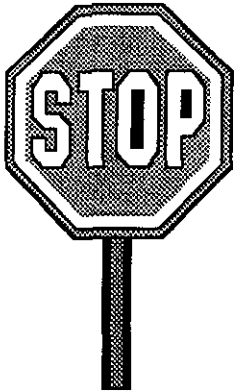
Do the children have access to the napkin holders or are they given one napkin per meal?

How are condiments including salt and pepper served?

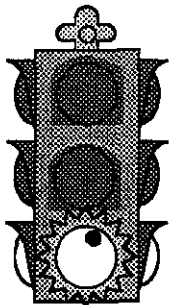
What type of silverware is used? (reusable or disposable, if disposable are "sporks" used?)

What types of packaging is the food delivered in? (example: meat comes into the cafeteria wrapped in clear plastic bags. An average of ten of these bags are used per day. All vegetables come in 60 oz. tin cans and about 8 cans are used per day, potatoes are pre-sliced and come in white plastic bags, flour comes in 25 lb. cardboard barrels, Cheese and lunch meat come in big hunks are sliced on the slicer, Bread is delivered every other day - 24 individually wrapped loaves are contained in a cardboard box. etc.)

Are any individually wrapped items served such as chips, muffins, desserts etc?



**STOP!** It's time to take a break! Relax, take a deep breath, and think about everything you've found out. Don't write anything down now-just think: Are there very obvious materials to recycle? What initial ideas come to mind for practicing source reduction, reuse, composting, and purchasing recycled products? What material is the biggest waste in the school? How will students be involved with the waste reduction efforts? Take some time and mill these ideas over. Plan a meeting with the waste reduction team to share all the information that you have gathered. Bounce ideas off of key individuals. Talk to markets, think logistics, Research prices of collection containers etc. Re-read the section on implementing a waste reduction program. What will be the major obstacles in implementating the waste reduction program?



**GO!**

### Part VIII Goals, Logistics, and Responsibilities

#### DECLARE WHAT THE SCHOOL OR SCHOOL SYSTEM IS GOING TO ACCOMPLISH!

IT IS THE GOAL OF \_\_\_\_\_ (name of school)

TO REDUCE THE AMOUNT OF WASTE DISPOSED BY \_\_\_\_\_ PERCENT

BY \_\_\_\_\_ (date)

This will be accomplished through the following activities: (You may want to write these out on a separate sheet of paper, include logistics, expenditures, revenues, and student and staff responsibilities)

Waste Reduction:

Reuse:

Recycling:

Composting:

Purchasing Recycled Products:

Education and Promotion

LEGEND

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

You may find that it is useful to make a rough drawing of the school campus, in order to most efficiently direct the flow of materials, and visualize where activities such as composting will occur. Use the following space to create a drawing; include the dumpster (s), playgrounds, fields, gardens, driveways, etc. Clearly mark items in the legend.

