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**WILSON COUNTY SOLID WASTE
REGIONAL PLAN**

MAY, 1994

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Part I
Executive Summary

EXECUTIVE SUMMARY

Description

Wilson County Solid Waste Planning Region is located in Middle Tennessee about 30 miles east of Nashville. In 1990, the total county population was 67,675 with a land area of 571 square miles which equates to a density of 118 persons per square mile. Incorporated municipalities within Wilson County include Lebanon (Pop. 15,208), Mt. Juliet (Pop. 7,579), and Watertown (Pop. 1,250).

The "Solid Waste Management Act of 1991" (the act) requires all counties to prepare a solid waste plan with the major requirements as follows:

- prepare a 10-year plan for solid waste disposal
- provide an adequate collection system to all residents
- provide a recycling drop-off center
- reduce the amount of waste disposed of by 25 percent by weight
- recommend an education system to aid in waste reduction

Wilson County's existing solid waste management system consists of the following components:

- Wilson County owned Class I sanitary landfill nearing capacity expected to close in the Summer of 1994.
- Wilson County is planning to construct a Class III/IV landfill to being operation in 1994.
- Wilson County operates 8 convenience centers throughout the county
- City of Lebanon operates house-to-house pick up of solid waste for City residents.
- The Green Hills Utility District provides house-to-house pick to residents in the northwestern portion of the county.
- Commercial, industrial and schools are picked up by private haulers.

Regional Needs

In order to meet the requirements of the act and provide a integrated solid waste management system for Wilson County, the following is a summary of regional needs:

- Convenience centers upgraded as per current guidelines with drop-off recycling for newspaper, aluminum cans, cardboard, glass.
- White goods and scrap metal collection to be expanded.
- Recycle bins at county schools for white paper and corrugated cardboard.

- Industrial waste reduction through education.
- Recycling for commercial businesses and industries.
- Construct Class III/IV landfill for yard waste & demolition waste.

Goals And Objectives

The following is a list of regional goals for Wilson County:

- To provide an integrate solid waste management system to meet the requirements of the "Solid Waste Management Act of 1991", that is cost effective for its citizens.
- To implement recycling and education programs to reduce the amount of waste disposed of.
- To dispose of waste at a Subtitle "D" landfill in order to help protect the environment.

System Elements

Waste Reduction and Recycling

Wilson County must reduce or divert 13,367 tons beginning in 1995 in order to meet the 25% waste reduction goal. In order to meet this reduction a combination of programs will be implemented including construction of a Class III/IV landfill, implementing a yard waste composting program in the City of Lebanon, provide white good and scrap metal collection for the entire county, recycling at the convenience centers, education at schools, industries, civic groups and area businesses.

Collection

This plan recommends Wilson County utilize the existing 8 convenience centers located throughout the county as shown on the baseline map in order to provide an adequate collection system for its residents. The City of Lebanon and the Green Hills Utility District will continue current collection as is.

Disposal

The current Class I landfill will reach capacity in the Summer of 1994. Wilson County has decided to contract with a private landfill for disposal as its primary option for solid waste disposal over the next ten years. Wilson County has a permit pending for a new Class I and Class III/IV landfill adjacent to the current landfill. The county will continue to pursue these permits in order to provide an alternate disposal option of Class I waste. The Class III/IV landfill will be constructed to help meet the waste reduction goal and reduce the amount of waste being transported to a Class I facility.

Problem Waste

Wilson County is required to provide a permanent collection site for household hazardous waste by January 1, 1996. Household hazardous wastes include: paint thinners, solvents, paints and varnishes, cleaners, cosmetics (nail polish remover), pesticides, fertilizers, bleach, automobile fluids, photo and hobby chemicals, swimming pool chemicals, batteries, wood preservatives, motor oil, air conditioning refrigerants, adhesives, herbicides, fungicides, etc. The benefits of HHW collection programs go beyond the collection and disposal of these potentially dangerous chemicals. The programs can include public education elements that identify HHW, outline proper ways to store the wastes, and suggest alternative products. Collection programs increase the public's awareness of HHW in the home and encourage safer use and proper disposal.

Other problem wastes include tires, used oil, and lead acid batteries. Wilson County currently has a tire storage facility at the landfill. Wilson County has made arrangements with several private businesses (TSC, Fast Lube) for collection of waste oil and lead acid batteries are accepted at the convenience centers and the landfill.

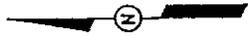
Guidelines and recommendations are provided in Chapter X. The current state mobile collection program will provide collection once a year for all counties through 1995 that request this program.

Allocation of Responsibility

The Wilson County Solid Waste Planning Board has developed this regional plan and will be responsible for implementation. Wilson County Commission will be responsible for funding all programs except for collection and disposal provided by the City of Lebanon and the Green Hills Utility District.

Implementation Schedule

<u>Activity</u>	<u>Date</u>
Solid Waste Plan Submitted	June 1994
Apply for Convenience Center Grant	Summer 1994
Solid Waste Plan Approved	September 1994
Begin White Good/Scrap Metal Collection	Summer 1994
Diversion Manager In Place	January 1995
Begin Drop-off Recycling Program (newspaper, aluminum cans, cardboard, glass)	January 1995
Class III/IV Landfill On-Line All Regulatory Bans	Summer 1995
Begin School Recycling and Education Program (white paper, cardboard)	August 1995
Begin Lebanon Curbside (if needed) (newspaper)	November 1995
All Planned Programs Associates w/ Diversion Operating at 100%	December 1995
25% Diversion Goal Met	January 1, 1996



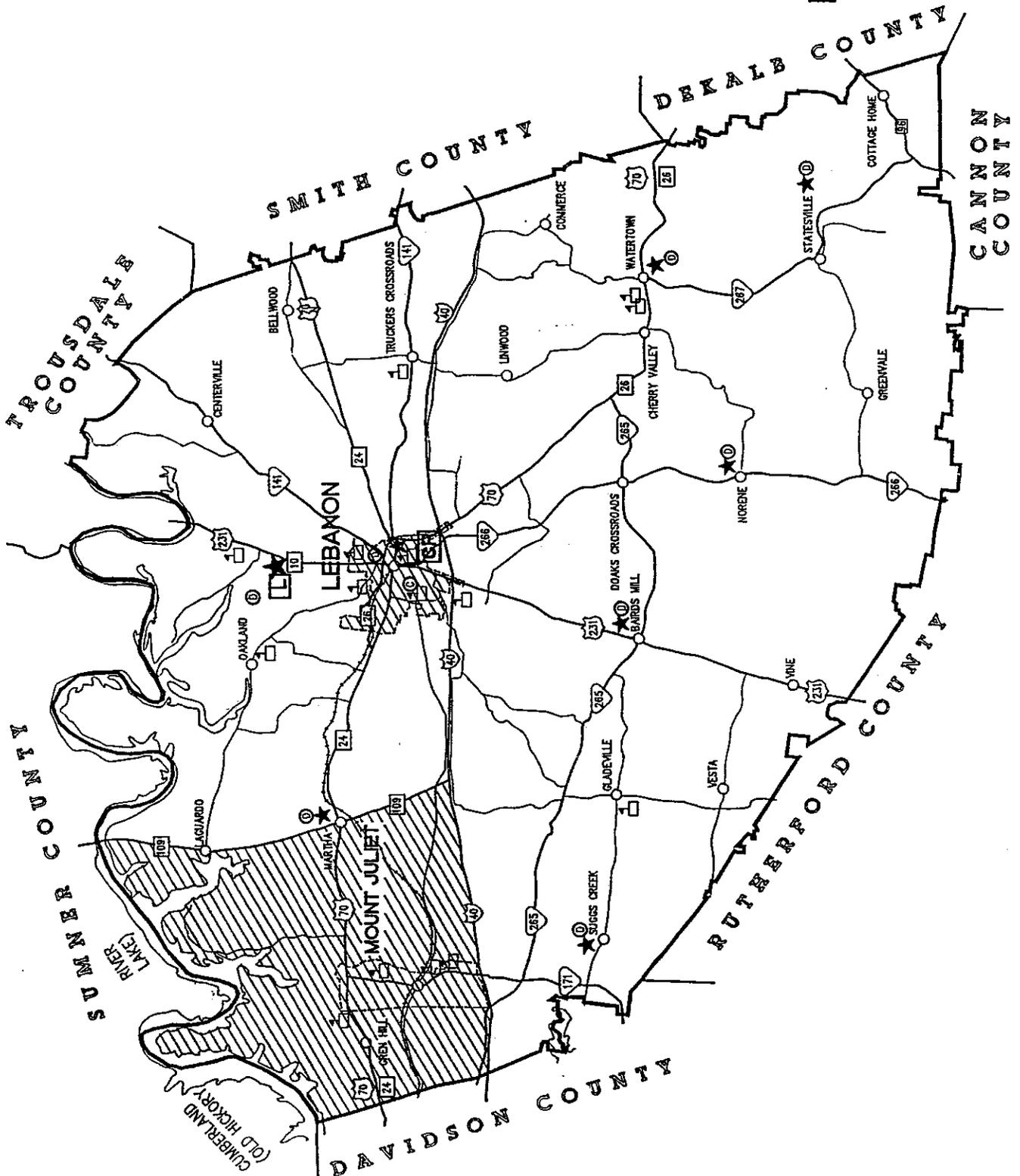
LEGEND

-  CLASS I LANDFILL
-  TRANSFER STATION
-  GREEN BOXES
-  INCINERATOR (BRUSH)
-  CONVENIENCE CENTERS
-  DROP-OFF RECYCLING CENTER
-  COMMERCIAL RECYCLERS
-  COMPOSTING FACILITY
-  HOUSE TO HOUSE PICK-UP
-  SCHOOLS (EDUCATIONAL PROGRAMS)



**RECOMMENDED SYSTEMS
MAP
WILSON COUNTY SOLID WASTE
PLANNING REGION**

Draper Aden Associates
CONSULTING ENGINEERS
Blacksburg, Va. - Richmond, Va. - Nashville, Tenn.



The following cost estimate is based on the Proposed Solid Waste Budget for FY 94-95 provided by Wilson County. 1995 - 2003 figures based on 1994 cost plus a 5% inflation rate per year.

EXPENDITURES FOR INTEGRATED SOLID WASTE MANAGEMENT SYSTEM

WILSON COUNTY

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Waste Reduction ¹	10,000	126,609	132,939	139,586	146,565	153,893	161,588	169,667	178,150	187,058
Collection & ² Transportation	509,700	535,185	561,944	590,041	619,543	650,520	683,046	717,198	753,058	790,711
Recycling ³	8,000	8,400	8,820	9,261	9,724	10,210	10,721	11,257	11,820	12,411
Disposal ⁴	859,300	775,656	814,439	855,161	897,919	942,815	989,956	1,039,454	1,091,427	1,145,998
Education	5000	5,250	5,513	5,789	6,078	6,382	6,701	7,036	7,388	7,757
Problem Waste	1500	2000	2500	15,000	15,000	20,000	20,000	25,000	25,000	30,000
TOTAL	1,393,500	1,453,100	1,526,155	1,614,838	1,694,829	1,783,820	1,872,012	1,969,612	2,066,843	2,173,935

¹ Waste Reduction includes transportation cost for recycling, and Class III/IV landfill beginning in 1995.

² Cost includes operation of the convenience centers and transportation cost to the disposal facility.

³ Cost includes administrative cost of recycling only. Cost for transport to market is included in the Waste Reduction budget.

⁴ Cost include disposal at a private landfill and operation of the current landfill. In 1995 cost for operation of a new Class III/IV landfill was included in the Waste Reduction category and operations cost at the current landfill were reduced by the same amount as the current landfill will be closing. Cost for closure of the current landfill are not included in this budget.

TOTAL OPERATING BUDGET FOR WILSON COUNTY

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Expenditures	1,393,500	1,453,100	1,526,155	1,614,838	1,694,829	1,783,820	1,872,012	1,969,612	2,066,843	2,173,935
Revenues ¹	240,000	252,000	264,600	277,830	291,722	306,308	321,623	337,704	354,589	372,318
Total Budget	1,153,500	1,201,100	1,261,555	1,337,008	1,403,107	1,477,512	1,550,389	1,631,908	1,712,254	1,801,617

¹ Revenues based on estimated tipping fees at current landfill and a 5% increase per year. No revenues for sale of recyclables assumed due to instability of market.

Part II

Regional Solid Waste Management Plan

CHAPTER I - Description of Municipal Solid Waste Region

A. General Description

Wilson County is located in Middle Tennessee about 30 miles east of Nashville. It is located in the Central Basin region with topography ranging from 445 to 845 feet above mean sea level. The majority of the watershed flows to the Cumberland River which is the northern boundary of the county. The remainder of the watershed flows to the Stones River at the southwestern corner of the county.

Wilson County is planning as a single county planning region and has three incorporated cities within the county. Lebanon is the county seat and had a population of 15,208 according to the 1990 census. The other two cities are Mount Juliet and Watertown with population of 7,579 and 1,250 respectively. In 1990, the total county population was 67,675 and the total land area is 571 square miles which equates to a density of 118 persons per square mile.

There are several major highways which cross Wilson County including Interstate 40; US highways 70, 70N and 231; State highways 96, 109, 141, 265, 266 and 267. There are many city streets and county roads for a total of 1,033 miles of roadway within the county. Rail service is available on Northeast Short Line Rail Road which travels from Nashville through Mount Juliet, Lebanon and Watertown to Cookeville.

B. Rationale for Regional Formation

The "Solid Waste Management Act of 1991" requires all counties to prepare a 10-year solid waste plan. Although the act encourages multi-county regions, Wilson County has chosen to be a single county region. The reason for planning alone as stated in the resolution in forming the region is that Wilson County originally passed a resolution to plan with four other counties but one of the other counties didn't pass the same resolution. Therefore as the deadlines draw near, Wilson County formed a single county region.

C. Institutional Structure

The Wilson County Solid Waste Planning Board consist of five members. They are:

<u>Member</u>	<u>Term Expires</u>
Mr. Byron Lasater, Chairman	Feb. 22, 1995
Mr. John Dewaal, Secretary	Feb. 22, 1995
Mr. Charles Danner	Feb. 22, 1999
Mr. Gilbert Graves	Feb. 22, 1997
Mr. W. J. "Mac" McClusky, Vice Chairman	Feb. 22, 1997

The planning board was established on December 21, 1993 by resolution passed by the county commission. Members of the board were appointed by the County Executive on March 9, 1993. Mr. John Dewaal represents the City of Lebanon with the remaining members representing the county. The planning board met monthly from July 1993 until April 1994. The planning board will meet as required to implement this plan, but at least once a year in order to make the update by March 1 of each year until 2003.

D. Demographics

The population of Wilson County according to the 1990 census was 67,675. The projected population for 1993 is 71,546 with a density of 125 persons per square mile. The county is projected to grow about 1.87 percent per year for a population of 85,813 in the year 2003.

Table I-1 through I-6 gives a summary of the demographics for Wilson County.

CHAPTER I: FORMS

REGIONAL SUMMARY: Demographics

1. Name of Region: Wilson County
2. Regional Population: 67,675
3. Regional Area 571 square miles
4. Population and Population Density

Table I-1

County	Area (Sq. Miles)	Population	Avg. Density Population/sq. miles
Wilson	571	67,675	118.5
Regional Total	571	67,675	118.5

Comments and Calculations:

5. Distribution of the Total Regional Population, by urban and rural areas:

Table I-2

County	URBAN		RURAL	
	Population	%	Population	%
Wilson	30,477	45.0	37,198	55.0
Regional Total	30,477	45.0	37,198	55.0

Comments and Calculations:

6. Distribution of the Total Regional Population by Sex and Age

Table I-3

Age	Total	Male	%	Female	%
0-4	4,865	2,527	51.9	2,338	48.1
5-17	13,674	7,184	52.5	6,490	47.5
18-44	28,922	14,110	48.8	14,812	51.2
45-64	10,605	6,870	64.8	3,735	35.2
65+	6,609	2,726	41.2	3,883	58.8
Regional Total	64,675	33,417		31,258	

Comments and Calculations:

7. Distribution of Regional Population by Education (Age \geq 25)

Table I-4

	Number	%
Less than 9th Grade	5,246	12.1
High School	21,448	49.5
College	14,705	34.0
Post Graduate/Professional	1,917	4.4
Regional Total	43,316	100.0

Comments and Calculation:

8. Total Number of Households in Region 26,670

9. Distribution by Type of Housing and Occupancy

Table I-5

	Total Units (Persons)	Occupied	Owner	Rented
Single Family	20,313	18,937	16,821	2,116
1, Detached				
1, Attached	374	316	152	164
Multi-Family	1,114	988	108	880
2				
3-4	492	387	22	365
5-9	334	258	6	252
10-19	268	213	6	207
20-49	141	120	1	119
50 or more	0	0	0	0
Institutional	565	0	0	0
Mobile Home/Trailer	3,006	2,710	2,165	545
Other	156	141	98	43
Regional Total	26,763	24,070	19,379	4,691

Comments and Calculations:

10. Regional Population Projections 1994-2003

Table I-6

Regional Population 1993: 71,546

County	Projection Year									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Wilson	72,881	74,241	75,625	77,036	78,473	79,937	81,413	82,691	84,237	85,813
Regional Total	72,881	74,241	75,625	77,036	78,473	79,937	81,413	82,691	84,237	85,813

Comments and Calculations:

E. Economic Activity

Economic activity has a direct relationship with population and waste generation. As the economy grows, so will population and waste generation. The type of economic growth does have a bearing on waste generation, for instance, a new industry would probably create more waste per capita than a new service organization. Economic growth has been steady over the past few years but is very difficult to forecast over the next ten years.

Tables I-7 through I-14 provides a summary of the economic activity.

ECONOMIC ACTIVITY

1. Basic economic information, for each county, and the region in 1991.

Table I-7

County	Population	MSA County (yes/no)	Total Employment	Total Earnings	Per Capita Income	% Population Below the Poverty Line
Wilson	68,950	yes	34,063	340,573,000	13,681	8.7
Regional Total	68,950	yes	34,063	340,573,000	13,681	8.7

Comments and Calculations:

2. Non-Agricultural Employment, by Sector, 33,368

Table I-8

% of Total Employment

County	Manufacturing	Construction	Trade	Finance	Service	Gov't	Transportation Pub. Utilities
Wilson	7,094	2,812	8,016	2,138	8,915	1,360	3,033
Regional Total	7,094	2,812	8,016	2,138	8,915	1,360	3,033
%	21.3	8.4	24.0	6.4	26.7	4.1	9.1

Comments and Calculations:

3. Total Agricultural Employment in 1991 651

Table I-9

Agricultural Employees

County	Employment
Wilson	651
Regional Total	651

4. Prepare a regional summary of major generators of commercial and non-hazardous industrial waste in 1991. Use data from Table II-2 in the County Economic Activity Profiles, in District Needs Assessment, or data collected subsequently for the regional plan. State size criteria applied in each county (i.e., all generators > 100 employees, all generators > 50 employees, etc.)

Table I-10

County	Screening Criteria* Applied	Number of Generators	Estimated Total Quantity of Waste
Wilson	> 100 Employees	75	12,400
		75	12,400

Comments and Calculations:

5. Prepare a Regional summary of institutions housing more than 100 persons.

Table I-11

Wilson County	Total Number of Institutions	Total Number of Students - Prisoners/Residents	Estimated Quantity of Waste Generated
Wilson Co. Jail	1	103 prisoners	NA
Cumberland College	1	415 students	NA
Regional Total	2	518	NA

Comments and Calculations:

6. Provide summary data on major health care facilities (larger than 50 beds), (hospitals, nursing homes) in the region.

Table I-12

Infectious Waste Management

Wilson County	No. of Facilities	No. of Beds	OnSite/Offsite	Type Treatment	Est. Quantity of Solid Waste Generated
Humana Hospital	1	159	onsite	incinerate	NA
Univ. Med. Ctr	1	125	onsite	incinerate	NA
Cedars Health Care	1	120			NA
Quality Care Health Ctr	1	170			NA
Regional Total	4	574			NA

Comments and Calculations:

7. Sources of local revenue utilized in the region. Total Tax Income (1991):

Table I-13

County	Property Tax	Local Sales Tax	Wheel Tax	Local Waste Collection Fee	User Fee/ Tipping Fee	Other*
Wilson	x	x	x		x	
Regional Total	x	x	x		x	

Comments and Calculations:

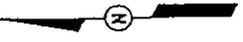
*specify

8. Provide the following data for fiscal 1993.

Table I-14

County	Total Assessed Property Value	Total Property Tax Revenue	Total Sales Subject to Sales Tax	Total Local Sales Tax Revenue	# Registered Vehicles	Total Wheel Tax Revenue
Wilson	661,424,139	20,561,218	151,046,200	2,265,693	68,736	1,428,746
Regional Total	661,424,139	20,561,218	151,046,200	2,265,693	68,736	1,428,746

Comments and Calculations:



LEGEND

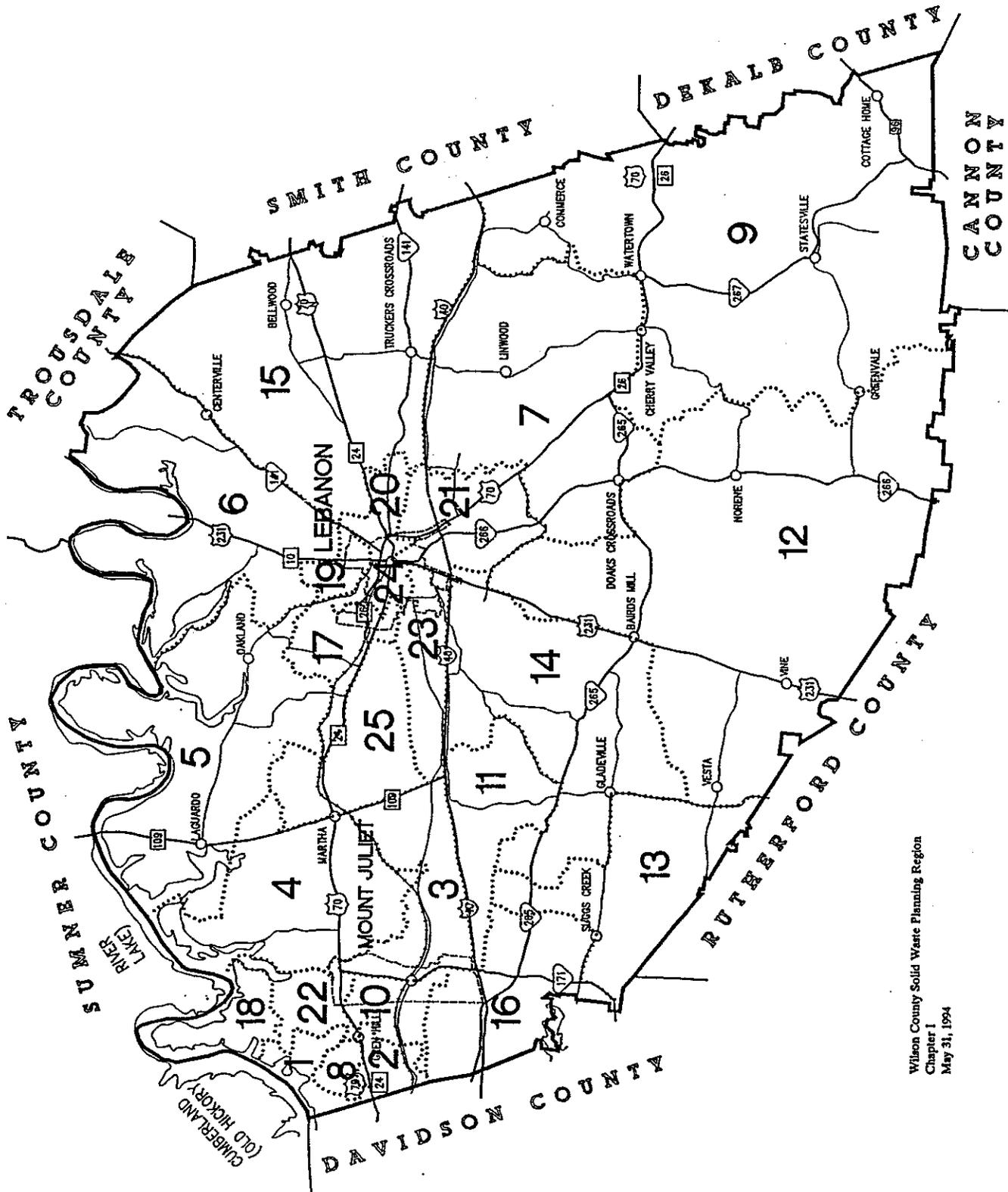
- U.S. HIGHWAY MARKER
- STATE PRIMARY MARKER
- STATE SECONDARY MARKER
- COUNTY COMMISSION DISTRICT
- CITY LIMITS
- DISTRICT BOUNDARY



GRAPHIC SCALE

**BASELINE MAP
WILSON COUNTY SOLID WASTE
PLANNING REGION**

Draper Aden Associates
CONSULTING ENGINEERS
Bristol, Va. - Richmond, Va. - Nashville, Tenn.



Wilson County Solid Waste Planning Region
Chapter 1
May 31, 1994

CHAPTER II - Analysis of the Current Solid Waste Management System for the Region

A. Waste Stream Characterization

The Needs Assessment prepared by the Greater Nashville Regional Council used the national averages for waste stream characterization as no detailed study has been performed. Based on conversations with the landfill operator, the national averages are fairly representative of Wilson County and will be used in this study.

Tables II-1 through II-5 provides a summary of the waste stream characterization.

CHAPTER II: FORMS

REGIONAL SUMMARY: Waste Stream Characterization

1. Quantity of Solid Waste Received for Disposal/Incineration in Calendar 1991

Table II-1

County	Tons Disposed	Population (1991)	Waste Disposed Per Capita
Wilson	47,700	67,675	0.70
Regional Total	47,700	67,675	0.70

Comments and Calculations:

The above data is taken from the Needs Assessment.

2. Origin of Regional Solid Waste in 1991

Table II-2

County	Residential	Institutional/ Commercial	Non-Hazardous Industrial	Special	Other
Wilson	35,300	4,300	8,100	---	---
Regional Total	35,300	4,300	8,100	---	---

Comments and Calculations:

3. Acceptance of Certain Categories of Solid Waste for Disposal or Incineration

Table II-3

County/Facility	Yard Waste (Clippings- leaves-grass)		Sewage Sludge (tons/yr)		Construction Demolition		Tires		White Goods	
	Y/N	Qty	Y/N	Qty	Y/N	Qty	Y/N	Qty	Y/N	Qty
Wilson Co. LF	y	9	n	---	y	744	y	37	y	16
Regional Total	y	9	n	---	y	744	y	37	y	16

*White Goods - discarded major appliances, such as refrigerators, ranges, etc.

Comments and Calculations:

4. Description of the Waste Stream By Materials

Table II-4

<u>Waste Category</u>	<u>National %</u>	<u>Regional Tons</u>
Paper & paperboard	40.0	19,080
Glass	7.0	3,339
Ferrous Metals	6.5	3,101
Aluminum	1.4	668
Other Non-Ferrous Metals	0.6	286
Plastics	8.0	3,816
Rubber & Leather	2.5	1,193
Textiles	2.1	1,002
Wood	3.6	1,717
Food Waste	7.4	3,530
Yard Waste	17.6	8,394
Misc. Inorganic Waste	1.5	715
Other	<u>1.7</u>	<u>810</u>
TOTAL MUNICIPAL SOLID WASTE	100.0	47,700

Comment and Calculations:

5. Unmanaged Waste*

Table II-5

County	Potential Waste Generation 1991 tpy	Actual Waste Disposed 1991 tpy	Unmanaged Waste 1991 (potential/actual) tpy	Percent of Potential Total
Wilson	75,500	47,700	27,800	37%
Regional Total	75,500	47,700	27,800	37%

* Waste that are "outside" the collection system such as materials in roadside dumps, litter, etc.

Comments and Calculations:

From Needs Assessment

REGIONAL SUMMARY: Facilities

Table II-6

6. Operating and Planned Composting Facilities in the Region

Existing:

County	Facility Location	Tons of Waste Processed/Yr	Composted Materials		
			Yard Waste	Sewage Sludge	Solid Waste
Wilson	City of Lebanon		x		

Planned: None

County	Facility Location	Tons of Waste Processed/Yr	Composted Materials		
			Yard Waste	Sewage Sludge	Solid Waste
Wilson					

7. Municipal Solid Waste Incinerators or Waste-to-Energy Facilities in the Region

Table II-7

Operating Facilities: None

County	Facility Location	Design Capacity tons/year	Current Use tons/year	Anticipated Operating Life of Facility
Wilson				

Planned Facilities: None

County	Facility Location	Design Capacity tons/year	Current Use tons/year	Anticipated Operating Life of Facility
Wilson				

8. Existing Municipal Solid Waste Landfills in the Region

Table II-8

County	Name of Landfill	Location	Permitted Capacity (years)	Current Rate of Waste Accepted (tons/day)	Remaining Capacity (tons)
Wilson	Wilson Co. lf	378 Dump Rd		50 ¹	5000
Regional Total				50	5000

Comments and Calculations:

¹ Beginning in February 1994, Wilson County began accepting only waste from the convenience centers and smaller users. The Green Hills Utility District, Wilson County Schools, and the City of Lebanon are transporting to a private landfill for disposal.

9. Existing Landfills Expected to Close Before 2003

Table II-9

County	Location	Current Use Tons/Day	Current Annual Use (Tons/Year)	Anticipated Date of Closure
Wilson		50 ¹	15,600	Fall 1994
Regional Total		50	15,600	

Comments and Calculation:

¹ As of March 1994

10. Planned Expansions and Planned New Facilities Which Will Operate for Ten Years or More

Table II-10

County	Proposed Facility	Location	When Will Capacity be Available	Permitted Capacity Sought (acre)	Design Rate of Waste (tpd) Disposed	Potential Expansion Yes/No
Wilson Co. Landfill	x	Wilson Co. Landfill	1994	74	130	yes
Planned New Regional Capacity				74	130	yes

Comments and Calculations:

The planned landfill has a permit pending but Wilson County has decided to delay construction and dispose of waste at a private landfill.

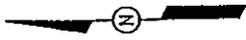
11. Total Existing and Planned Capacity in the Region at the Close of the Next Ten Years

Table II-11

TONS

Year	Existing	Planned	Total
FY 1994	10,000	370,260	380,260
FY 1995			
FY 1996			
FY 1997			
FY 1998			
FY 1999			
FY 2000			
FY 2001			
FY 2002			
FY 2003			

The existing capacity is remaining in the current landfill as of April 1994. Wilson County has decided not to open its planned facility at this time.



LEGEND

- CLASS I LANDFILL
- TRANSFER STATION
- GREEN BOXES
- INCINERATOR (BRUSH)
- CONVENIENCE CENTERS
- DROP-OFF RECYCLING CENTER
- COMMERCIAL RECYCLERS
- COMPOSTING FACILITY
- HOUSE TO HOUSE PICK-UP

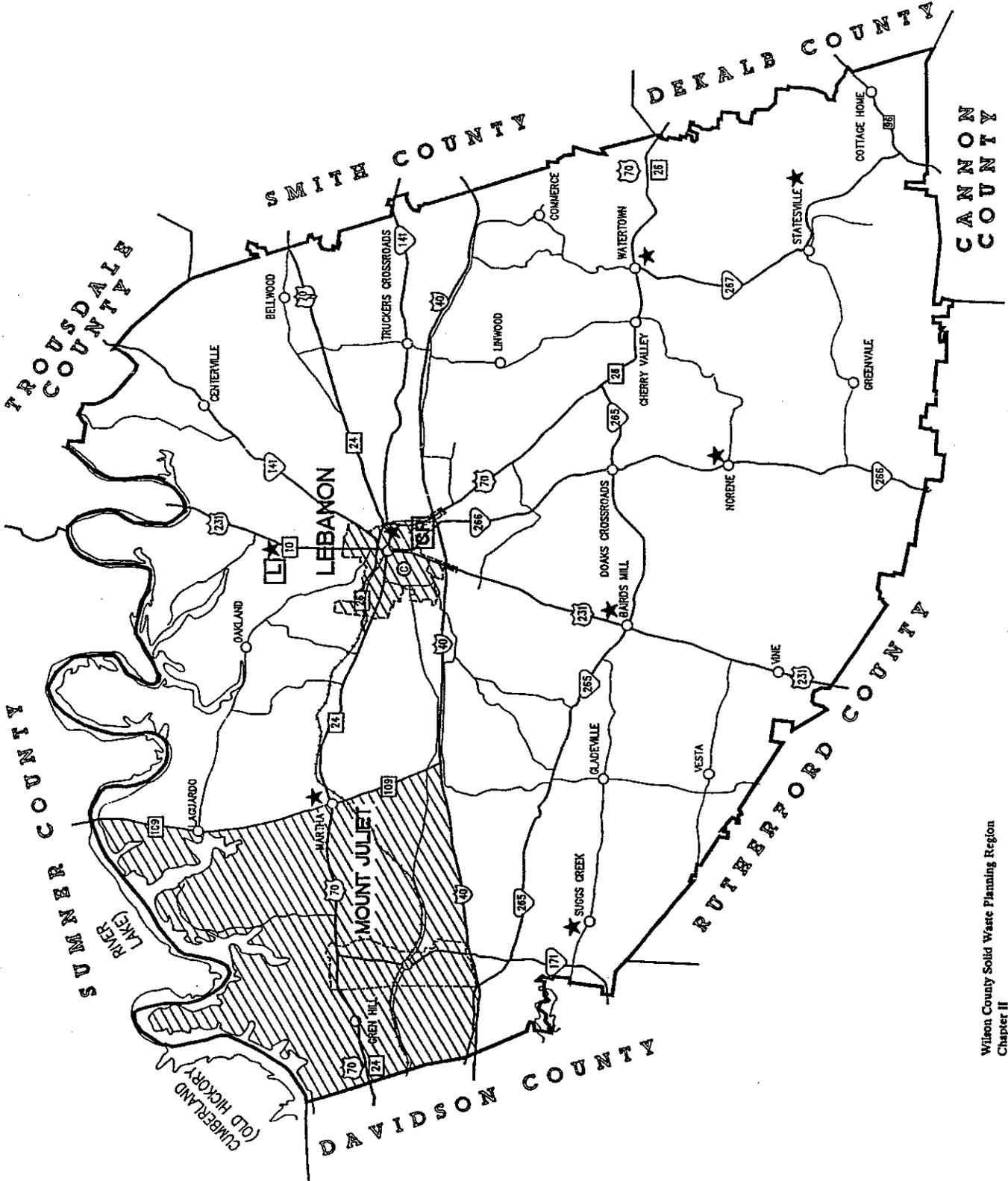


GRAPHIC SCALE

**EXISTING SYSTEMS
MAP**

**WILSON COUNTY SOLID WASTE
PLANNING REGION**

**Draper Aden Associates
CONSULTING ENGINEERS**
Roanoke, Va. - Richmond, Va. - Nashville, Tenn.



Chapter III - Growth Trends, Waste Projects and Preliminary System Structure

A. Preliminary System Structure

A preliminary system design for Wilson County was conducted in order to determine which elements of an integrated solid waste management system would be considered. Of all the options considered, preliminary recommendations were made to the Wilson County Solid Waste Board on September 23, 1993 at a regular board meeting. All options were evaluated using Wasteplan, a computer modeling program developed by TVA for use in Tennessee for developing system costs. This software combines collection, recycling, transportation and disposal and generates a single cost per ton. The preliminary recommendations reflect the most economical design for Wilson County in order to meet the requirements of "The Solid Waste Management Act of 1991."

The following is a list of all the options considered followed by the recommendations for the preliminary system design.

OPTIONS CONSIDERED

Disposal

Composting - Bedminster, Buhler, Tunnel Reactor, Agitated Bed System, Site Specific, Valorga

Waste-to-Energy/Incineration

Class I Landfill - Wilson County only, regional, private

Diversion / Reduction

Yard Waste Composting - Ecology System, Non Vendor

Class III/IV Landfill

Recycling Collection and Processing (Blue Bag, Co-mingled, Wet/Dry, Source Separated)

Collection/Transportation

Convenience Centers - Roll off Containers, Green Boxes, Transfer Station

Wilson County Solid Waste Planning Region

Technology Overview

Consultant's Recommendations Concerning Preliminary System Design

<u>Item</u>	<u>Option</u>
Disposal	Regional Landfill
Yard Waste	Small Low-End Composting Facility For Lebanon
Demolition Waste	Class III/IV Demolition Landfill For The County
Convenience Centers	Maintain Convenience Centers
Curbside Garbage P'up	Maintain as is.
Transfer Stations	Install As Needed
Recycling Drop-Off	Expand system using Convenience Centers and offer roll-offs and collection to Schools And Industries.
Recycling Curbside	Study A Program For Lebanon.
Other Recycling	Work with Industries on potential source reduction programs.

Tables III-1 through III-8 provide a summary of the adjusted waste loads.

CHAPTER III: FORMS

1. Complete the following Table, summarizing calculations of annual per capita solid waste generation rates, for each county in the region.

Table III-1

County	Total Waste Disposed in FY 1993 ¹	Projected Population 1993	Annual Per Capita Generation Tons/Persons/Year
Wilson	47,700	71,546	0.667
Total	47,700	71,546	0.667

¹Total County waste stream including scale data at the Wilson County landfill, and estimates from the Green Hills Utility District, Wilson County Schools, and commercial and industrial waste loads.

2. Summarize the projected quantity of solid waste requiring disposal (generation) in the region in each projected year, adjusted for population changes.

Table III-2*

Quantity of Solid Waste Requiring Disposal (tons)

County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Wilson	48,590	49,497	50,419	51,360	52,318	53,294	54,278	55,130	56,161	57,212
Total	48,590	49,497	50,419	51,360	52,318	53,294	54,278	55,130	56,161	57,212

* Aggregate from Tables IV-1 in District Needs Assessment County Profiles, as extended.

3. Summarize the projected quantity of solid waste requiring disposal in the region for each projection year, adjusted for population growth and economic growth.

Table III-3*

**Quantity of Solid Waste Requiring Disposal (in tons)
Adjusted for Population and Economic Growth**

County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Wilson	50,145	51,081	52,032	53,004	53,992	54,999	56,015	56,894	57,958	59,043
Total	50,145	51,081	52,032	53,004	53,992	54,999	56,015	56,894	57,958	59,043

* Aggregate from Table IV-3 in District Needs Assessment County Profiles, as extended.

4. Summarize the projected quantities of solid waste requiring disposal (=generation) for each projection year, adjusted for population growth, economic growth, and source reduction, recycling and industrial process change.

Table III-4*

**Quantity of Waste Requiring Disposal (in tons) Adjusted for Population Changes,
Economic Growth, and Waste Reduction and Recycling**

County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Wilson	48,445	37,714	38,418	39,134	39,864	40,608	41,358	42,007	42,792	43,058
Total	48,458	37,714	38,418	39,124	39,864	40,608	41,358	42,007	42,792	43,058

* Aggregate from Table IV-4 in District Needs Assessment County Profiles, as extended.

Tables III-5,6,7 were omitted as they were not applicable to this region.

6. Prepare a Summary Table indicating projected quantities of solid waste which will require collection and disposal in each projection year, after adjustment for all applicable factors.

Table III-8

**Annual Projections of Solid Waste Requiring Disposal Adjusted
for All Applicable Factors (in tons/year)**

County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Wilson	48,445	37,714	38,418	39,134	39,864	40,608	41,358	42,007	42,792	43,058
Total	48,445	37,714	38,418	39,134	39,864	40,608	41,358	42,007	42,792	43,058

Chapter IV - Waste Reduction

A. Establish a Base Year Quantity

1989 Data

The following data table is compiled of information taken from "Managing Our Waste: Solid Waste Planning in Tennessee," published February, 1990 by the University of Tennessee.

<u>County</u>	<u>Population</u>	<u>Waste(TPY)</u>	<u>Per Capita</u>
Wilson County	70,800	39,905	0.564
Regional Total	70,800	39,905	0.564

Variance Request

A variance was requested by Wilson County for an adjustment to the 1989 base year figures. The basis for this request was to update the tons per capita per year figure of 0.564 (in 1989 calculations) to 0.677, which is based on 1992 census projections and actual scale data from the Wilson County landfill. A copy of this request is included in Appendix IV.

This variance was approved as indicated by letter from the State Planning Office included in Appendix IV. This letter also mentions that the Waste Haulers Report from Wilson County reported a total of 73,904 tons of waste from Wilson County from June 1992 to July 1993. A copy of the waste flow was obtained and each haulers waste load evaluated. The discrepancy was found to be imported out-of-state waste was mistakenly assigned to Wilson County. Therefore, a reported waste load to facilities number 395, 62, 2, and 70 of 32,363 tons were not generated in Wilson County. Subtracting the 32,363 tons from 73,904 tons leaves 41,541 tons generated in Wilson County in FY 1993 reported by Waste Haulers which is realistic compared to the 47,700 tons actually generated. A copy of the waste flow report is included in Appendix IV.

B. Waste Reduction Goals

The Waste Reduction Goal is calculated by taking 75% of the per capita generation and multiplying that number by the projected population. Then subtract the generation goal from the estimated generation from Table III-8. The following represents the waste generation in tons per capita per year which is required to meet the waste reduction goal:

$$0.677 * .75 = 0.508$$

Yearly Generation Goals:

<u>Year</u>	<u>Pop.</u>	<u>Generation (TPY)</u>	<u>Year</u>	<u>Pop.</u>	<u>Generation (TPY)</u>
1995	74,241	37,714	2000	81,413	41,358
1996	75,625	38,418	2001	82,691	42,007
1997	77,036	39,134	2002	84,237	42,792
1998	78,473	39,864	2003	84,813	43,593
1999	79,937	40,608			

Yearly Waste Diversion Goals

<u>Year</u>	<u>Generation Goal (TPY)</u>	<u>Estimated Generation (TPY)</u>	<u>Required Diversion (TPY)</u>
1995	37,714	51,081	13,367
1996	38,418	52,032	13,614
1997	39,134	53,004	13,870
1998	39,864	53,992	14,128
1999	40,608	54,999	14,391
2000	41,358	56,015	14,657
2001	42,007	56,894	14,887
2002	42,792	57,958	15,166
2003	43,593	59,043	15,450

C. Methodology for Meeting Reduction Goal

Short Term Reduction Goals and Objectives:

In order to meet the 25% diversion goal, it is necessary to phase in the diversion program. An effort to implement a single large-scale program which meets the criteria in a single stroke is inordinately expensive as well as a tremendous gamble. By utilizing a phased approach, the county will be able to implement the program incrementally and judge each phase before proceeding. In the event that a phase diverts more waste than is predicted, a later phase might be deleted until diversion past 25% is desired. In the event that a phase does not meet expectations, the plan can be reviewed and additional programs added.

The recommended phases are as follows:

Phase One

1. Provide for collection of white goods and scrap metal. Collect said materials at the landfill and work with a scrap dealer for sale.
2. Provide a reduced rate for source separated Class III/IV wastes. Construct and operate a Class III/IV landfill at the existing landfill site.
3. Provide drop-off recycling collection at the convenience centers and at the landfill. Phase One collection to include newspaper and aluminum cans.
4. Provide large scale education effort for businesses and industry.

Phase Two

1. Provide recycling bins at county schools to collect white paper and corrugated cardboard.

Phase Three

1. Provide curbside collection for newspaper in the City of Lebanon if done by the City of Lebanon.

Long-Term Options

1. Expand Lebanon curbside to collect aluminum cans, metal cans, cardboard, and glass if done by the City of Lebanon.

Previous Waste Reduction Credit

Draper Aden Associates researched the region in an effort to determine significant recycling efforts which were in place between 1985 and 1989. None were found which were of sufficient significance to request this credit.

Therefore, no cause was found within the region to file for a previous waste reduction credit.

Quantities of Materials Diverted Per Year

1994 (projected)	1,500 tons
1995 (projected)	13,367 tons
1996 (projected)	13,614 tons
1997 (projected)	13,870 tons
1998 (projected)	14,128 tons
1999 (projected)	14,391 tons
2000 (projected)	14,657 tons
2001 (projected)	14,887 tons
2002 (projected)	15,166 tons
2003 (projected)	15,958 tons

Regulatory Bans

In the event that the region has sufficient control of the disposal site to enforce such bans, the following items will be banned from acceptance at any Class I landfill facility:

- Yard Waste
- Wood Waste
- Construction/Demolition Debris
- Sewage Sludge (unless dewatered sufficiently to pass the Paint Filter Test)
- All Liquid Wastes (defined by the Paint Filter Test)

Economic Incentives and Disincentives

Variable rates are proposed such that the following items can be disposed of at the County Solid Waste Facility at reduced rates:

- Wood Waste
- Construction/Demolition Debris
- White Goods
- Scrap Metal

No economic disincentives are proposed due to the negative impacts such programs have on roadside littering and illegal dumping.

Other Waste Reduction Strategies

Commercial/Industrial Source Reduction:

Goal 1 -- Increase Source Reduction and Program Involvement Through Education -- Education in Area Industries

The primary purpose of this program is to get industries working with one another to identify problem wastes and potential solutions within the region. The stories are getting less rare of situations where one industry was throwing away large quantities of a material which a nearby industry purchases as a raw material.

The offices associated with industry would be handled under the office program.

Target Groups and Audiences:

The target group for this program is those industries identified in this report as being major waste generators.

Amount and Kind of Information and Specific Methods to be Utilized:

The region should perform an inventory of the manufacturers in the region which includes the raw materials and waste products associated with their process. All other materials which are disposed of in bulk should be cataloged. This listing should then be made available to the industries in the region. Regular meetings between area industries should be sponsored by the Solid Waste Region in order to motivate communication among the industries.

Method For Evaluation and Reporting of Program

Area industries should be contacted on an annual basis and questioned concerning recycling programs and any programs which have been worked out in coordination with other area industries. Multi-industry programs should be charted for progress. In the event that one of these programs is canceled, the region representative should meet personally with the industries involved to determine if the arrangement can be continued.

**Goal 2 -- Increase Source Reduction and Program Involvement Through Education --
Education in the Area Offices and Stores**

Target Groups and Audiences:

The primary target for this program are those establishments which generate large amounts of paper. This includes governments offices, insurance offices, legal firms, professional firms, etc.

Amount and Kind of Information and Specific Methods to be Utilized:

This program must be very simple and not time consuming. The primary purpose of the program is to overcome the fallacy that paper recycling is difficult. As such, an brochure must be simple and preferably on a single page. The brochure should include an offer for a region representative to come to the office and assist them in setting up the recycling collection program.

Some simple points which should be added to the educational package are:

1. Always have a paper recycling box at the copy machine.
2. Another good location for a paper collection box is at the coffee machine.
3. A system which does not work well is the use of desk-top "in" boxes for recycling. Such a box on someone's desk is usually being used for something else within a week.
4. Individual boxes next to each employee's desk work only when someone in the office is designated to take the recyclables to a central point on at least a weekly basis.

Method For Evaluation and Reporting of Program

The region must keep records of all offices which have requested assistance in setting up in-office recycling programs. In addition, each of these offices should be contacted on an annual basis to determine if they have continued their recycling efforts. In the event that an office has discontinued, the region should make a personal call on the business to determine if there is any way to reinstate the program.

Area Industries

Apache Grounding
Bradley Candy Company
Briskin Manufacturing Co.
Century Steps, Inc.
Custom Packaging, Inc.
Dillon Cabinet & Millwork
Elastomeric Molders, Inc.
Ely Walker Company
Fortune Plastics of TN, Inc.
Georgia Pacific Corp.
Gibson Broach & Tool Co.
Globe Business Furniture
Hartmann Luggage Co.
Horizon Concrete/Block/Brick
J & M Machine Co., Inc.
K & M Cabinet Co.
K & S Marble Company
Lebanon Aluminum Products
Lebanon Rack Co.
Lebanon Steel Fabricators
Lebanon Wire Products
Lojac, Inc.
Lojac Safety, Inc.
Lojac Materials
Mastercraft Tool Co.
Ontario Die of Tennessee
Metokote Co.
Nashville Refrigeration
Nutro Products
Middle Tennessee Sawmill
Penske Plastics
Perma-Pipe Div. of Midwesco
Rock-Tenn Co.
Savik Construction
Steed Bros. General Cont.
Steves & Son
TRW Ross Gear Div.
Tennessee Woolen Mills
Texas Boot Co.
Textile Sales
Toshiba America, Inc.

Universal Rack Co.
Vulcan Materials Co.
Waco Truck Bodies
West End Tool Shop, Inc.
Wilson County Concrete Co.
Wynn's Precision
Wynn's Precision Tool
TCT Stainless Steel
Bay's Southern Breads
Better Letter Printing
Coca-Cola Bottling Co.
CoffeeConnexion
Creative Graphics
Designer Printing
Emerald Supply, Co.
Lebanon Chemical Co.
Lebanon Democrat
Lebanon Locker Co.
Kenneth O. Lester Co.
Multi-Industrial Supply Co.
Purity Dairies, Inc.
Shenadoah Mills, Inc.
Tucker Sausage & Ham
Wilson Co. Farmer's Co-Op
Wilson World, Inc.
Wright Printing
Alpine Fiberglass, Inc.
Aviall Battery Shop
BSC
Campbell-Hausfeld Paint
Cornell Ironworks
Diamond Plastics, Inc.
Durameter, Inc.
Gillian Machine Co.
International Machinery Corp.
John Deal, Inc.
Mt. Juliet Rock Products
Mar-Tech
Old Time Log Homes
S & S Industry
Southern Engraving & Sign, Inc.

Area Industries (continued)

Tennessee Adhesives
W. R. Newman & Associates
West Wilson Co. Concrete
World Testing, Inc.
Hydro Design Service

D & D Manufacturing
Fastomatic, Inc.
Specialty Converting Services
Technical Plating & Rubber

Staffing Requirements Narrative

It is recommended that the county employ one additional staff person working within the solid waste department to coordinate diversion, recycling, and education. This person will be described from here on as the Diversion Manager.

10-Year Implementation Schedule

Fall 1994	Begin Construction of Class III/IV
Summer 1994	Begin White Goods/Scrap Metal Collection
October 1994	Hire Diversion Manager
January 1995	Begin Drop-off Recycling Program
Summer 1995	Demolition Landfill On-Line All Regulatory Bans in-place.
August 1995	Begin School Recycling Program
November 1995	Begin Lebanon Curbside Recycling
December 1995	All Planned Programs Associated With Diversion Operating at 100%.
January 1, 1996	25% Diversion Goal Met.

Allocation of Responsibility

Wilson County will be responsible for all aspects of the program with the exception of the Lebanon Composting Program.

The county will need to negotiate with the city on responsibility concerning the curbside pick-up of newspaper within the city limits. This program serves only the city due to the cost-efficiencies associated with collection in the more densely populated environment.

Data Collection System Narrative

As stated above, the Diversion Manager is responsible for all data collection and report preparation.

All recyclable and compost materials will be run across the scales at the landfill and a record will be kept of all materials, tonnages, markets, and dates. These files will be utilized in the preparation of the quarterly reports to the State of Tennessee Department of Environment and Conservation, Division of Solid Waste Assistance.

D. Synopsis of Plan

Calculations for the summary provided in the following tables are included in the appendix at the end of this chapter.

RECYCLING GOAL

Year	White Goods Scrap Metal	Drop-off Recycling	School Recycling	Lebanon Newspaper	TOTAL (tons)
1995	1441	1083	223	474	3,221
1996	1468	1103	227	483	3,281
1997	1495	1124	231	492	3,342
1998	1523	1145	236	501	3,405
1999	1552	1166	240	510	3,468
2000	1580	1188	245	520	3,533
2001	1605	1206	248	528	3,587
2002	1635	1229	253	534	3,651
2003	1666	1252	258	547	3,723

WASTE REDUCTION GOAL

Year	Composting	Recycling	Class III/IV Landfill	Industrial Source Reduction	TOTAL (tons)
1995	497	3221	3329	6320	13,367
1996	506	3281	3391	6436	13,614
1997	516	3342	3454	6558	13,870
1998	525	3405	3519	6679	14,128
1999	535	3468	3584	6804	14,391
2000	545	3533	3651	6928	14,657
2001	554	3587	3708	7038	14,887
2002	564	3651	3777	7174	15,166
2003	574	3723	3848	7305	15,450

E. Ten Year Budget for Waste Reduction

The following table provides estimated annual cost of waste reduction including transportation cost for recycling and a Class III/IV landfill beginning in 1995. A cost estimate for the Class III/IV landfill and transportation of recycling are included in the appendix.

TEN YEAR BUDGET FOR WASTE REDUCTION

WILSON COUNTY

Year	Recycling *	Class III/IV Landfill	TOTAL
1994	0	0	0
1995	20,034	106,575	126,609
1996	21,036	110,460	131,496
1997	22,088	114,539	136,627
1998	23,192	118,822	142,014
1999	24,352	123,319	147,671
2000	25,570	128,041	153,611
2001	26,849	141,084	167,933
2002	28,191	146,290	174,481
2003	29,601	151,757	181,358

* Includes Industrial Source Reduction staff person.

Appendix IV



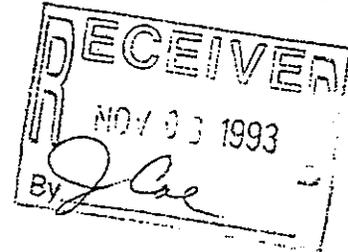
TENNESSEE STATE PLANNING OFFICE
307 JOHN SEVIER STATE OFFICE BUILDING
500 CHARLOTTE AVENUE
NASHVILLE, TENNESSEE 37243-0001
(615) 741-1676

NED McWHERTER
Governor

CAROL WHITE
Director

October 27, 1993

Mr. Jim Coe
Executive Director
Wilson County Regional Solid Waste Authority
P.O. Box 1417
Lebanon, TN 37088



Dear Mr. Coe:

I want to acknowledge and respond to your recent letter requesting an adjustment in Wilson County's base year waste generation data.

As you know, a region may request an adjustment if it can demonstrate that the 1989 data is clearly in error. I understand that the Wilson County Regional Solid Waste Authority wishes to substitute the quantity of waste delivered to the county landfill in calendar 1992 (47,546 tons), as documented by the landfill scales, for the earlier 1989 estimate (39,905 tons) as reported by the UT survey.

The request is approved. When divided by the 1992 population projections as reported in the District Needs Assessment, the per capita waste generation is 0.677 tons/person/year.

This quantity may be low, because of exports to other regions. Your planning board should be aware that Wilson County waste transporters reported that they collected a total of 73,904 tons of waste in Wilson County last year. According to their reports, about 28,000 tons were disposed at the county landfill, and about 46,000 tons (or 62% of what they collected) were shipped out of the region to landfills in 7 counties.

If these reports are accurate, and some of this waste should be disposed in Wilson County in future, the board may wish to consider these waste exports as they prepare a 10-year plan. They will need to identify them in any case. Copies of the transporters' reports may be requested from the Division of Solid Waste Management, in the Department of Environment and Conservation.

I hope that your planning work is going well. Please let me know if there is anything our office can do to help.

Sincerely,

Carol White

CCW/RHN/jmp

cc: Phil Armor
Tom Tiesler

Wilson County Regional Solid Waste Authority

Phone
(615) 443-1977

Fax
(615) 443-1979

June 4, 1993

Ms. Carol White, Director
Tennessee State Planning Office
Room G12, State Capitol Bldg.
Nashville, TN 37243

Dear Ms. White:

This is to request approval of an adjustment to the 1989 data used to measure waste reduction.

The 1991 University of Tennessee study uses a 1989 population estimate of 70,800 for Wilson County. The actual 1990 census of Wilson County was 67,675 and the projected 1992 census is 70,236.

Using the 1992 census projection and actual scales information from the Wilson County Landfill (see attachment 1), the per capita waste generation for 1992 is 0.667 tons per capita per year.

I have used 1992 as a base year because that is the first full year for which actual weight data (from scales) is available for Wilson County.

If the 1989 U.T. data is used, the assumed per capita waste generation would be 0.564 tons per year. This is obviously an artificially low figure and should be adjusted in order to provide Wilson County with a more realistic base figure to use in calculating the twenty-five percent (25%) reduction goal.

Your careful and prompt consideration of this request will be appreciated.

Please call me if you need further information or clarification.

Sincerely,

Jim Coe
Executive Director

Encl.

JFC:cmf

Recycled Paper
Of Course!



**Waste Received at Wilson County Landfill
January 1 - December 31, 1992**

(tons)

January	3797	July	4344
February	3418	August	4242
March	4114	September	3963
April	4060	October	3938
May	3765	November	3584
June	4350	December	3971
		TOTAL	47,546 TONS

DEPARTMENT OF ENVIRONMENT AND CONSERVATION
 TENNESSEE NON-HAZARDOUS WASTE FLOW REPORT

COUNTY OF GENERATION	NUMBER OF FACILITIES	HAULER ID#	AMOUNT OF WASTE (TONS)	TYPE OF WASTE	COUNTY OF DISPOSAL	RECEIVING FACILITY ID#
Williamson	800	HLR-94-000-1436	884.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	1	HLR-94-000-1438	2,464.00	OTHER	Williamson	SNL 94-102-0057
Williamson	800	HLR-94-000-1439	2,496.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	7000	HLR-94-000-1440	15,615.36	HOUSE	Williamson	SWP 94-102-0109
Williamson	250	HLR-94-000-1440	650.64	OTHER	Williamson	SWP 94-102-0109
Williamson	900	HLR-94-000-1441	962.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	900	HLR-94-000-1442	780.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	291	HLR-94-000-1443	312.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	486	HLR-94-000-1444	432.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	1600	HLR-94-000-1446	240.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	1	HLR-94-000-1453	3.50	OTHER	Williamson	SNL 94-102-0057
Williamson	9	HLR-94-000-1458	9,000.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	1	HLR-94-000-1667	419.00	OTHER	Williamson	SNL 94-102-0057
Williamson	700	HLR-94-000-1810	3,000.00	HOUSE	Williamson	SNL 94-102-0057
Williamson	1	HLR-94-000-1877	562.50	OTHER	Williamson	SNL 94-102-0057
Williamson	100	HLR-11-000-1994	90.00	OTHER	Williamson	SNL 94-102-0057
Wilson	400	HLR-19-000-1340	1,304.00	OTHER	Wilson	SNL 95-102-0145
Wilson	3800	HLR-19-000-1340	4,484.00	HOUSE	Wilson	SNL 95-102-0145
Wilson	12	HLR-89-000-1394	120.00	OTHER	Wilson	SNL 95-102-0145
Wilson	29	HLR-79-000-1795	60.00	OTHER	Wilson	SNL 95-102-0145
Wilson	7	HLR-95-000-1986	15,200.00	HOUSE	Wilson	SNL 95-102-1145
Wilson	200	HLR-95-000-1986	6,400.00	OTHER	Wilson	SNL 95-102-1145
Wilson	3400	HLR-95-000-1988	1,682.00	HOUSE	Wilson	SNL 95-102-1145
Wilson	4	HLR-95-000-2028	1,800.00	OTHER	Wilson	SNL 95-102-1145
Wilson	1	HLR-95-000-2031	800.00	OTHER	Wilson	SNL 95-102-0145
Wilson	1	HLR-95-000-2032	500.00	OTHER	Wilson	SNL 95-102-0145
Wilson	575	HLR-24-000-0267	468.00	HOUSE	Shelby	SNL 79-106-0135
Wilson	25	HLR-24-000-0267	84.00	OTHER	Shelby	SNL 79-106-0135
Wilson	1	HLR-54-000-0840	112.61	OTHER	McMinn	SNL 54-103-0174
Wilson	1	HLR-99-000-0843	1,544.73	OTHER	McMinn	SNL 54-103-0174
Wilson	1	HLR-54-000-0845	1,544.73	OTHER	McMinn	SNL 54-103-0174
Wilson	0	HLR-66-000-0935	6,963.00	HOUSE	Obion	SNL 66-101-0143
Wilson	2	HLR-79-000-1360	186.22	OTHER	Shelby	SNL 79-106-0135
Wilson	1	HLR-90-000-1530	58.53	OTHER	Shelby	SNL 79-106-0135
Wilson	14	HLR-79-000-1795	653.00	OTHER	Shelby	SNL 79-106-0135
Wilson	395	HLR-79-000-1795	24,215.00	OTHER	Shelby	SNL 79-106-0135
Wilson	62	HLR-79-000-1795	3,797.00	OTHER	Shelby	SNL 79-106-0135
Wilson	2	HLR-79-000-1795	52.00	OTHER	Shelby	SNL 79-106-0135
Wilson	70	HLR-79-000-1795	4,299.00	OTHER	Shelby	SNL 79-106-0135
Wilson	225	HLR-52-000-1852	460.80	HOUSE	Lincoln	SNL 52-102-0169
Wilson	60	HLR-52-000-1852	153.60	OTHER	Lincoln	SNL 52-102-0169
Wilson	1	HLR-33-000-1884	8.08	OTHER	Hamilton	SWP 33-105-1059

OUT-OF-STATE WASTE

Grundy
 Shelby
 Shelby
 Shelby
 Shelby
 Lincoln
 Lincoln
 Hamilton

SNL 31-104-0185
 SNL 79-106-0135
 SNL 79-106-0135
 SNL 79-106-0135
 SNL 79-106-0135
 SNL 52-102-0169
 SNL 52-102-0169
 SWP 33-105-1059

CALCULATIONS FOR WASTE REDUCTION WILSON COUNTY
Based On 1995 Waste Generation of 51,081 Tons

Yard Waste Composting Program (Within City of Lebanon)

City of Lebanon population 16,684 (1995 Est.)

Per capita waste generation 0.677

Waste stream generation 16,684 (.677) = 11,295 tons

Use 17.6% yard waste - 1,988 tons

Use a 25% diversion rate

1988 (.25) = 497 tons

White Goods & Scrap Metal

Tons available (from Wilson County waste stream characterization)

Assume 60% capture rate

White goods 2% (51,081) = 1,022 (.6) = 613

Scrap metal 2.7% (51,081) = 1,379 (.6) = 828

1,441 tons

Drop-Off Recycling

From waste stream analysis = 1,083 tons

Class III/IV Landfill

Tons available (from waste stream analysis)

Yard waste 8,990 - 497 (compost) = 8,493

Wood waste 1,839

Misc. inorganic 766

Use 30% capture rate 11,098 tons

11,098 (.3) = 3,329 tons

School Recycling

Number of students 15,000 (1995 Est.)

From national average (verified in some Tennessee counties) .08 tons/yr/student waste generation

20% white paper & 11% cardboard

15,000 (.08) = 1,200 tons

White paper 1,200 (.2) = 240 tons

Cardboard 1200 (.11) = 132 tons

Use 60% capture rate

White paper 240 (.6) = 144

Cardboard 132 (.6) = 79

223 tons

Lebanon Newspaper Curbside (If Needed)

Lebanon waste generation - 11,295 tons

Newspaper 7% (from waste stream analysis)

Use 60% capture rate

11,295 (.07) = 790 tons (.6) =

474 tons

Industrial Source Reduction

1995 Goal

6,320 tons

TOTAL

13,367 tons

COST ESTIMATE FOR CLASS III/IV LANDFILL

WILSON COUNTY

Estimated 1995 Tonnages Diverted Through Class III/IV Landfilling

County	Total Eligible Tonnage	Participation/Capture Rate	Estimated Tonnage Diverted
Wilson	11,098	30	3329

Estimate Annual Costs For Facility:

Capital Costs of Operating the Wilson County Class III/IV Landfill

Assume 1995 cost of heavy equipment at \$125,000

Assume Replacement Cost of Same Equipment in 2000 at \$160,000 (5% Inflation)

Item	Capital Cost	Annualized Cost ²
Land, Construction	0 ¹	
Full-Time Equipment 1995-2000	125,000	28,875
Full-Time Equipment 2001-2006	160,000	36,960

¹ Wilson County has a permit pending for a Class III/IV landfill to be placed at existing sanitary landfill.

² Capital cost amortized over 5 years at 5% interest.

Estimated Operations and Maintenance Costs (1995)

Item	Unit Cost	Quantity	Total
Operator/ Attendant	27,000	1	27,000
Maintenance	20,000	1	20,000
Fuel	20,000	1	20,000
Groundwater Monitoring	7,500	1	7,500
Total			77,700

Estimated Annual Costs Wilson County Demolition Landfill

Year	Annualized Capital	O & M *	Total
1994	0	0	0
1995	28,875	77,700	106,575
1996	28,875	81,585	110,460
1997	28,875	85,664	114,539
1998	28,875	89,947	118,822
1999	28,875	94,444	123,319
2000	28,875	99,166	128,041
2001	36,960	104,124	141,084
2002	36,960	109,330	146,290
2003	36,960	114,797	151,757

* 5% inflation added to the O&M cost each year.

ANNUAL TRANSPORTATION COST FOR RECYCLING

WILSON COUNTY

Drop-Off Collection Locations:

As stated earlier, drop-off collection stations will be located throughout the region at all convenience center locations. These sites are shown on the base map included within this report. The following is a listing of the number of sites in Wilson County:

Drop-Off Collection Centers

County	Number of Locations	Households Served Per Location (Approximate)
Wilson	8	2200

Drop-Off Recycling Estimated Costs:

The following costs are estimated based upon hauling the recyclables directly from the drop-off collection point using roll-off trucks to Markets.

Transportation costs are therefore derived through the number of "pulls" per year. A "pull" is defined as the hauling of a roll-off container to the destination and the return of that or another container to the same site. From experience in the Cheatham County recycling program, over a year each pull will average about 3.41 tons. A pull will be necessary whether or not the material is contaminated. Therefore the number of pulls is based upon the total maximum estimated tonnage of recyclables. The following is the number of pulls per county per year:

Number of "Pulls" Per Year

County	Tonnage Hauled	Number of Pulls
Wilson	1083	318

Transportation costs are based upon *Solid Waste: Transportation and Other Costs*, published by the University of Tennessee County Technical Assistance Service. From this publication, it was determined that the costs associated with operating a roll-off truck including labor costs, contract services, supplies and materials, and amortized capital costs is about \$1.80 per mile.

Transportation Costs to Market

County	Number of Pulls/Year	Miles/Pull	Total Miles	Transportation Cost(\$)
Wilson	318	35	11,130	20,034

Chapter V - Waste Collection and Transportation

A. Comparison of Existing System to Requirements

The "Solid Waste Management Act of 1991" requires counties to provide an adequate collection to all residents within the county. An adequate collection system can be convenience centers or house to house pickup. The minimum number of convenience centers required by the act is based on the following criteria:

- one center per 12,000 people excluding cities with house to house pickup, or
- one center per 180 square miles of land area excluding cities with house to house pickup, government owned land and forestry reserves held by a wood processing industry.

Table V-1

COUNTY	AREA SQ. MI.	CENTERS REQ'D.	2003 POP.	CENTERS REQ'D.	MINIMUM REQ'D.	EXISTING CENTERS
Wilson	571	3	85,813	7	3	8

Based on the above criteria, Wilson County is required to provide three convenience centers at a minimum. Wilson County has eight convenience centers currently in place which exceeds the minimum requirement indicated in Table V-1.

Wilson County's current collection systems are as follows:

- House to house pick up provided by the City of Lebanon within the city limits.
- House to house pick up available in the Northwestern portion of the County provided by Green Hills Utility District. Boundaries are shown on the baseline map.
- The County operates eight convenience centers that are fenced and manned during hours of operation. Hours of operation for the convenience centers are:
 - Monday - Thursday, 7 AM - 5 PM
 - Friday - Sunday, 7 AM - 6 PM (Open till 7 PM in summer)

The following is an inventory of components for each convenience center:

	<u>Center</u>	<u>Inventory</u>
1.	Bairds Mill	Compactor, 3 open top containers
2.	Lebanon	Compactor, 3 open top containers
3.	Martha	Compactor, 3 open top containers
4.	Norene	3 open top containers
5.	Statesville	3 open top containers
6.	Suggs Creek	Compactor, 3 open top containers
7.	Watertown	3 open top containers
8.	Landfill	2 open top containers

B. Regional Needs

Wilson County will need to upgrade its convenience centers to meet the criteria as per the current requirements of the Division of Solid Waste Management. A convenience center is defined as an area which is staffed and fenced that has waste receptacles on site that are open to the public, when an attendant is present, to receive household waste, municipal solid waste and recyclable material. Waste receptacles can be green boxes or a compactor accompanied with a roll off container. The operator will inspect each load to make sure that no hazardous waste or problem waste (tires, Lead acid batteries, used oil, paint, etc.) is disposed of along with the regular waste. Provisions will be made to accept these items at the convenience center or at a designated place. Convenience centers must have a shelter for inclement weather and to store necessary records, water for wash down, sanitary facilities, and communication maintained during operating hours to notify authorities in an emergency. Storm runoff must be controlled to a single point enabling the center to contain runoff if a problem occurs. Process water must be contained and disposed of in a sanitary sewer system or a septic system.

C. Meeting Identified Needs

As indicated above, Wilson County meets all requirements for solid waste collection. Some training of current convenience center operators will be required in order to monitor waste and only accept municipal waste. As indicated above tires, lead acid batteries, waste oil, paint and household hazardous waste cannot be accepted at convenience centers. Convenience center operators should also be familiar with the current regulations as per the Division of Solid Waste Management.

D. Ten Year Staffing And Training Needs

Additional staff should not be required as convenience centers are currently staffed full time. Some training will be required to educate operators on requirements of the Solid Waste Management Act.

E. Ten Year Budget - Collection and Transportation

TEN YEAR BUDGET FOR COLLECTION AND TRANSPORTATION *

1994	\$509,700
1995	\$535,185
1996	\$561,944
1997	\$590,041
1998	\$619,543
1999	\$650,520
2000	\$683,046
2001	\$717,198
2002	\$753,058
2003	\$790,711

* Cost for 1994 based on the proposed Solid Waste Budget for FY 94-95 provided by Wilson County. 1995 - 2003 figures include a 5% inflation factor per year.

Chapter VI - Recycling

A. Regional Goals and Objectives

The primary goal of the recycling program is to augment the waste diversion program. Therefore many of the goals and objectives are shared between recycling and waste diversion. In order for the waste diversion program to be able to meet the goals as outlined in Chapter IV, the following recycling goals will have to be met:

<u>Year</u>	<u>Recycling Goal (tons)</u>
1995	3221
1996	3281
1997	3342
1998	3405
1999	3468
2000	3532
2001	3588
2002	3655
2003	3723

The above numbers do not include yard waste composting or demolition landfilling under the heading recycling. The above numbers must be met through the collection and successful marketing of the following materials: white paper, newspaper, glass containers, ferrous containers, aluminum containers, and cardboard. These numbers represent a program which is much more comprehensive than the existing programs within the region.

The following goals and objectives are given as a means to accomplishing this increase (for clarity, the definition of a goal is a basic target of the program and the objectives are the steps toward the goal):

Goal 1: Make Recycling Easily Available to All Residences in the Region

Objective a: Provide facilities where drop-off customers can bring their source separated recyclables. This is to be accomplished utilizing the convenience center network within the region.

Objective b: Provide a system for residents within the urban areas of the county. This is to be accomplished at convenience centers outside of Lebanon and the curbside newspaper collection in Lebanon.

Goal 2: Make Recycling Available to Business Customers

Objective a: Adapt the collection and processing system to allow business participation.

Goal 3: Make Recycling Available for Industrial Customers

Objective a: Adapt a recyclable collection program to any industry which generates more than 100 tons of recyclables per year.

Objective b: Provide a Roll-Off or Dumpster service for cardboard at the above industries.

Objective c: Set up a program to research industrial waste products within the region for potential markets

B. Expansion of Recycling Collection to Unserved Areas

The convenience centers are being planned to serve the entire county. By utilizing these facilities, service should be provided to all citizens.

Description of Planned Programs and Location of Proposed Facilities

Drop-off Collections:

Drop off collections will be maintained at the proposed convenience centers and at the landfill. These will consist of compartmentalized roll-off containers and roll-off trucks (or optionally 8 CY dumpsters and front loading trucks). Scrap metal and white goods collection will be at the landfill in bins as requested by the end market. A curbside collection program is proposed for Lebanon.

Cooperative Marketing Plan

All recyclable materials will be processed and marketed through the Diversion Manager (See Chapter IV). Marketing will be coordinated by the Diversion Manager. It is the responsibility of the Diversion Manager to work with surrounding counties for cooperative marketing.

Interaction with the Tennessee Office of Cooperative Marketing

The Diversion Manager will be responsible for coordinating with the Tennessee Office of Cooperative Marketing (TOCM). The following information will be provided to the TOCM on at least a quarterly basis:

1. Tonnage and Type of Materials Recycled and Marketed
2. Tonnage and Type of Materials Backlogged On Site
3. Age and Type of Materials Backlogged On Site
4. New and Available Markets in the Region
5. Prices Obtained for Recycled Materials
6. Potential Materials Being Planned for Collection/Separation

Actions to Expand/Create Markets

In this plan, this program falls under the purview of the Diversion Manager. The goals and objectives associated with it are detailed as Goal 3 in Chapter IX *Public Information and Education*.

Education Programs

In this plan, educational programs fall under the purview of the Diversion Manager. The goals and objectives associated with it are detailed in Chapter IX *Public Information and Education*.

10-Year Staffing Plan

Administration:

The Diversion Manager will be a full-time position. The Diversion Manager will be responsible for coordinating and providing the paperwork for the county-operated systems such as the demolition landfills and yard waste composting facilities. The Diversion Manager will also be responsible for recycling and education programs.

10-Year Budget

The Administrative Staffing Budget for the Program is estimated as follows:

Salary and Benefits:	\$ 4,500 *
Supplies:	1,000
Travel:	1,500
Printing:	500
Advertising:	<u>500</u>
TOTAL	\$ 8,000

* Designates costs which are shared with other programs.

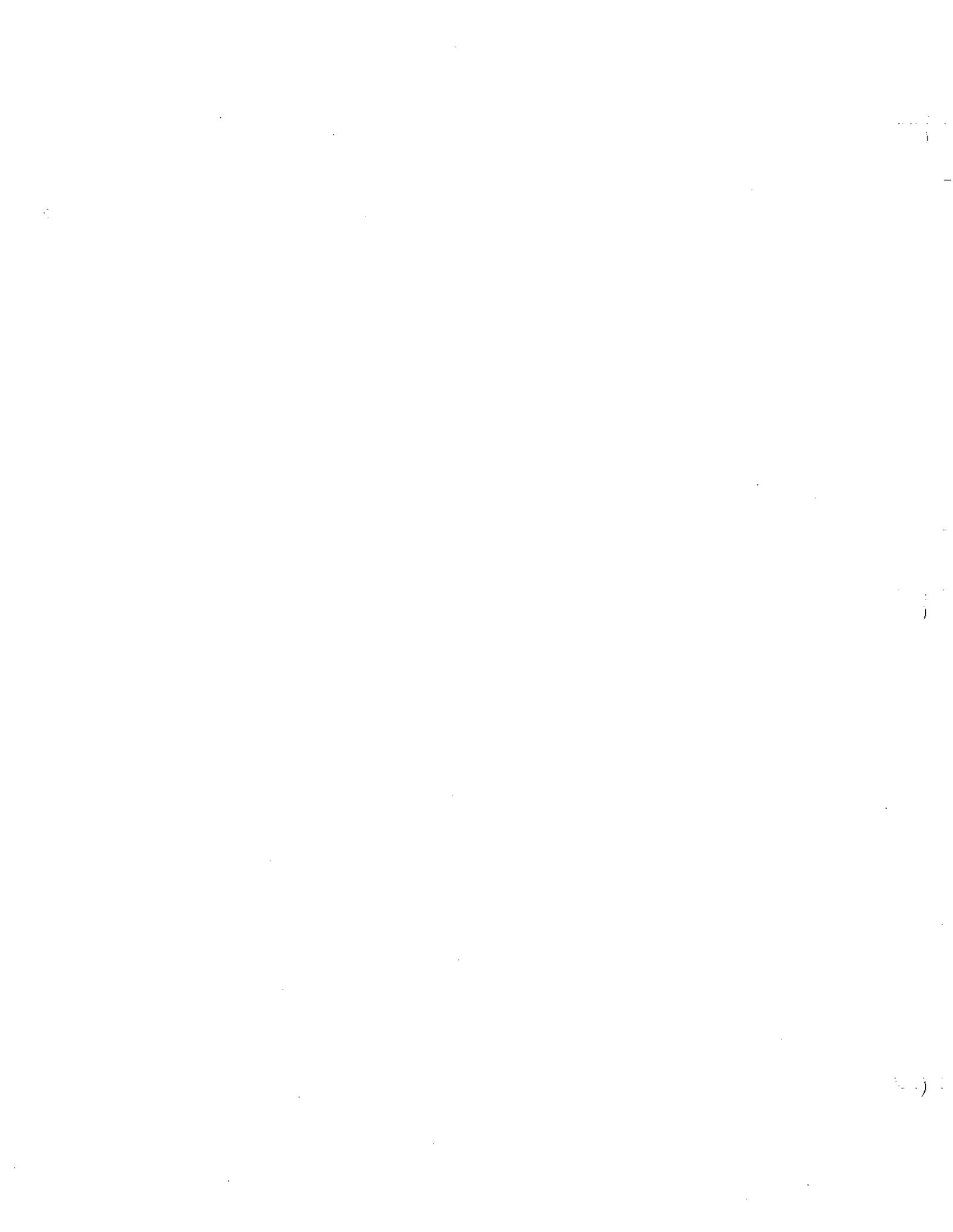
C. Funding Plan

Funding for the recycling program is included in the proposed Solid Waste Budget for Wilson County. No revenue for sale of recyclables is assumed due to the instability of the market projected over the next few years.

D. Data Collection Plan

The Waste Diversion Manager is responsible for all data collection and is charged with collecting sufficient data to make the quarterly reports to the state as required by regulations and by this plan.

Appendix VI



CALCULATIONS FOR RECYCLING MATERIALS RECOVERY

WILSON COUNTY

Drop-Off Collection Overview:

Drop off collections will be maintained at the existing convenience centers. These will consist of roll-off 20 CY containers and 8 CY boxes. The collection of these material will be hauled to a market. The drop-off recycling collection program will consist of one 20 CY roll-off container for newspaper, one 20 CY roll-off container for glass, one 8 CY container for cardboard, one 8 CY container for ferrous containers, and one 8 CY container for aluminum cans at each convenience center. Also existing drop-off sites in the City of Lebanon and the Green Hills Utility District will remain.

Drop-Off Collection Estimated Materials Recovery

The number of households in Wilson County is estimated at 29,258 in 1995.

The Solid Waste Guidelines for Decision Makers, published in 1991 by the University of Tennessee County Technical Advisory Service was utilized as background for the following tables. In that document, it states that each household in Tennessee generates about 370 pounds of recyclable material per year. Therefore the maximum amount of recyclable material available to the drop-off system is as per the following table:

Maximum Recyclables Available to the Drop-Off System

County	Recyclable Materials Available (TPY)
Wilson	5413

From case studies performed by the California Solid Waste Management Board of 5 recycling programs conducted within that state, a 60% participation rate with a capture rate of 40% was generated. These two numbers together mean that of the total amount of recyclables available, 24% will be collected in an average system. These studies are recorded in The Solid Waste Handbook, A Practical Guide, William D. Robinson, P.E., John Wiley and Sons, 1986. This participation rate number is based upon the tonnage recovered as opposed to strictly households participating. In other words, if two households participate half of the time, they would count as one household. The programs across the state which are claiming 85

and 95% participation are utilizing total numbers of participants even if the participation is infrequent. From practical experience, from a program designed and implemented by Gary L. Lide, P.E. of Draper Aden Associates in Cheatham County, Tennessee, between 20% and 0% of the loads will have to be landfilled due to contamination in a manned facility. The 20% rates should steadily decrease as public education grows.

Estimated Materials Recovery Through Drop-Off Recycling Collection

County	Minimum Estimate (TPY)	Maximum Estimate (TPY)
Wilson	1083	1299

In order to give detailed waste recycling estimates, a more detailed breakdown of the recyclable waste stream is needed. In order to prepare this breakdown, the waste stream characterization is consulted:

Waste Stream Characterization for Wilson County (1995)

Category	Percentage	Annual Tonnage
Paper and Paperboard	40.0	20,432
Glass	7.0	3,576
Ferrous Metals	6.5	3,320
Aluminum	1.4	715
Non-Ferrous	0.6	306
Plastics	8.0	4,086
Rubber and Leather	2.5	1,277
Textiles	2.1	1,073
Wood (Primarily Pallets)	3.6	1,839
Food Waste	7.4	3,780
Yard Waste	17.6	8,990
Other	3.3	1,686
		51,080
Total	100.00	51,081

In order to break these numbers down into the components needed, two sources were used to estimate the more detailed breakdown of the waste types needed. The first source was the nationwide waste stream characterization study published in *Solid Waste Management in the United States: An Overview* U.S. EPA, prepared by Franklin Associates, 1988. The second source was a compilation of eight studies from Michigan published in *WastePlan Default Data Report*, prepared by the Tellus Institute, Inc., 1988, 1989. The following tables give the breakdowns for waste categories in question:

Breakdown of Paper and Paperboard Category
 Category: Paper and Paperboard
 Subcategories: Newspaper, White Paper, Mixed Paper, Cardboard

Subcategory	Category % of Total Wastestream	Subcategory % of Category ¹	Subcategory % of Total Waste Stream
Newspaper	40.0	17.7	7.0
White Paper	40.0	10.1	4.0
Mixed Paper	40.0	46.4	18.6
Cardboard	40.0	25.8	10.4
Total		100.0	40.0

¹ From Franklin Associates Study.

Breakdown of Glass
 Category: Glass
 Subcategories: Clear, Green, Brown, and Miscellaneous

Subcategory	Category % of Total Waste Stream	Subcategory % of Category ²	Subcategory % of Total Waste Stream
Clear Glass	7.0	48.2	3.4
Green Glass	7.0	25.9	1.8
Brown Glass	7.0	16.7	1.2
Miscellaneous	7.0	9.2	0.6
Totals		100.0	7.0

² From Tellus Institute Study.

Breakdown of Ferrous Metals
 Category: Ferrous Metals
 Subcategories: Steel Cans, Major Appliances, Miscellaneous Ferrous

Subcategory	Category % of Total Waste Stream	Subcategory % of Category ²	Subcategory % of Total Waste Stream
Steel Cans	6.5	27.2	1.8
Major Appliances	6.5	30.4	2.0
Miscellaneous	6.5	42.4	2.7
Totals		100.0	6.5

² From Tellus Institute Study.

Breakdown of Aluminum
 Category: Aluminum
 Subcategories: Aluminum Cans, Scrap Aluminum

Subcategory	Category % of Total Waste Stream	Subcategory % of Category ²	Subcategory % of Total Waste Stream
Aluminum Cans	1.4	62.6	0.9
Scrap Aluminum	1.4	37.4	0.5
Totals		100.0	1.4

² From Tellus Institute Study.

Breakdown of Plastics
 Category: Plastics
 Subcategories: HDPE & PET, Other Plastic

Subcategory	Category % of Total Waste Stream	Subcategory % of Category ²	Subcategory % of Total Waste Stream
HDPE & PET	8.0	54.9	4.4
Other Plastics	8.0	45.1	3.6
Totals		100.0	8.0

² From Tellus Institute Study.

From the breakdowns calculated above, the following tonnage breakdown can be determined:

Commodity	Percentage of Total Waste Stream	Percentage of Recyclable Waste Stream	Tons in 1995
Clear Glass	3.4	13.8	149
Green Glass	1.8	7.3	79
Brown Glass	1.2	4.9	53
Aluminum	0.9	3.6	39
Newspaper	7.0	28.3	306
Cardboard	10.4	42.1	456
			1,082
Total	24.7	100.0	1083

RECYCLABLE/NON RECYCLABLE LIST

1. Clear glass

- No Green, Brown or blue glass
- All lids removed
- No bags , plastic or paper
- Clear glass should be rinsed out
- Labels can be left on

2. Aluminum and Tin Cans (separate compartments for each)

- Flatten* if possible
- Rinse out
- Labels can be left on

3. Newspaper

- Newspaper only
- No plastic or paper bags
- No magazines
- No junk mail
- Newspaper only

4. Plastic milk jugs and soda bottles only (ask people to rinse, remove caps and flatten*). *If it is not a plastic milk jug or plastic soda bottle we cannot accept it!!*

- No plastic bags
- No styrofoam
- No plastic wrap
- No cups, plates, silverware, combs, toys, clothes hangers etc.
- No ketchup bottles, margarine tubs, yogurt cartons
- No motor oil bottles
- No six pack rings
- No plant pots, trays

* a bin can hold 2-3 times more if materials are flattened

Please stress to people the importance of keeping our materials uncontaminated. The cleaner our material is the better able we are to hold our market and the higher price we will receive for the material. Please also remind them that the money from the sale of aluminum and newsprint goes to a college scholarship fund for a Wilson county student. If you have questions or comments please

contact CLIFF BRYANT OR KIM CURTIS 444-8360

WILSON COUNTY SOLID WASTE DISPOSAL/SANITATION DEPARTMENT
PHONE: 444-8360

BOARD MEMBERS:
DON SIMPSON
RALPH INCE
GILBERT GRAVES
GARY TARPLEY
WAYNE DRENNAN

SUPERINTENDENT
CLIFF BRYANT
RECYCLING COORDINATOR
KIM CURTIS

RECYCLABLE/NON RECYCLABLE LIST

1. CLEAR GLASS
 - no colored glass
 - no mirrors
 - no windows
 - all lids removed
2. ALUMINUM CANS
 - flatten if possible
3. TIN CANS
 - labels can be left on
 - flatten if possible
4. NEWSPAPER
 - no magazines
 - no junk mail
5. PLASTIC MILK JUGS & SODA BOTTLES
 - remove all lids
 - flatten if possible
 - If it is not a plastic milk jug or plastic soda bottle we can not take it!!
6. CARDBOARD
 - Please break down all boxes!
7. TIRES
 - All tires must be off the rim
 - A limit of 4 tires per resident per day!
8. BATTERIES
 - automobile batteries only!
9. FENCE WIRE
 - no fence posts
 - Please flatten if possible
10. USED MOTOR OIL
 - Until further notice used oil can be taken to TSC Store on West Main or Fast Lube on South Cumberland in Lebanon.
 - There is a 5 gallon limit per day per person.

PLEASE EMPTY ALL BAGS OF RECYCLABLE MATERIAL IN THEIR CORRECT BINS.
DO NOT PUT PAPER OR PLASTIC BAGS IN WITH THE RECYCLABLE MATERIAL!
THANK YOU FOR TAKING TIME TO HELP THE ENVIRONMENT.
REMEMBER RECYCLING MAKES CENTS!!

Chapter VII - Composting, Solid Waste Processing, Waste-to-Energy, and Incineration Capacity

A. Quantitative Needs

A following is a listing and a brief description of the needs and waste types which would require the above-listed facilities:

Yard Waste Composting

Yard waste composting can be utilized to process and divert grass, leaves, brush, and untreated wood wastes. In addition, given appropriate conditions, certain sanitary sewage sludges can be mixed into the yard waste compost to make a compost product which has higher nitrogen content and is thus a higher quality soil conditioner. The handling of sewage sludges is not within the scope of this plan and will be noted only to the point that if Wilson County desires to add sewage sludge into the composting process, the EPA 503 regulations would have to be addressed through the Tennessee Department of the Environment and Conservation, Division of Water Quality as well as the Solid Waste Regulations and the Division of Solid Waste Management.

Wilson County's waste stream is approximately 6% yard waste and 10% wood waste which represents about 2,500 tons of waste per year. The vast majority of this waste that can be diverted from the waste stream is planned to be diverted into a county-operated Class III/IV landfill. In addition it is planned to continue the small composting program which is presently being operated by the City of Lebanon Electric Department.

Solid Waste Composting

Solid waste composting is a capital-intensive process which requires large-scale processing of the entire waste stream to separate and compost those items which are compostable. Approximately 67% of Wilson County's waste stream appears to be compostable which represents about 30,000 tons per year. This option was reviewed as a part of this plan and costs associated with the development of such a facility for Wilson County were about \$98 per ton. As it does not appear that this system will be required to meet the 25% reduction requirement within the ten year timeframe of the plan, large-scale solid waste composting was not recommended.

Solid Waste Processing (Baling)

Many large solid waste facilities use baling of solid waste as a method of reducing land and soil requirements over the life of the facility. Approximately 92% (43,000 tons per year) of the waste stream could be processed through a horizontal baler. Baling increases waste densities from about 1,000 pounds per cubic yard to about 1,250 pounds per cubic yard. This results in a waste volume reduction of 25%. In addition, variances are available for daily cover requirements which reduce the amount of soil needed in the landfill. This can increase the available volume of a landfill by about 30% to 35%. The capital cost of a baling facility serving Wilson County would be about \$500,000. This cost includes a single horizontal baler with installation and a pre-fabricated metal structure with concrete floor and conveyor system. Assuming a 10-year payback at 5% yields an annualized cost of about \$64,750 per year. Given that the landfill is expected to utilize about 1 acre per year and the land costs in the area can be conservatively estimated at \$5,000 per acre, the baling option is not justified based upon cost.

Solid Waste Processing (Shredding)

Shredding of solid waste prior to landfilling is utilized to reduce the volume of the material and thereby preserve land and landfill volume. Approximately 92% (43,000 tons per year) of the waste stream could be processed through a shredder. Shredding is most effective with container type wastes and wastes which contain a large amount of air and do not compress well (plastics, cans, bottles, brush). Shredding can reduce the volume of waste in the landfill by as much as 25%. The costs of a solid waste shredder of this type would be about \$150,000. This cost is for a 100 HP shredder installed out of doors. Assuming a 10-year payback at 5% yields an annualized cost of about \$19,500 per year. Given that the landfill is expected to utilize about 1 acre per year and the land costs in the area can be conservatively estimated at \$5,000 per acre, the shredding option is not justified based upon cost.

Yard Waste Incineration

Incineration of yard and untreated wood waste can be performed through the use of a pit burner or air curtain destructor. Wilson County's waste stream is approximately 17.6% yard waste and 3% wood waste which represents about 10,500 tons of waste per year. The vast majority of this waste that can be diverted from the waste stream is planned to be diverted into a county-operated Class III/IV landfill. Pit burning and air curtain destruction are allowable as a portion of the 25% diversion program. They were not recommended due to the fact that they were not needed to meet the reduction goals and that air quality regulations may remove them the approved waste disposal methodologies in the near future.

Waste-to-Energy

Preliminary evaluation of this alternative yielded costs well in excess of \$100 per ton for solid waste disposal through this alternative. It is therefore not recommended as a part of the 10-year plan.

B. Implementation Steps

The only composting, processing, incineration, or waste-to-energy facility for the region is a composting program operated by the City of Lebanon Electric Department. This program is low-tech in that wood waste is collected, chipped, piled up, allowed to decompose, and finally given away and utilized by the City.

1. Goals and Objectives

The goal of this facility is to continue with its present operation and to work with the county/region diversion and education manager such that at least 497 tons of yard waste per year reaches the facility and is processed and distributed or utilized. 497 tons per year represents about 497 cubic yards.

2. Type, Capacity, and Location

The facility is a simple "chipper and pile" system with a capacity of about 500 tons per year. The facility is located within the City of Lebanon.

3. Materials Composted

The materials composted will be yard waste including leaves and brush which are generated in and around the City of Lebanon.

4. Siting, Designing, Permitting, Constructing, and Operation

The City of Lebanon will locate a site and be responsible for design, construction, and operation. It will be the responsibility of the City of Lebanon to work with the region to apply for and receive any required permits.

5. Market for Compost

The market for compost is the citizens and government of Lebanon. This market should be sufficient to divert the quantities planned to be generated.

6. Quantities of Residuals to be Disposed

The residuals from this system are planned to be minimal based upon separated collection of the yard waste. Any materials found in the yard waste which cannot be composted will be taken to a County convenience center and hauled to a landfill for proper disposal.

7. Staffing and Training

The facility will be operated by the Lebanon Electric Department. Due to the size and scope of the facility, no special training should be necessary. It will be the responsibility of the county/region diversion and education manager to coordinate the documentation of the diversion rates.

8. Estimated Capital Costs and Financing

Costs and financing will be forthcoming.

9. Integration with Other Elements of the Regional Solid Waste System

The yard waste composting is a small part of the over waste diversion plan and operates fairly independently of the remainder of the system. The composting facility is not essential to the remainder of the plan but provides a service to the people of Lebanon and does divert the yardwaste from the landfills where disposal is substantially more expensive. Coordination of the documentation of the facility is the responsibility of the county/region diversion and education manager.

C. Implementation Schedule

January 1, 1995

Diversion Manager in place

The Diversion Manager works with the City of Lebanon and provides public awareness of the facility and the program.

D. Implementation Responsibility

Single-county region. County will provide education and awareness programs, City of Lebanon will provide facility and operations.

Chapter VIII - Disposal Capacity

A. Background

The Wilson County Solid Waste Planning Board has evaluated several options for disposal of solid waste over the next ten years that is not being recycled, reused or composted. These options include:

- Construct a new landfill conforming to Subtitle "D" regulations
- Contract with a private landfill
- Regional public landfill if available

The Wilson County Solid Waste Planning Board working with the Urban Type Public Facilities Board, which is in charge of the current landfill and recycling operations, has decided to contract with a private landfill as its primary option for solid waste disposal over the next 10 years.

Wilson County has a permit pending for a new Class I landfill and Class III/IV landfill adjacent to its current landfill. The County will pursue obtaining these permits in order to provide an alternate disposal option of Class I waste. The new Class III/IV landfill will be constructed within the next two years as needed when the current landfill has reached capacity.

A new regional public landfill was also evaluated by the Wilson County Planning Board. Although a regional landfill would probably be more economical (dependent on size of region and waste load), there are none planned at this time. Therefore, the Planning Board has decided a regional landfill will not be considered because assurance of disposal is not available.

B. Class I Capacity

There is one landfill in the Wilson County Planning Region, the Wilson County Landfill. This is a public landfill owned and operated by the County and managed by the Wilson County Public Type Facilities Board. This facility will reach capacity in the Summer of 1994 and will be closed at that time. The County has an expansion of a Class I planned with a permit pending. This planned expansion has a capacity of approximately 7 years based on waste loads of 50,000 tons per year. The design plans for this expansion were prepared by Draper Aden Associates, Nashville, Tennessee and dated August 4, 1993.

Wilson County's options for disposal through the year 2003 include:

- Develop Class I landfill to handle only Wilson County waste.
- Develop Class I landfill and contract with surrounding counties to import waste.
- Contract out disposal to a private landfill.
- Contract out disposal at a regional Subtitle "D" landfill if available.

Recommendations for Class I disposal are:

Receive bids and contract to private landfill for next five years with options through the year 2003.

- Proceed with necessary steps to obtain pending permit for Class I landfill. Steps include:
 - Make necessary minor revisions to plans and specifications as per the Tennessee Division of Solid Waste Management Permit Review Board (TN DSWM).
 - Hold a public hearing as required by the TN DSWM guidelines.

This will allow Wilson County flexibility in the next ten years to dispose of solid waste at the most economical facility - private or public - Wilson County only or regional.

Wilson County will need to proceed with construction of a Class III/VI landfill to meet the 25% reduction requirement.

C. Implementation Schedule

If Wilson County decided to open the new Class I landfill to meet Subtitle "D" regulations by 1996, the following schedule will need to be followed:

TASK	DATE
Respond to State comments on proposed permit	March 1995
Approval of Class I Facility	September 1995
Prepare bid documents for construction	November 1995
Bid first cell sufficient for 2-4 years life	January 1996
Award of construction contract	February 1996
Begin construction of first cell	March 1996
Begin operation	August 1996

D. Long Term Disposal (in excess of ten years)

The evaluation process for long term disposal should begin three to four years before capacity is needed. The site should be selected by a process based on technical and economic merit of specific areas. The sites will be evaluated on certain technical factors:

hydrogeologic considerations - depth to groundwater and bedrock, stability of the geology, amount of clay on site, suitability of buffer material

environmental issues - wetlands, endangered species, floodplains, surface water, natural resources

social impacts - buffer from surrounding land uses, proximity to schools, churches, tourist attractions, populated areas, historical sites, archeological concerns, local issues

engineering concerns - airports, topography, stability, drainage, current land use, access to the fill area

And certain economical factors:

location in relation to waste generation

infrastructure available - access roads, available waste water treatment for leachate, water source (municipal), power, etc

technical issues impact on cost, such as availability of soil

The initial site selection process will involve preliminary hydrogeological, environmental and engineering evaluations. This process is expected to take six months to one year. Once the site is chosen, the full site characterization, design and permitting process is expected to take two to three years. The construction is expected to take six months to one year.

1. Projected Demand and Supply, and Identification of Potential Shortfalls or Surplus in Disposal Capacity.

County: Wilson

Table VIII-1

Tons Per Year

Year	DEMAND: Tons of Waste Requiring Disposal	SUPPLY: Existing & Planned Capacity	Surplus (+)	Shortfall (-)
1993				
1994	15,000	10,000		5,000
1995	15,480			20,048
1996	38,418	370,260	331,842	
1997	39,134	331,842	292,708	
1998	39,864	292,708	252,844	
1999	40,608	252,844	212,236	
2000	41,358	212,236	170,878	
2001	42,007	170,878	128,871	
2002	42,792	128,871	86,079	
2003	43,058	86,079	43,021	

The above table assumes that Wilson County decided to construct the proposed Class I landfill in 1996 and all available waste generated within Wilson County is disposed of at this facility.

If Wilson County decided to construct the proposed landfill for county use by 1996, the proposed landfill would have enough capacity for waste generated in Wilson County if the 25% diversion goal is met. The above table indicates a shortfall of capacity in 1994 and 1995. Wilson County is currently disposing of Class I waste in a private landfill to make up this shortfall.

2. Regional Disposal Capacity: Potential Shortfalls or Surplus in Project Years

Table VIII-2

Projected Net Disposal Capacity (Tons Per Year)
Wilson County

Year	1 Class I	2	3	4	5	6	Regional Total
1993 base year							
1994	10,000						
1995	0						
1996	370,260						
1997	331,842						
1998	292,708						
1999	252,844						
2000	212,236						
2001	170,078						
2002	128,871						
2003	86,079						

Figures in the above table were calculated using the assumption that Wilson County developed the proposed landfill in 1996.

E. Ten Year Budget for Disposal

The following cost estimates is based on the Proposed Solid Waste Budget for FY 94-95 provided by Wilson County. Cost include disposal of Class I waste at a private facility, Wilson County operating it's current landfill in 1994. In 1995 cost for operation of a Class III/IV landfill is transferred to the waste reduction budget in Chapter IV. Cost for 1996-2003 include a 5% inflation factor over the 1995 budget.

Year	Annual Cost
1994	859,300
1995	775,656
1996	814,439
1997	855,161
1998	897,919
1999	942,815
2000	989,956
2001	1,039,454
2002	1,091,427
2003	1,145,998



Chapter IX - Public Information and Education

A. Introduction

Note: The following publications were utilized liberally in the preparation of this section:

Getting the Word Out!
A Guide to Publicity
New Jersey Department of Environmental Protection
Office of Recycling
101 Commerce Street
Newark, New Jersey 07102
(201)648-6295

Let's Reduce and Recycle:
Curriculum for Solid Waste Awareness
EPA/530-SW-90-005
August 1990
United States Environmental Protection Agency

The central focus of both public information (publicity) and education is to help the public understand the various solid waste programs ongoing in the region and to motivate participation in such programs as source reduction, recycling, backyard composting, household hazardous waste collection, special waste collection (e.g. waste oil, batteries, tires), and litter abatement. While some overlap does exist between them, *Publicity* is generally considered a means of capturing an audience's attention through the use of mass media and promotional techniques. *Education* sustains public interest and involvement and refers to formal classroom instruction, seminars, workshops, as well as informal presentations. The ultimate goal of the publicity and education program is to change attitudes and behavior towards the handling of household, office, commercial, and industrial waste such that recycling and other forms of environmental stewardship become routine. For this to happen, the program must become a part of a comprehensive plan.

B. Regional Needs for Education

The county needs an expansion of the existing educational and promotional programs into the rural area of the county in an organized approach to prepare and motivate the community concerning all of the programs available under the comprehensive solid waste plan.

C. Goals and Objectives

For clarification, goals are defined as the primary targets of the education and publicity program and objectives are the stepping stones to the goals. In the listing below, the goals are shown in **bold** and the objectives associated with each goal are listed beneath it.

Goal 1-- Increase Source Reduction and Program Involvement Through Education

- a. Educational Programs in the Schools
- b. Backyard Composting Programs
- c. Education in the Area Offices
- d. Education in Area Stores
- e. Education in Area Industries
- f. Seminars for Civic Groups
- g. Increased Mass Media Involvement

Goal 2-- Increase Rural Interest and Participation in Programs

- a. Increase Area Yard Sales and Garage Sales
- b. Work with Area Churches and Pastor's Organizations

Goal 3-- Develop Markets for Recyclables and Recycled Materials

- a. Recommended Governmental and School Purchasing Policy
- b. Coordinate Area Business for Mass Buys of Recycled Products
- c. Work with local nurseries for Compost Market

D. Target Groups and Audiences, Amount and Kind of Information, Specific Methods to Be Used

Goal 1, Objective a-- Increase Source Reduction and Program Involvement Through Education-- Educational Programs in the Schools

This program is best divided into two subprograms based upon age and grade level of the participants.

Subprogram 1-- Basic Family Information

This educational program is to be developed for younger students and is primarily geared toward providing the student with stimulating topics to take home and discuss with the family. The primary focus will be not to fill the child's head with facts and figures but instead to provide colorful and exciting material which will motivate the child to begin discussions at home.

Target Groups and Audiences:

Elementary School Students, 5th Grade.

Amount and Kind of Information and Specific Methods to be Utilized:

Presented here is a five unit study with 28 associated activities. A seminar should be hosted by the solid waste region to which the 5th grade teachers from the above-listed schools are invited. The purpose of this seminar is to go through the units and activities in detail.

It should be noted that many of the activities included within the program are publicity programs for the community-at-large and the family which are prepared and performed by the students. It must be left up to the individual teacher as to which of the activities are appropriate for the class.

Subprogram 2-- Environmental and Waste Education

This educational program is more involved and gives details concerning waste, waste processing, and waste disposal. The purpose of this section is to give the older student the information needed to vote and make decisions concerning solid waste as an adult.

Target Groups and Audiences:

High School Level Students, 10th Grade

Amount and Kind of Information and Specific Methods to be Utilized:

Presented here is a five unit study with 36 associated activities. A seminar should be hosted by the solid waste region to which the 10th grade science teachers from the above-listed schools are invited. The purpose of this seminar is to go through the units and activities in detail. The amount of effort which the individual teachers must exert to prepare to teach this program must be minimal.

It is recommended although not essential that the above program be presented within a science curriculum. As can be seen, the curriculum is intended to last about one week although it can be utilized in a variety of fashions to last five weeks or throughout the school year as individual projects. The program is not intended to be a curriculum in itself.

This program is much more detailed than subprogram 1 and therefore lends itself more readily to providing examination material.

Method For Evaluation and Reporting of Program

The following two pages constitute a form with which the individual teachers can evaluate the provided program. It will be the responsibility of the region to provide a method for gathering the completed forms through the school systems and utilizing the provided information to revise and improve the curriculum.

Goal 1, Objective b-- Increase Source Reduction and Program Involvement Through Education-- Backyard Composting Programs

Target Groups and Audiences:

For a backyard composting program to be successful a subdivision-type housing environment is required. In other words, large amounts of single-family housing located on lots of one acre or less. The primary area in the region which would have sufficient amounts of this environment are Lebanon and Mt. Juliet.

In addition, garden clubs are an excellent source for master composters.

Amount and Kind of Information and Specific Methods to be Utilized:

The information utilized must be very brief and very simple. The primary factor that must be overcome in a backyard composting program is the fallacy that composting is difficult. A brief flyer similar to the one on the following page should be printed for the region and utilized within a "master composter" program.

The "Master Composter" program is a pyramid style organization in which the solid waste region trains interested persons from the target areas identified above in backyard composting. These persons should be from different neighborhoods. These people become the master composters. The region then supplies them with the flyers and materials they need to interest others in their neighborhood in composting. It is important that the majority of the information pass directly from person to person that the flyers do not attempt to be overly comprehensive or complex.

The region may choose to provide composting bins either free or at cost to interested residents or may choose to construct a composting demonstration project in an area park. The purpose behind this project is to have various composting bins in-use and on display. The park should be staffed at certain hours (preferably by master composters on a volunteer basis). If such a park is desired, it would be recommended that it be constructed in the Lebanon area.

Method For Evaluation and Reporting of Program

The evaluation of the program must come through the master composters. It is virtually impossible to determine a percent diversion through this method (or any source reduction method). At the end of each year, the master composters should fill out a form which answers the following questions:

1. How many new household have begun composting this year? ____
2. How many households continued composting this year? ____
3. How many households have attempted composting since the beginning of the program and have quit? _____

Goal 1, Objective c & d-- Increase Source Reduction and Program Involvement Through Education-- Education in the Area Offices and Stores

Target Groups and Audiences:

The primary target for this program are those establishments which generate large amounts of paper. This includes governments offices, insurance offices, legal firms, professional firms, etc.

Amount and Kind of Information and Specific Methods to be Utilized:

This program must be very simple and not time consuming. The primary purpose of the program is to overcome the fallacy that paper recycling is difficult. As such, an brochure must be simple and preferably on a single page. The brochure should include an offer for a region representative to come to the office and assist them in setting up the recycling collection program.

Some simple points which should be added to the educational package are:

1. Always have a paper recycling box at the copy machine.
2. Another good location for a paper collection box is at the coffee machine.
3. A system which does not work well is the use of desk-top "in" boxes for recycling. Such a box on someone's desk is usually being used for something else within a week.
4. Individual boxes next to each employee's desk work only when someone in the office is designated to take the recyclables to a central point on at least a weekly basis.

Method For Evaluation and Reporting of Program

The region must keep records of all offices which have requested assistance in setting up in-office recycling programs. In addition, each of these offices should be contacted on an annual basis to determine if they have continued their recycling efforts. In the event that an office has discontinued, the region should make a personal call on the business to determine if there is any way to reinstate the program.

Goal 1, Objective e-- Increase Source Reduction and Program Involvement Through Education-- Education in Area Industries

The primary purpose of this program is to get industries working with one another to identify problem wastes and potential solutions within the region. The stories are getting less rare of situations where one industry was throwing away large quantities of a material which a nearby industry purchases as a raw material.

The offices associated with industry would be handled under the office program.

Target Groups and Audiences:

The target group for this program is those industries identified in this report as being major waste generators.

Amount and Kind of Information and Specific Methods to be Utilized:

The region should perform an inventory of the manufacturers in the region which includes the raw materials and waste products associated with their process. All other materials which are disposed of in bulk should be cataloged. This listing should then be made available to the industries in the region. Regular meetings between area industries should be sponsored by the Solid Waste Region in order to motivate communication among the industries.

Method For Evaluation and Reporting of Program

Area industries should be contacted on an annual basis and questioned concerning recycling programs and any programs which have been worked out in coordination with other area industries. Multi-industry programs should be charted for progress. In the event that one of these programs is canceled, the region representative should meet personally with the industries involved to determine if the arrangement can be continued.

Goal 1, Objective f-- Increase Source Reduction and Program Involvement Through Education-- Seminars for Civic Groups

Target Groups and Audiences:

Target groups for this program include the organized and active civic, professional, and service groups within the region.

Amount and Kind of Information and Specific Methods to be Utilized:

The amount and kind of information utilized will vary with the type of organization. The primary methods of publicity will be through personal presentations given before these groups or the boards of directors of these groups. In some instances, volunteer support will be requested. However, in most instances the presentation will be concerning the programs available through the region and source reduction strategies.

Method For Evaluation and Reporting of Program

Follow-up questionnaires should be mailed to each group after a presentation to determine if the information was presented was informative to them and if they had any use for it.

Goal 1, Objective g-- Increase Source Reduction and Program Involvement Through Education--Increased Mass Media Involvement

Target Groups and Audiences:

The target group and audience for this objective is the overall population of the region. Radio, television, and newspaper advertisements and public service announcements should be regularly distributed throughout the area media.

Amount and Kind of Information and Specific Methods to be Utilized:

Television: Public Service Announcements should be brief and visual. Voice-only announcements should be avoided if possible.

Radio: Public service Announcements should be bright and include either music or upbeat phrasing. Dry schedules and announcements should be avoided.

Newspaper: Newspaper should be approached about including information on solid waste programs in a thematic portion of the newspaper. For example, an environmental section coinciding with Earth Day could include a large amount of information about the overall program. Small single articles concerning solid waste go largely unread.

Method For Evaluation and Reporting of Program

Statistics should be maintained which allow for charting various programs. This charting should be done on a small enough interval that increases and decreases in participation due to these advertisements can be noted.

Goal 2, Objective a-- Increase Rural Interest and Participation in Programs-- Increase Area Yard Sales and Garage Sales

Target Groups and Audiences:

The target group of this program will be that portion of the population which lives in a rural environment and therefore does not have easy access to the more modern forms of recycling. The purpose of this program is to build on and increase existing forms of source reduction and reuse through expanding the opportunities for large-scale yard sales and garage sales. It is hoped that those persons already actively participating in yard sales will invite and assist others who otherwise would not participate if the yard sale is made into a neighborhood event.

Amount and Kind of Information and Specific Methods to be Utilized:

This method will be to work through local neighborhoods, civic groups, community centers, and churches to coordinate large-scale neighborhood yard sales utilizing publicly accessible parking lots. The region will contact and create a network of "block leaders" to coordinate the yard sales throughout the rural areas of the region. This block leader will be responsible establishing a location and a date for the sale and for providing participants from the area and advertising. The block leader must be allowed charge a percentage of sales in order to cover costs including a personal stipend. Maximum allowable percentages and stipends, as well as recommended budgets for advertising and other associated costs.

Method For Evaluation and Reporting of Program

The block leader must file the following information with the recycling and education coordinator:

Location of Yard Sale: _____

Dates of Yard Sale: _____

Number of Participants: _____

Approximate Number of Households Represented: _____

Approximate Number of Shoppers: _____

Goal 2, Objective b-- Increase Rural Interest and Participation in Programs-- Work with Area Churches and Pastor's Organizations

Target Groups and Audiences:

The target group of this program will be that portion of the population which lives in a rural environment and therefore does not have easy access to the more modern forms of recycling. The ministerial alliances should be contacted in an effort to inform the church community of the available programs which might be used for fundraising activities as well as to request the assistance of the pastors and congregation in source reduction and recycling.

Amount and Kind of Information and Specific Methods to be Utilized:

The primary means of publicity and education for this objective will be through the passing out of simple flyers and personal speaking engagements.

Method For Evaluation and Reporting of Program

A record of speaking engagements should be maintained.

Goal 3, Objective a-- Develop Markets for Recyclables and Recycled Materials, Recommended Governmental and School Purchasing Policy

A purchasing policy should be prepared and then presented to all governmental bodies within the region. The policy may be similar to the one included as an appendix to this document (Note-- not yet prepared as of 10/6/93) but should include as a minimum the following:

1. Plan for gradually working the governmental body up to 100% purchase of recycled paper. The policy should work gradually toward that goal with no more than 15% increase in recycled material purchase per year.
2. Definition of recycled paper by post-consumer content. A 30% post-consumer content is recommended as a minimum definition of recycled paper.
3. A bid multiplier for nonrecycled materials when bidding against recycled materials. For example, when bidding buckets made of virgin plastics against buckets made of recycled plastics, multiply all costs associated with the virgin plastics buckets by 1.05 for comparative purposes.
4. A plan for phasing out disposable products where reusable products are available.
5. A plan for requiring written reasons for utilizing toxic chemicals and materials where less toxic chemicals and materials are available.

Target Groups and Audiences:

Local municipal and county governments.

Amount and Kind of Information and Specific Methods to be Utilized:

The purchasing policy itself will be utilized along with personal presentations to governing bodies. It is recommended that a pilot program be developed for one year with one municipality within the region and the cost increases due to the policy be charted before presenting the policy to other governmental bodies.

Method For Evaluation and Reporting of Program

A listing of the governmental bodies which have adopted the policy along with the revisions and changes which each made to it should be kept on file. Annual checks should be made with the purchasing officers to follow-up on progress made towards the percentage goals presented within the policy.

Goal 3, Objective b-- Develop Markets for Recyclables and Recycled Materials, Coordinate Area Business for Mass Buys of Recycled Products

Target Groups and Audiences:

Local business and industry.

Amount and Kind of Information and Specific Methods to be Utilized:

All local distributors of recycled products should be kept on file. Special prices for bulk purchases should be worked out. These special prices would then be presented to a grouping of businesses and industries as a mass purchase. This would obviously only be applicable on universally used items such as copy paper. In addition, local businesses should be encouraged to join the Buy Recycled Business Alliance which is a no cost organization which assists businesses in buying recycled materials.

Method For Evaluation and Reporting of Program

A listing of businesses that have participated in this program as well as those that have expressed an interest should be maintained along with the materials that each would be interested in purchasing.

Goal 3, Objective b-- Develop Markets for Recyclables and Recycled Materials, Work with Local Nurseries for Compost Market

Target Groups and Audiences:

Local Nurserymen

Amount and Kind of Information and Specific Methods to be Utilized:

The information presented would consist of samples and analyses of available compost materials. These materials would be generated both within and without the region although those generated within the region would be given precedence. This program would acquaint the nurserymen with the local compost quality and markets and would establish lines of communication between the two.

A regular newsletter for the nurserymen updating them on the compost "crop" in the region and the availability of compost materials.

Sewage sludge could also be featured with articles on how to become approved as a land disposal location.

Method For Evaluation and Reporting of Program

Quantities of compost material utilized by nurserymen in Wilson County would be recorded and maintained.

E. Staffing and Budget Needs

For Wilson County, it is assumed that the Diversion Manager will handle Public Education, Publicity, Recycling, and Waste Diversion. The budgeting for his position will primarily come from the recycling budget (See Chapter IV).

A budget for this group would be as follows:

Salary and Benefits:	\$ 0 (See Chapter VI)
Overhead:	0 (See Chapter VI)
Supplies:	2,000
Office Equipment:	0 (See Chapter VI)
Travel:	2,000
Printing:	500
Advertising:	500

TOTAL	\$ 5,000

* Denotes expense shared with another department.

Funding Options and Allocation of Responsibility

Two options exist for the funding of this program. The first is funding through the tipping fee and the second is direct government line item.

Utilizing the tipping fee to fund this program would result in an additional **\$0.10** being added per ton.

Another funding option includes having Wilson County provide the funds to the region for this position.

F. 10-Year Implementation Schedule

January 1, 1995	Diversion Manager in place.
Ongoing	Prepare Press Releases and Provide Photo Ops at the Beginnings of All Programs. Prepare Monthly Press Releases. Goal 1, Objective g
February 1995	Begin Work with Block Leaders for Community Yard Sales Goal 2, Objective a
February 1995	Work with Pilot Community for Implementing Purchasing Policy Goal 3, Objective a
March 1995	Backyard Composting Program Kick-off Goal 1, Objective b
March 1995	Begin Seminars for Civic Groups Goal 1, Objective f Schedule one presentation per month
April 1995	Begin Education in Area Industries Goal 1, Objective e
May 1995	Schedule Meetings with Ministerial Alliances in the Region Goal 2, Objective b
August 1995	Begin Educational Programs in Schools Goal 1, Objective a
September 1995	Begin Work with Local Nurseries Goal 3, Objective c
October 1995	Begin Education in Area Offices Target Three Offices Per Month Goal 1, Objective c

February 1996

Begin Education in Area Stores
Target Two Stores per Month
Goal 1, Objective d

February 1996

First Mass Purchase of Recycled Products
Goal 3, Objective b

Home Compost Demonstration Facility

(Optional - Not Included In Budgets)

Master Composter Program

Cost Estimate

Construction:

Parking Spaces	\$3,000	
Water Service	500	
Sidewalk	120	
Clearing	1,000	
Path Construction	500	
Seed & Straw	800	
Landscaping	3,000	Annualized
	<hr/>	
Subtotal	\$8,920	\$1,150

Equipment and Materials:

Bins for Demo Site	\$ 500	
Chipper	NA (Already Available)	
Handtools	300	
Brochures (10,000)	2,500	
	<hr/>	
Subtotal	\$3,300	\$ 500

Operation:

Labor	\$10,000	
	<hr/>	
Subtotal	\$10,000	\$10,000

TOTAL ANNUALIZED COSTS **\$11,650**

Appendix IX-A
School Curriculum
Grade 5

UNIT ONE

What Is Waste?

K-6



Objective:
To define waste and discuss where it comes from.

Vocabulary: waste garbage landfill combustor

To lead into this activity, initiate a discussion based on the following questions:

- Q** Who knows what *waste* or *garbage* is?
- Q** What are some other names we have for waste?
- Q** Where do we put our classroom waste?

Have children cut out pictures from magazines of things that could be thrown out when they are used up or no longer needed and create a montage. You may want to have the entire class create one giant montage.

Then discuss with children where all of this trash might go:

- Q** What happens to our waste when it leaves the school?
- Q** What kinds of waste do we throw away at home? (Write them on the blackboard.)

Q Where does it go?

Q Has anyone ever seen a big *landfill* or *combustor*? (Explain that a landfill is a place where garbage is buried and a combustor is a place where garbage is burned. Activities 7 and 8 describe landfills and combustors in more detail.)

A followup activity might be to have the children draw their impressions of a landfill. The children could go on a field trip to a sanitary landfill or study magazine or newspaper photos, then draw or write their reactions.



Objective:
To introduce children to the Garbage Gremlin and what he stands for.

Photocopy the Clip Art illustration of the Garbage Gremlin riding beside the school bus and the older students' car, and distribute it to the class. Have children react to the picture.

Q What do you see in this picture?

Q What do you notice about the character at the bottom of the page?

Explain to children that this character is called the Garbage Gremlin. Ask children why they think he might be called that. Help them to understand that the Garbage Gremlin is a fictional character who is very wasteful and lazy. The Gremlin loves to litter and makes his home in garbage. Tell children that they will see him throughout these lessons and that they should pay close attention to whether his actions are helpful or harmful.

Have children color the picture. Then encourage them to draw their own Garbage Gremlins. You may want to use these pictures in a bulletin board display.



Objective:
To identify the many different types of waste.

Vocabulary: metal plastic paper cardboard
glass aluminum tin steel

Have each child bring in one or two examples of waste from his or her home. (Ask children to be sure the waste has been cleaned as much as possible before bringing it in.) You may wish to bring in some examples, as well. The collection should include *plastic*, *paper*, *cardboard*, different types of cans, and *glass*. (It may be inappropriate for very young children to be collecting or handling glass.)

Label boxes or piles at the front of the classroom and have the children sort the waste into categories such as paper waste, *metal*, *glass*, and *plastic*. They should manipulate it as much as possible to feel the different textures and shapes.

Have the children determine which objects are attracted to a magnet. Explain to children that *aluminum* cans are not magnetic. *Tin* and *steel* cans will be attracted to a magnet.

Have the younger children trace outlines of the objects and make pictures of them to color. What are their shapes?

Older children might like to try making animals or useful objects out of the waste that has been collected. For example, children could decorate cans to use as pencil holders or make plastic containers or cartons into planters. At the conclusion of the activity, help children to understand that they have found one constructive way to use waste.

UNIT TWO

Where Does Waste Go?

K-6



Objective:
To illustrate the importance of clean air, water, and land.

Vocabulary: air water soil

For this activity, you will need a balloon, paper for folding fans, a glass of water, and a potted plant.

Ask a volunteer to blow up the balloon. Then let the air out slowly so that children can feel it with their hands. Explain to them that it is *air* that they feel.

Q Why do we need *air*?

Have children take a deep breath to understand that without clean air we could not live. Have them make a fan out of folded paper to see how air can be moved and felt. Discuss with them the wind, airplanes, whistles — these all illustrate air and its movements.

Show them the water.

Q Why do we need *water*?

Have children relate their experiences with water. Make a list on the board of all things they use water for.

Show them the potted plant.

- Q** What grows in the *soil*?
- Q** Does anyone have a garden?
- Q** If we had no soil could we have any food?

Discuss with children why soil is necessary for our survival.



Objective:
To introduce children to the concept of pollution and the different forms pollution may take.

Vocabulary: pollution

- Q** Who knows what *pollution* is?
- Q** How many have ever seen pollution? Where have you seen it? (land, air, water)
- Q** How does the waste we produce pollute the land, air, and water?
- Q** Why is pollution bad for us?

You might want to have children vote on which kind of pollution is the worst (land, air, or water). There is obviously no "right" answer, but make sure children can support their opinions with concrete examples.

Tell children that they will be performing some activities that demonstrate how pollution affects the land, air, and water.



Objective:
To help children identify litter in the world around them.

Vocabulary: litter litterbug

Have the children look for signs of pollution on the way to and from school. Tell them to focus on the garbage they see strewn along the ground. Alternatively, you could take younger children on a "litter hunt" and have them record the number of different types of litter they see.

- Q** What is the most common type of *litter*?
- Q** Where is the most litter found?
- Q** What is a *litterbug*?
- Q** Do you think the Garbage Gremlin is a litterbug? Why?

Organize a litter cleanup of your school or neighborhood, or a local recreational area. As children collect the litter, have them sort it into proper categories (paper, plastic, aluminum, tin cans, etc.). A variation would be to conduct a "litter rap" around the school grounds or a block adjacent to school property. With a rap beat playing on a portable tape player in the background, have children spot pieces of litter, then make up short "raps" one at a time to describe them. For example:

Can on the street is not too neat,
Ugly litter I kick with my feet.

I see a bottle beside that fence.
Let's bring it in and earn five cents!

That paper's from a burger and fries —
Wish someone hid it away from my eyes.

You might wish to record the song as children make it up a verse at a time, or have children write down their own "raps." Then compile them into a song to perform for the grade or school.



Objective:
To allow children to compare what happens to waste in a dump and in a landfill.

Vocabulary: open dump sanitary landfill
 contaminate leachate

In partners, have children construct both a mini-landfill and a mini-dump and compare the two over the course of several weeks. Or you may wish to have each child construct a mini-landfill, but make just one mini-dump for the whole class.

To make the landfill, have children cut three quarters of the way around the top of a 1-gallon plastic milk or water jug. Have them place a layer of soil on the bottom, then alternate layers of soil and garbage, leaving a layer of soil at the top. The garbage should include a variety of organic and inorganic items: a metal barrette or paper clip, a piece of plastic, a piece of aluminum foil, a piece of newspaper, a candy or gum wrapper, a piece of food (apple, orange skin). Sprinkle with water, seal the openings with masking tape, and cover with the lid. Open the lid to air and water the landfill approximately every other day.

For the dump, fill a second plastic jug with soil and place the garbage on top. Sprinkle the dump periodically with water, and leave it uncovered.

Have children list all of the items they have placed into their dumps and landfills and keep separate charts monitoring the changes in both. At the end of the observation period, discuss with children the differences between what happened in the dump and in the landfill.

In the dump, over a period of time you can expect the food to rot and smell slightly. The newspaper will also begin to break down. (You may wish to explain the process of decomposition to children. Refer to Activities 21 and 22.) Paper wrappers will decompose as well, but plastic will not. The metal barrette will gradually rust and nothing will happen to the plastic or aluminum foil. Very little decomposition should take place in the landfill and it should not smell.

Q Can you think of any problems that might result from disposing of garbage in an *open dump*? (Answers might include odors; attract rats or other pests; disease; ugly; trash could spread to other areas and pollute them; run out of space to put more garbage.)

Point out to children that, in the past, dumps did not protect the surrounding environment from the trash dumped into them. Landfills present better ways of disposing of our garbage. Modern *sanitary landfills* prevent waste from polluting or *contaminating* the land around them. Deposited waste is covered daily with soil for added protection. Modern landfills also

control any liquid, or *leachate*, that accumulates in the buried waste so that it does not leak into the environment. (A diagram showing one modern sanitary landfill design appears on p. 63 of this guide. You may wish to distribute copies of this diagram to older children during the discussion.)

Children should be aware that many of the environmental problems associated with dumps have been eliminated with sanitary landfills, which will continue to be the major form of disposal for many years to come. They should also realize that little decomposition occurs in this type of landfill.



Objective:
To learn about the harmful effects of burning and the alternative of waste combustion.

Vocabulary: burning ash combustor waste-to-energy plants

Some problems with open *burning* of waste may be examined by using a tin can with air holes punched around the bottom. Loosely place in it small pieces of waste food (such as apple core, egg shell, small piece of carrot), aluminum foil, plastic wrap, glass, and newspaper. In a safe place outdoors, light a match to the contents. Have the children observe what happens.

Q Which items burn and which don't?

Q Which things melt?

The paper will burn easily. The food will char, but not really burn. The plastic will catch on fire and drip down into the pan, giving off fumes as a result of its petroleum base, and leaving a sticky residue. The metals will not burn at all.

Q When we burn our garbage, where does the smoke go? Is this air pollution?

Q What can happen to us when too much smoke gets into the air?

Q What happens to the *ash* produced?



Could the heat given off be used? For what?

Explain that waste can be burned safely and that harmful effects on the environment can be greatly reduced by using properly constructed and operated waste *combustors*. These combustors must have special controls to avoid polluting the air. Tell children that after the waste has been burned, there is still ash left over. This ash should be disposed of in a specially constructed sanitary landfill.

Modern combustors also create energy through the heat given off when waste is burned. This energy can be used to heat homes or provide electricity. Waste combustors that also produce energy are known as *waste-to-energy plants*. (A diagram of a waste-to-energy plant is shown on p. 60 of this guide.)

Tell children that land disposal and combustion are two ways that communities can manage their waste. Source reduction — or reducing waste before it is produced — and recycling are two other methods which will be discussed in later activities. (Source reduction, Activity 16; Recycling, Activity 23).



Objective:
To demonstrate how garbage can pollute the water.

Vocabulary: runoff

Explain that garbage can also pollute water. Illustrate by having the children place different types of garbage such as shredded paper, food scraps, a tin can, and a dark liquid such as coffee into a clear bowl containing clean water. Let the children observe the changes in the water after each addition.

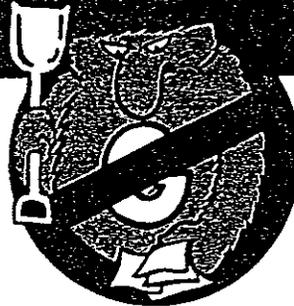
Tell children that water becomes polluted by garbage even when the garbage is not put directly into the water. Illustrate by pouring some ink onto a mound of sand that has been placed in a bowl. Explain that the ink represents the pollutants in garbage. Sprinkle water over the mound (to represent rain) until it drains into the bowl.

Explain that in the environment this water would run off into rivers and lakes or would seep down into the ground and pollute the water there. Ask if anyone has a well. Help children to understand that there is water in the ground that we use for drinking and bathing, and that this water can become polluted by *runoff* from garbage that is not properly managed.

UNIT THREE

How Does Waste Affect Our Resources?

K-6

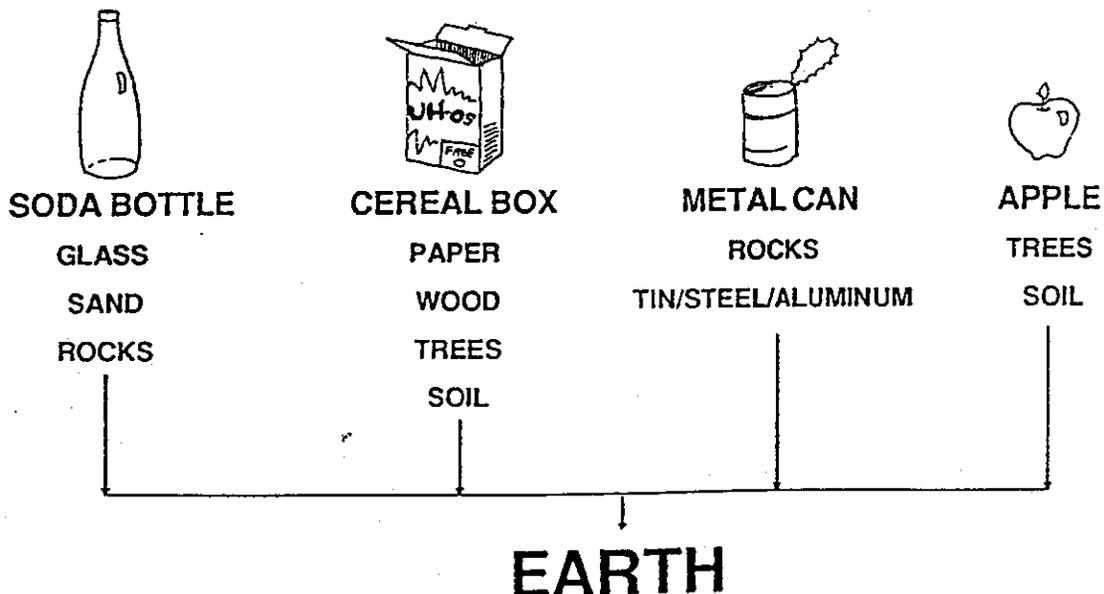


Objective:
To introduce the concept of natural resources.

Vocabulary: earth natural resources energy

Have the children name objects made of paper, metal, and glass, and a favorite type of food.

Using the blackboard or a large piece of paper, help the children trace these materials back to their source. For example, a soda bottle is made from sand mixed with soda ash and lime and melted down to form a liquid, which is then molded into glass. See if the children can trace the origin of the other objects illustrated below. (Refer to the "Resource Tree" on p. 69 to trace the origins of additional everyday objects.)



Ask the children if they can think of anything that they use that is not provided by the *earth*. (The children will probably name some things, but on close examination, it will be seen that these things also come from the earth.) Explain to children that raw materials that we take from the earth to make into other things are known as *natural resources*. Help children to list the natural resources used in the objects named on the previous page. Remind them that *energy*, which is also a natural resource, is needed to change objects from their natural forms into the products we use.

Q What are some forms of energy? (solar, wind, thermal, electrical, nuclear, mechanical)

Q What kind of energy does a tree need to produce fruit? (solar)

Q What kind of energy does a windmill use? (wind)



Objective:
To illustrate the use of a natural resource.

Vocabulary: reuse fuels

Pass out clay from a container labeled "earth," explaining that this is an example of one of the earth's resources. Let the children make models of things that they like to use.

Write the words BURY, BURN, and THROW AWAY on three small boxes or cups. Let the children place their clay product into one of the three boxes.

Q After we bury, burn, or throw away these objects, what will happen to them?

Repeat several times to show that as we buy and use products, we use up the supply of the earth's materials. When there is no more clay, point out that the resource container is now empty and that the resources have been used up. Point out how heavy the boxes are, and that someone will have to take them to the disposal site, where they will take up room and may contribute to pollution. Also, point out that the clay is still valuable material that can be used.

Q Can we ever get back the things we throw away? Which ones?

Q What is going to happen if we keep taking materials from the earth? What will happen when we run out?

Suggest that instead of burying, burning, or throwing the clay away children could *reuse* it. Explain that if we did this with all our garbage, very little would have to be buried in a landfill or burned, and we would not take as much from the earth. Point out that even the burning of waste can generate heat, which can be used in creating energy, thereby saving precious *fuels*, such as oil and coal.



Objective:

To illustrate that by wasting things in our home and at play we are using up the vital resource supply of the earth.

Vocabulary: waxed cardboard

Ask each child to list all the different containers that provide his or her evening meal; include all the materials used to make the container. For example, a child who eats soup, hamburger, ketchup, apple sauce, carrots, ice cream, and milk might have a list resembling the following:

Soup — metal can with label

Hamburger — plastic tray and clear plastic wrap

Ketchup — glass bottle, metal cap, paper label

Apple sauce — glass jar with metal top and paper label

Carrots — plastic or paper bag

Ice cream — paper or cardboard container

Milk — waxed cardboard container

Ask each child to count the number of containers that use each different material (glass, metal, paper, etc.) and the total number of containers used in his or her household. Children will be interested in seeing which family threw away the most items. Stress accuracy — there will be a tendency to give elaborate totals and to magnify the amount used.

Ask each child to divide the total number of containers used by his or her household by the number of people in the household. This number will be an estimate of the amount thrown away at one meal by one individual. Then have children multiply this number by three to get an estimate for 1 day. To continue this illustration, estimate the number of containers thrown away in 1 day by the whole class. This total will be amazing to them.

Have the children imagine that all the containers the class threw away yesterday were stacked up in a corner of the room.

Q How much of the room would it occupy?

Q How much of the room would a week's worth of garbage occupy?

Use the figure representing the number of containers thrown away by one person in 1 day. Multiply by the number of people in the community to determine the total number of containers thrown away in your community for 1 day. Multiply that number by 365 days a year. Review that these containers are made of resources that are necessary for survival.



Objective:
To give children an appreciation of waste disposal costs.

Vocabulary: pound ton cost tipping fees

Bring in a scale and a bag of clean garbage containing an assortment of glass and plastic bottles, cans, cartons, and paper waste. (Or use some of the garbage brought in for Activity 3 if you were able to store it.) Call on a volunteer to weigh the bag of garbage and then weigh him or herself. Write the two numbers on the board.

Tell children that the average person in the United States throws away 4 *pounds* of garbage each day. Based on this statistic, ask children to answer the following questions:

Q How many days' worth of garbage was contained in the bag we just weighed?

Q How many days would it take you to throw away an amount of garbage equal to your own weight?

If each person in your community (pop. _____) throws away 4 pounds of garbage each day:

Q How many pounds does this equal in 1 day?

Q How many *tons* is this?

To help children grasp the concept of a ton (2,000 pounds), you might want to ask them how many tons some familiar objects weigh (an average 4-door compact automobile weighs about 1 ton).

Have the children try to imagine where all this refuse is being put every day of every year in every community.

You can also go further and get population statistics for your state and the entire United States, and multiply these numbers by 4 pounds. Remind children that much of this garbage is made up of resources that could be put to good use.

Tell children that it *costs* money to dispose of all of this waste. Have children imagine that it costs your community about \$30 for each ton of refuse that is disposed of in a landfill or burned in a waste combustor (or use the amounts for *tipping fees* from your Community Profile):

Q How much would waste disposal or combustion cost your community each day?

Q How much would it cost per year?

Q Where does this money come from?

To give children a better appreciation of this sum of money, ask them the price of a cassette tape or compact disk of a popular group. (For younger children, you might ask how much they get for an allowance or how much it costs to buy lunch at school.)

Q Approximately how many cassettes or CDs could you buy with the money your community spends on landfill or combustion in 1 day? In 1 year?

You might want to have children calculate how much money could be saved if each person in the community reduced the amount he or she threw away each day by 1 pound.



Objective:
To help children realize the enormous amount of resources Americans throw away.

vocabulary: population statistic

Draw a square on the floor with chalk, approximately 5 feet by 5 feet. This square can also be delineated by grouping chairs to form the perimeters. Ask one child to step inside the square holding one piece of solid waste, probably scrap paper. Emphasize that each person involved cannot step outside the square once he or she is in it.

Then ask another to step in, representing a couple. Assume they then have two children, those two marry and have two children, etc. The number of children in the square will go up very quickly, yet the square remains constant. Ask the children how they would be able to get anyone *out* of the square. As the square grows more crowded, obvious reactions will be observed, especially pushing, restlessness, and generally aggressive behavior.

Ask all the children to drop their pieces of solid waste into the square and return to their seats. The result will certainly be solid waste pollution. This vividly illustrates the concepts that an increasing *population* creates more waste, that our crowded cities have limited space, and that the amount of waste pollution increases every year.

Share with children the following *statistics*.

Every 2 weeks, we throw away enough bottles and jars to fill the 1,350-foot twin towers of New York's World Trade Center.

We throw away 31.6 million tons of yard waste each year.

With the aluminum we throw away in 3 months, the United States could rebuild its entire commercial airfleet.

We throw away 2.5 million plastic bottles every hour (22 billion plastic bottles a year).

With the office and writing paper we throw away every year, we could build a 12-foot high wall from Los Angeles to New York City.

We throw away over 200 million tires every year (one for every person in the United States).

Children may want to try illustrating some of these enormous quantities or creating posters for the classroom based on these figures. (See the Clip Art pages for some illustration ideas.)

UNIT FOUR

How Can We Produce Less Waste?

K-6



Objective:
To explore changes in lifestyle that have led to increased production of waste.

Vocabulary: disposable product durable

Q What do you do when your pen runs out of ink?

Most children will say that they throw it away or get a new one. Explain that an item that is made to be used once or for a short period of time and then thrown away is called *disposable*.

Q What are some examples of disposable *products* that you have used? (diapers, pens, razors, cameras, shopping bags, wrapping paper, fast food containers, plastic eating utensils, paper plates, paper napkins, paper towels)

Q Why do you think people use these disposable products rather than more *durable*, or long-lasting, alternatives?

Help children to understand that people often use disposable items because it is easier, and sometimes cheaper, to replace these items than to clean, refill, or repair nondisposable products. However, although it may be more convenient to throw out paper plates, paper cups, and plastic utensils than to wash dishes, these disposables create a tremendous amount of waste.



Do you think people have always thrown away as many things as they do now? Why or why not?

Discuss with children what kinds of changes in lifestyle have caused us to create more waste in our day-to-day lives. Some examples might include:

- Buying new clothing instead of mending socks and patching worn clothing.
- Eating prepared foods or "fast foods" rather than cooking food from scratch.
- Buying individual servings or amounts convenient for storage instead of buying foods in bulk quantities.
- Getting plastic or paper bags with each purchase instead of shopping with baskets or reusable bags brought from home.
- Replacing broken items rather than repairing them.

This would be a good opportunity to read the skit "Throwaway Three" at the back of the guide, focusing on the issue of waste production through the ages. You might also conduct this activity in conjunction with a social studies unit on how people lived at a certain period of time in history. Compare their use of resources and generation of garbage with our own. Have children work in groups to prepare skits showing the contrast between the two societies.



Objective:
To introduce children to the concept of source reduction.

Vocabulary: source reduction

Review with children some of the problems associated with having too much garbage:

- Air, land, and water pollution.
- No place to put all of the waste.
- Shortages of natural resources.
- High costs of burying or burning garbage.

Have children imagine that for 1 week they are not allowed to throw anything out in a garbage can at home or at school.

- Q** How would you eat?
(Bake your own quick breads and cookies, drink juice in the largest containers you could find, buy vegetables without any wrapping, buy huge boxes of cereal.)
- Q** How would you clean up a spill?
(Use reusable rags and sponges instead of paper towels.)
- Q** What would you do if you tore your clothes?
(Patch them or sew up the hole.)
- Q** Can you think of any other habits you would have to change for that week?

Explain to the class that eventually they would probably have to start throwing out some things — the empty juice container, the cereal box, the wrapper from a new bar of soap. However, putting into practice some of the ideas they just mentioned could drastically reduce the amount of garbage they produce.

Tell children that what they have just been talking about are methods of *source reduction*. Explain that source reduction is the concept of using up fewer materials so that less waste is produced. Define for children or call on volunteers to define the words *source* and *reduce* to give children a better understanding of the term. There are several components of source reduction:

1. **Cutting down on the quantity and weight of waste, including cutting down on packaging of the products you use.**
2. **Making things last as long as possible, thereby extending the useful life of products.**
3. **Using things more than once for the same or for different purposes, such as taking a clean jug back to a farmstand to be refilled with cider or using a specially designed jelly glass as a drinking glass.**
4. **Using products that are less toxic, meaning those that contain potentially harmful ingredients.**

These components will be discussed in more detail in the next few activities. Help children to understand that the less waste we produce, the fewer problems we will have disposing of it.



Objective:
To help make children conscious of packaging and ways that it can be reduced.

Vocabulary: ecological packaging green product toxicity

Construct a visual aid in the form of a bulletin board or display using packages and pictures of packaging brought from home by teachers and children. Actual packages work best, but carefully chosen pictures are also valuable. The bulletin board display can evolve into a comparison of "good" and "bad" packaging. The board can be broken down into three categories:

1. Nature's packaging: coconut, bananas, peanuts, etc.
2. Older types of packaging: paper bags, pottery, returnable bottles.
3. Modern packaging: plastic wrap, plastic foam, plastic-coated milk and juice containers, and individually wrapped packets.

Q What are these packages made of?

Q What natural resources were used to make them?

Q Which packages can be reused?

Ask children to consider what materials might need elaborate packaging and why (for example, aspirin capsules need to be sealed for health reasons). Point out the ways in which packaging can prevent waste by reducing spoilage and providing individual servings. Ask if some packages use excessive materials, and thus contribute to the waste problem (for example, packages of gum in which each piece is individually wrapped in two wrappers).

Q How would you design an *ecological package* (one that requires as little energy and as few resources as possible for its production or disposal)?

Tell children that another name for a product that uses ecological packaging and does not harm the environment is a *green product*. You might ask children to take a trip to the supermarket or drugstore and look for the most ecological and the most wasteful packaging.

Remind children that cutting down on product packaging and reusing packaging materials are important aspects of source reduction. Tell children that they can encourage their households to buy products with less packaging and to bring containers from home when they shop. You might have them prepare a list of source reduction "shopping tips," individually or as a class.



Objective:
To show children that some things that are thrown out have value.

Vocabulary: valuable

Q What might there be in one person's trash that would not be trash or waste to someone else?

Set up a "swap box" where the children can bring in old toys or objects that might be thrown out. They can trade an old toy for another one that is new to them. An alternative would be to set up a collection box for a local Goodwill or Salvation Army collection.

As a homework assignment, ask the children to write a short story, real or imaginary, describing something *valuable* that they found buried in the garbage. The stories should include accounts of the previous owners and reasons why the objects were thrown away.

Explain to children that one way to make something last longer — or extend its "life" — is to share it with someone else once you have outgrown or grown tired of it.



Objective:
To introduce children to the concept of reuse as an alternative to disposal.

Vocabulary: reuse

Ask children how many uses they can think of for a large peanut butter jar or a coffee can. Write them on the board. Tell children that many things can be used again, or reused in the same or in different ways.

Set up a "use-it-again" box for your classroom. Have the children paint, color, or paste pictures on it. Suggest that children place in it all materials that can be used again. Encourage children to contribute to the "use-it-again" box on a day-to-day basis. For example, paper that has only been used on one side can be used again for drawing paper, quiz sheets, etc. Craft items from home (egg cartons, margarine tubs, thread spools, etc.) can also be brought in to make collages and other art projects.



Objective:
To understand product toxicity and explore ways to reduce it.

Vocabulary: toxic nontoxic

You might want to introduce this activity by asking children to have their parents help them find five things around the house that could be harmful to the earth. Stress that children should not handle these items. Begin a discussion by talking about what children have found.

Q Have you ever seen a product with a label that says "warning," "danger," or "caution"? What does this mean? What kinds of products have these labels? (ammonia, turpentine, bug spray, drain cleaner, nail polish remover)

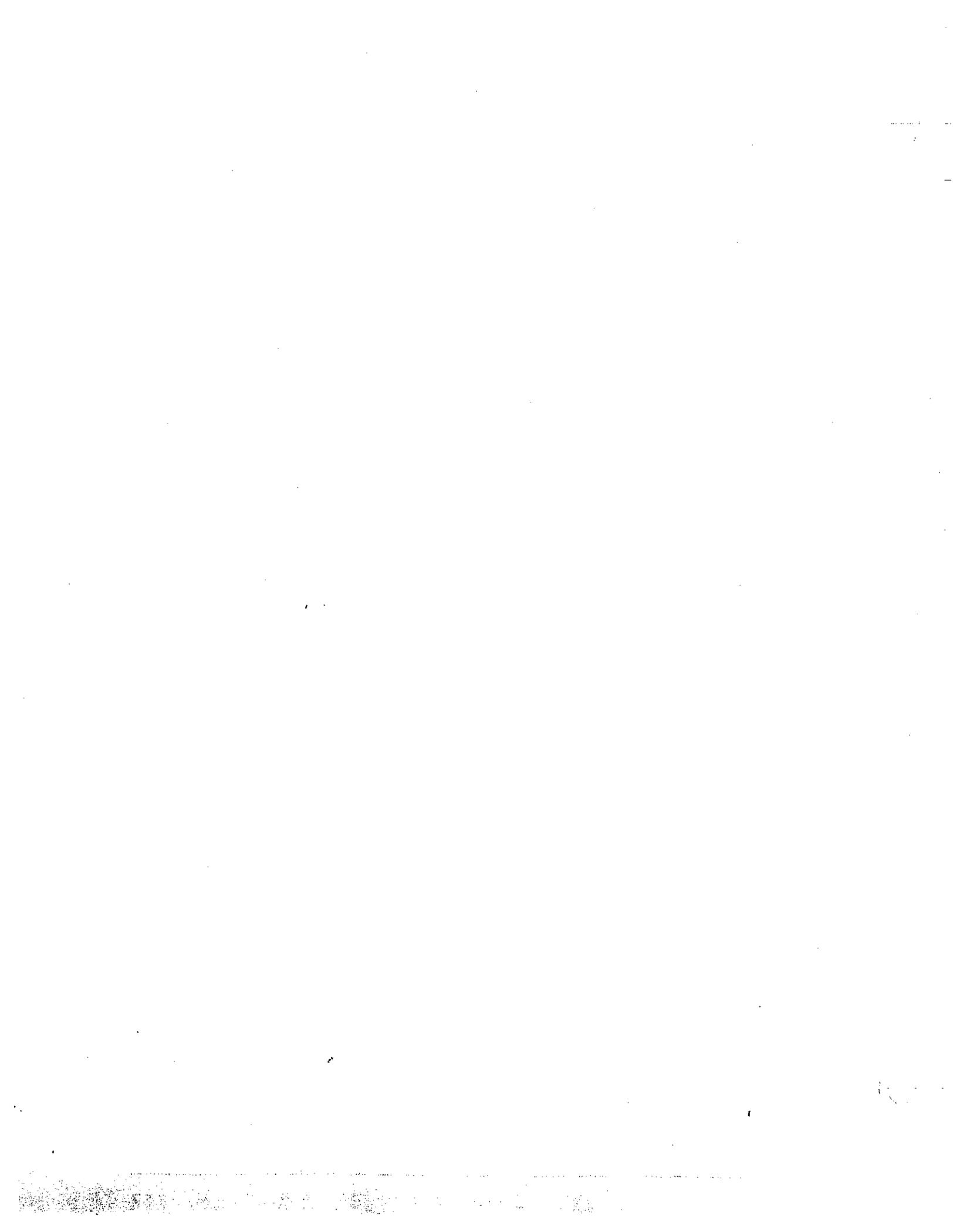
Q What does the label usually warn you against doing? (swallowing, getting it in your eyes, maybe getting it on your skin) Why?

Explain to children that substances that contain ingredients that may be poisonous are called *toxic*. Encourage children to consider where waste from toxic products might end up and why it might cause problems to people or to the environment. Explain to them that many of these toxic substances can be replaced by *nontoxic* or less toxic products that do the same job.

Ask children if any of them have seen boxes of baking soda in refrigerators or sachets of herbs in closets or drawers. Explain that these are nontoxic substitutes for air fresheners that may contain toxic ingredients.

Let children know that some products, such as household batteries, also contain ingredients that become harmful only after they are thrown out and may leak into the environment. (See Activity 7.)

You may want to conduct the following demonstration of a nontoxic substitute for the class. Tell children you are going to show them a homemade "silver polish" that is safe and can be made from ingredients they have around the house. Boil 2 to 3 inches of water in a shallow pan with 1 teaspoon of salt, 1 teaspoon baking soda, and a sheet of aluminum foil. Totally submerge a piece of silverware and boil for 2 to 3 minutes. Wipe the utensil with a cloth; tarnish should come off. Repeat the procedure if any tarnish remains.



UNIT FIVE

What Can We Do About Waste?

K-6



Objective:
To show children the function
of mold in nature.

Vocabulary: mold decomposition

Ask children if they have ever noticed anything growing on food when it is old. As a demonstration, place very small pieces of fruit such as apple, orange skin, and bread on top of some moist soil in a container. Cover with clear plastic and a rubberband. Observe the changes over a few days.

Ask the children if they know what is growing on the food. Explain to them that these are *molds* and that they feed on this food, converting it to nutrients and organic matter in the process. The nutrients and organic matter then become available for reuse by plants. Tell children that this process, known as *decomposition*, is one way nature reuses its resources.



Objective:
To introduce children to the concept of natural cycles.

Vocabulary: organism natural cycle compost

Collect dead leaves in several stages of breakdown or take a field trip to a wooded area to show children what happens to leaves after they fall.

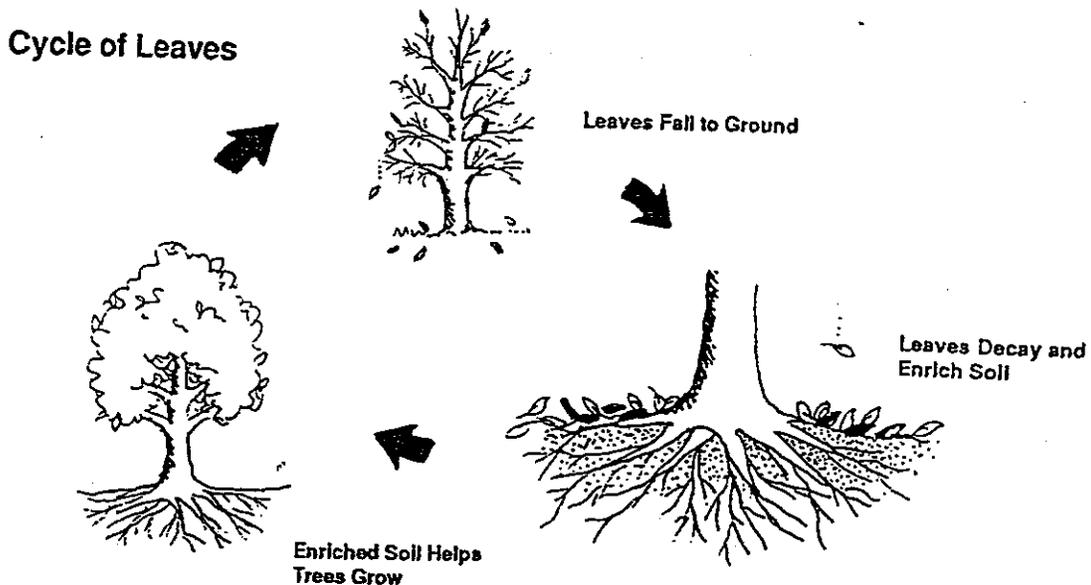
Q Do you know what becomes of all the leaves that are on the ground in the fall?

Q Where do they go next summer?

Make the connection that leaves become soil by letting the children see and feel the layers of leaf and soil that you collected. Have children make sketches and take notes on what they observe. Explain to children that, along with molds, other tiny *organisms* break leaves down into soil.

Help children to understand that a tree's leaves fall, decay into the soil, nourish the tree by making the soil richer, and thus help the tree to grow and produce more leaves. Tell them that a series of events in nature that repeat over and over is called a *natural cycle*.

Using their sketches, have children make a large art mural showing all the stages in the cycle of leaves. (You may wish to refer to the illustration below.)



Another way to illustrate the leaf cycle for younger children would be to print the following words on 3 x 5 cards: *soil, roots, trunk, branch, buds, green leaves, dead leaves*. Distribute the seven cards to seven children at random. After each child has shown his or her card to the class, give a long piece of string to the child holding the card marked "soil." Ask the children to arrange themselves in order according to stages of growth and decay. As each determines his or her corresponding position, he or she should take hold of the string. They should end up in a circle.

Explain to children that some households and communities put their food and yard waste in outdoor piles called *compost* piles. These materials will also decompose into the soil, and can then be used as compost to enrich soil for gardening or other planting. Recall for children the statistic in Activity 14: *We throw away 31.6 million tons of yard waste a year*. (Also, see Clip Art, p. 12.) Composting helps reduce the amount of waste that must be landfilled or combusted. Tell children that composting is a form of *recycling*, which they will learn more about in the next activity.



Objective:
To introduce the concept of recycling as an alternative to disposal.

Vocabulary: recycle

Write the word *recycle* on the board or a large sheet of paper. Next to it draw a picture of a bicycle wheel. Point out to the children that both end in the word *cycle*.

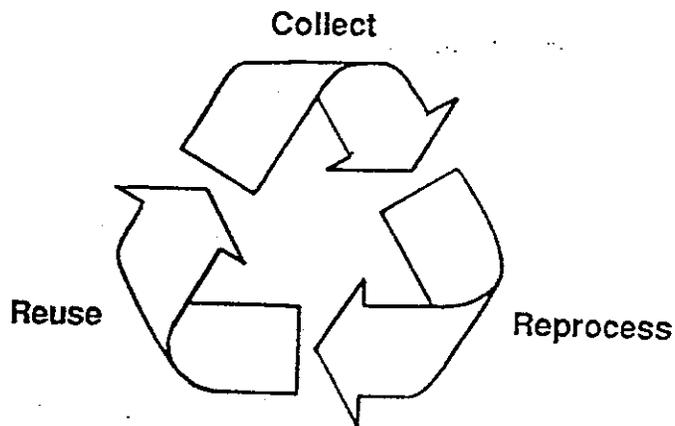
A bicycle wheel goes around and around — the word *recycle* means to use over and over again, or to go around. Show children the recycling symbol on the following page and explain to them that the three arrows represent the three stages involved in recycling materials: collect, remake, and reuse. You might wish to have children practice drawing the symbol.

Point out that when we recycle a product, it does not add to our garbage but goes back around into something new. As the leaves go back into the soil to help a new tree grow, manmade materials can also be broken down and used to make new materials. Old paper can become new paper, old cans and glass become new cans and glass, etc.

Have each child list the possible advantages of recycling. Call on volunteers to read from their lists, and write the major advantages on the board:

1. Reduces pollution
2. Saves natural resources
3. Saves energy
4. Saves money
5. Saves landfill space

As a result of this activity, the children should become very familiar with the word *recycle* and use it frequently.



Objective:
To review the ideas of recycling and reuse.

Have a show-and-tell session where the children bring in objects and discuss how they could be either reused or recycled. Children can put all objects that can be used again in the classroom into the "use-it-again" box that they set up in Activity 19.

**Objective:**

To increase children's awareness of recycling in their community and get them involved in school recycling efforts.

Vocabulary: recyclable

If there is a recycling center in your community where you can bring paper, cans, bottles, plastic, or other *recyclables*, set up recycling boxes for the classroom. You should have a separate clearly labeled box for each type of recyclable collected (aluminum, white paper, newspaper, plastic soda bottles, glass bottles, etc.). Stress to children the importance of separating their waste for recycling. Use the exercise on pp. 44-45 to test children's knowledge of recyclables and waste separation.

When you take the materials to the center, bring the class to see how it is run. Find out if your class could bring in recyclables from a 1-day community collection or an ongoing recycling program at the school.

If there are no recycling centers in your area, research with children possible markets for your waste materials. Look in the Yellow Pages of the telephone book under *recycling programs*, *waste paper*, or *scrap dealers*, and consult the list of State Solid Waste Agencies at the back of this guide.

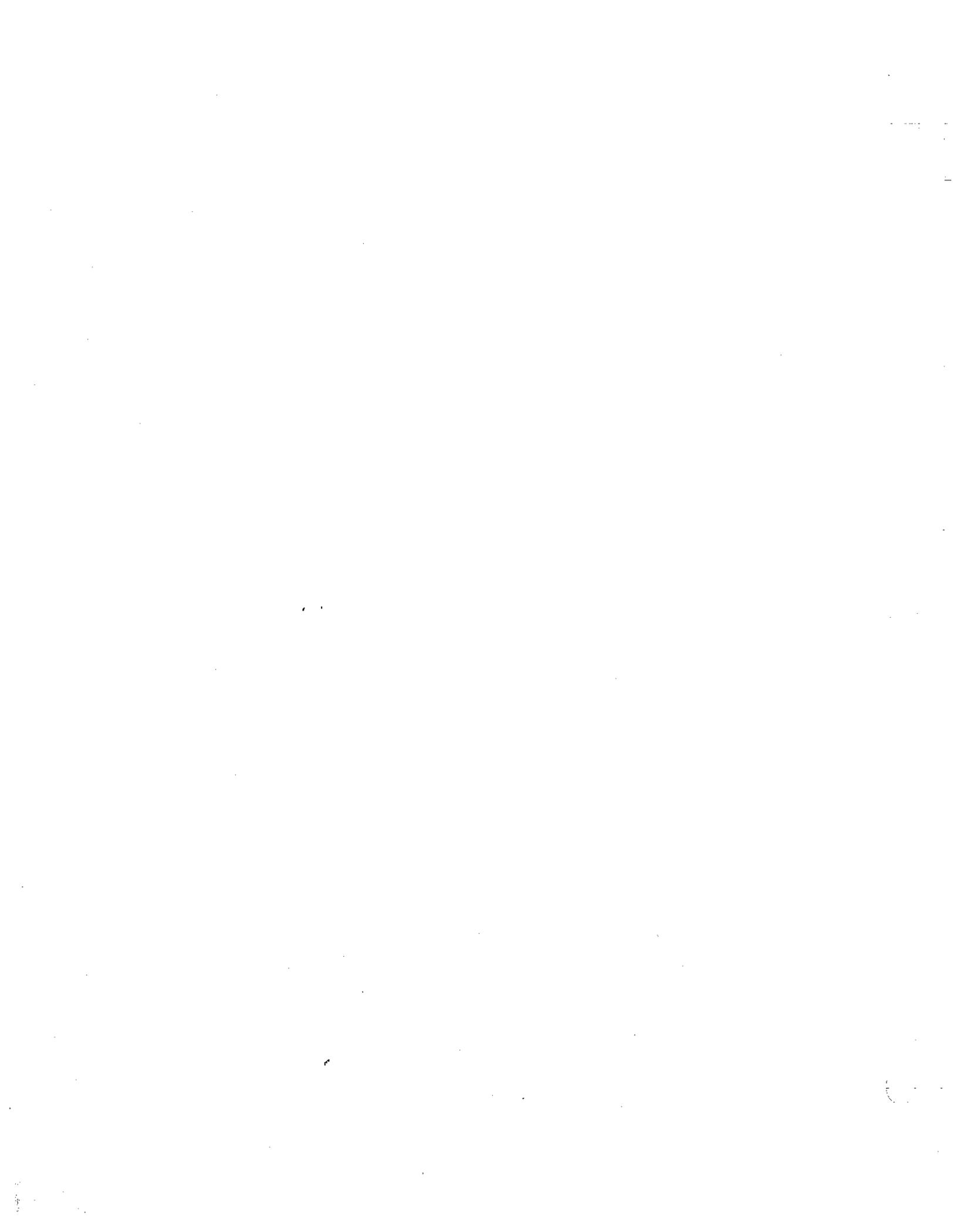
Have children start a school recycling program. They could begin by setting up collection boxes for used writing paper in all of the classrooms. A collection drive for certain recyclables, such as aluminum, could be used as a fundraiser for a class trip. You might organize a competition between grades for the most recyclables collected, and offer a prize of a movie or a trip to the winning grade. The U.S. EPA has published a brochure, "School Recycling Programs: A Handbook for Educators," which should be very helpful. (See list of Resources at the back of this guide.) Use Clip Art pages at the beginning of the guide to design posters or brochures to promote the program.

Note: Be sure you have suitable markets for your recyclables before you begin a collection program! Find out exactly what kinds of material each market will accept. For example, must paper be high grade paper?

Save! Sort! Recycle!

Color the recyclables in the boxes on this page. Then cut them out and paste them into the proper recycling bins on the other page.





COMPOST

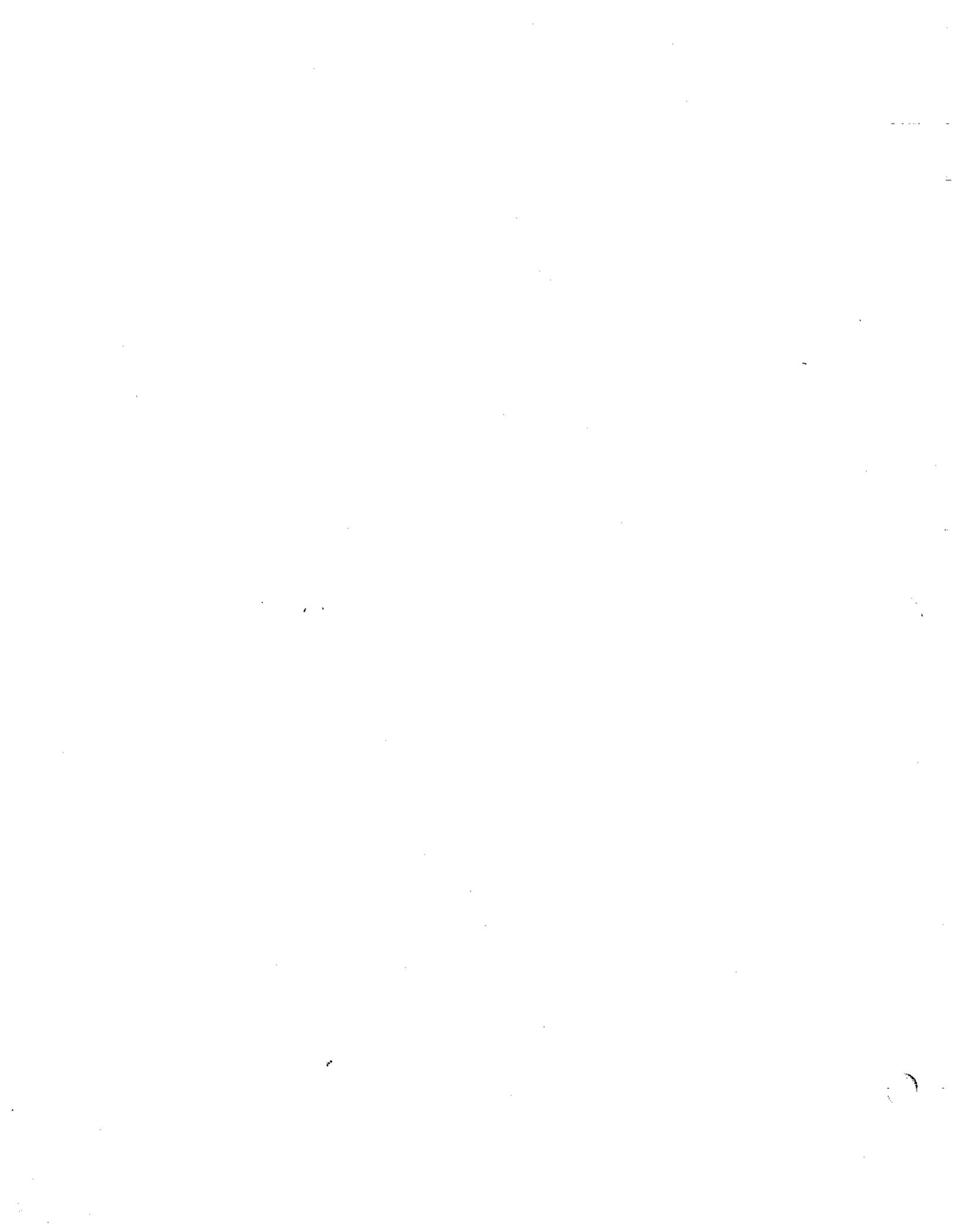
PLASTIC

METALS

SECOND HAND SHOP

PAPER

GLASS





Objective:
To illustrate how a common manufacturing process uses resources.

Take a field trip to a papermill or glass manufacturer that uses recycled paper or glass, or to another type of facility that uses recyclables in its manufacturing processes. Discuss with children how many resources the manufacturing process uses (for example, trees, water, energy for papermaking) and how these resources could be saved by using recyclables. Arrange to have someone from the facility speak to the class about its use of recyclables. Find out where the papermill or manufacturer gets the materials that it uses in its processes.

This activity could be followed by making recycled paper out of old waste paper in the classroom.

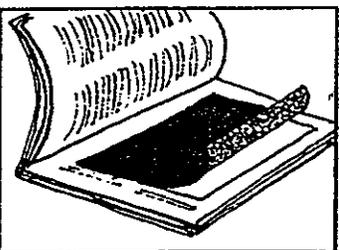
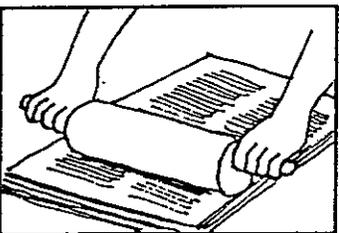
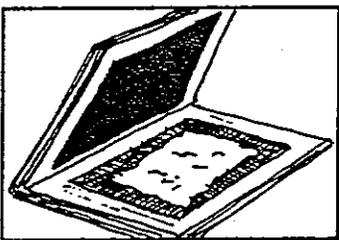
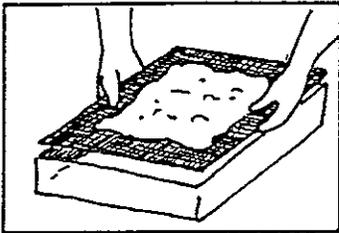
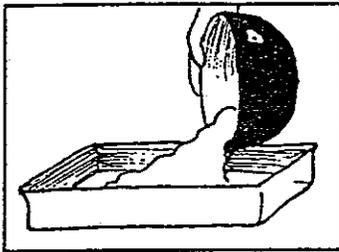
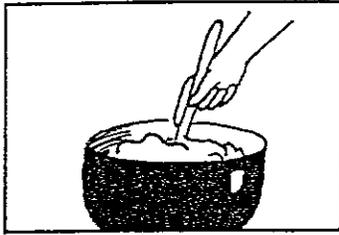
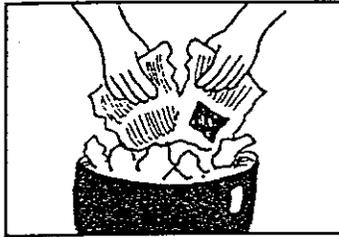
MAKE YOUR OWN PAPER

What You Need

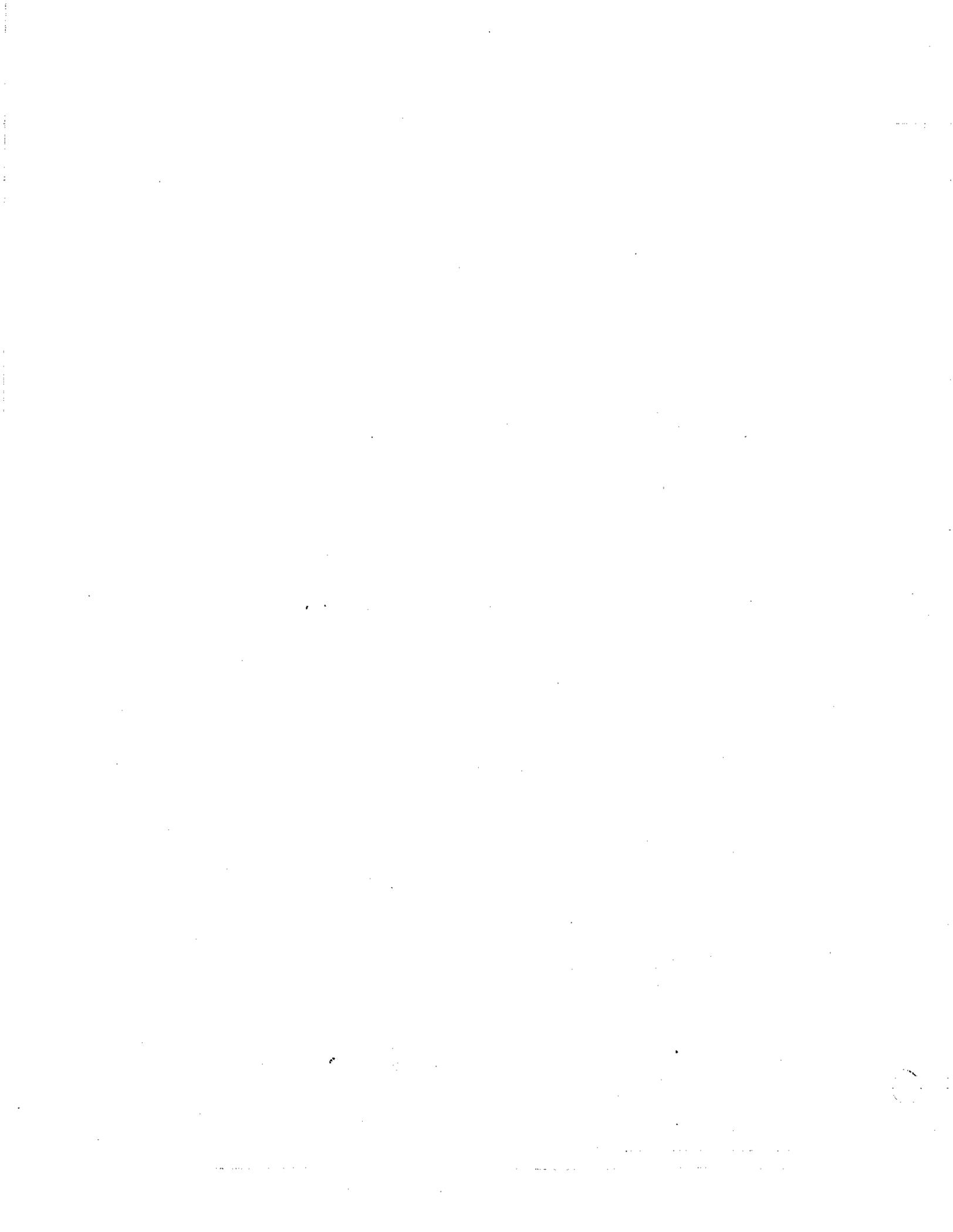
- Old paper (anything but newspaper)
- A piece of screen
- A flat dish, a little larger than the screen
- 4 pieces of blotting paper the size of the screen
- A bowl
- An egg beater (a blender would be better)
- A round jar or rolling pin
- Newspaper and blotter paper
- 2 cups of hot water
- 2 teaspoons of instant starch (for stronger paper, if desired)



What to Do



- 1** Tear the paper into very small bits into the bowl. Pour in the hot water.
- 2** Beat the tissue and water to make pulp.
- 3** Mix in the starch if desired.
- 4** Pour the mixture into the flat dish.
- 5** Slide the screen into the bottom of the dish and move it around until it is evenly covered with pulp.
- 6** Lift the screen out carefully. Hold it level and let it drain for a minute.
- 7** Put the screen, pulp side up, on a blotter on some newspaper. Put another blotter over the pulp, more newspaper over that.
- 8** Roll the jar over the sandwich to squeeze out the rest of the water.
- 9** Take off the top newspaper. Turn the blotter sandwich over so that the screen is on top. Then take off the blotter and the screen very carefully. Don't move the pulp. There is your paper.
- 10** Put a dry blotter on the pulp and let it dry.
- 11** Use the paper for an art or writing lesson. How is this paper different from normal drawing or writing paper?





Objective:
To encourage children to extend their new awareness of source reduction and recycling outside of the classroom.

Discuss with children what they can do to reduce waste and recycle at home:

Use all of your paper on both sides.

Use grocery bags to hold garbage instead of buying garbage bags.

Use grocery bags to wrap packages to send through the mail.

Use grocery bags for art projects.

Buy food in bulk quantities.

Pack your lunch in reusable containers.

Use silverware and dishes instead of disposable plastic utensils and plates.

Reuse plastic and glass containers to store food.

Use returnable glass and plastic bottles.

Compost yard wastes.

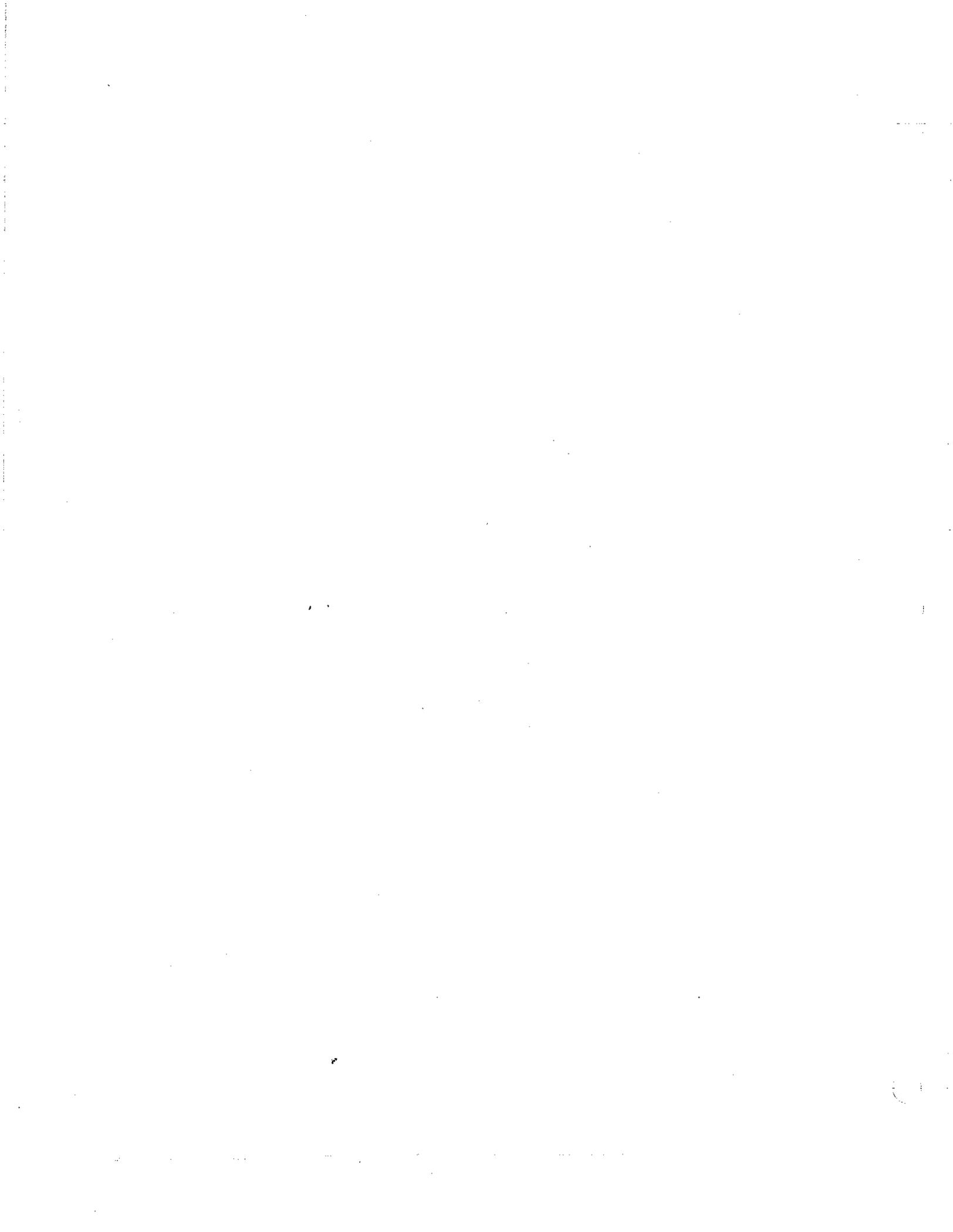
Save paper, glass, aluminum, and other recyclables and bring them to a recycling center.

Participate in a local recycling program.

Get involved in starting a school recycling program.

Give things that you no longer use to people who can use them.

Borrow things that you don't use very often, instead of buying them.

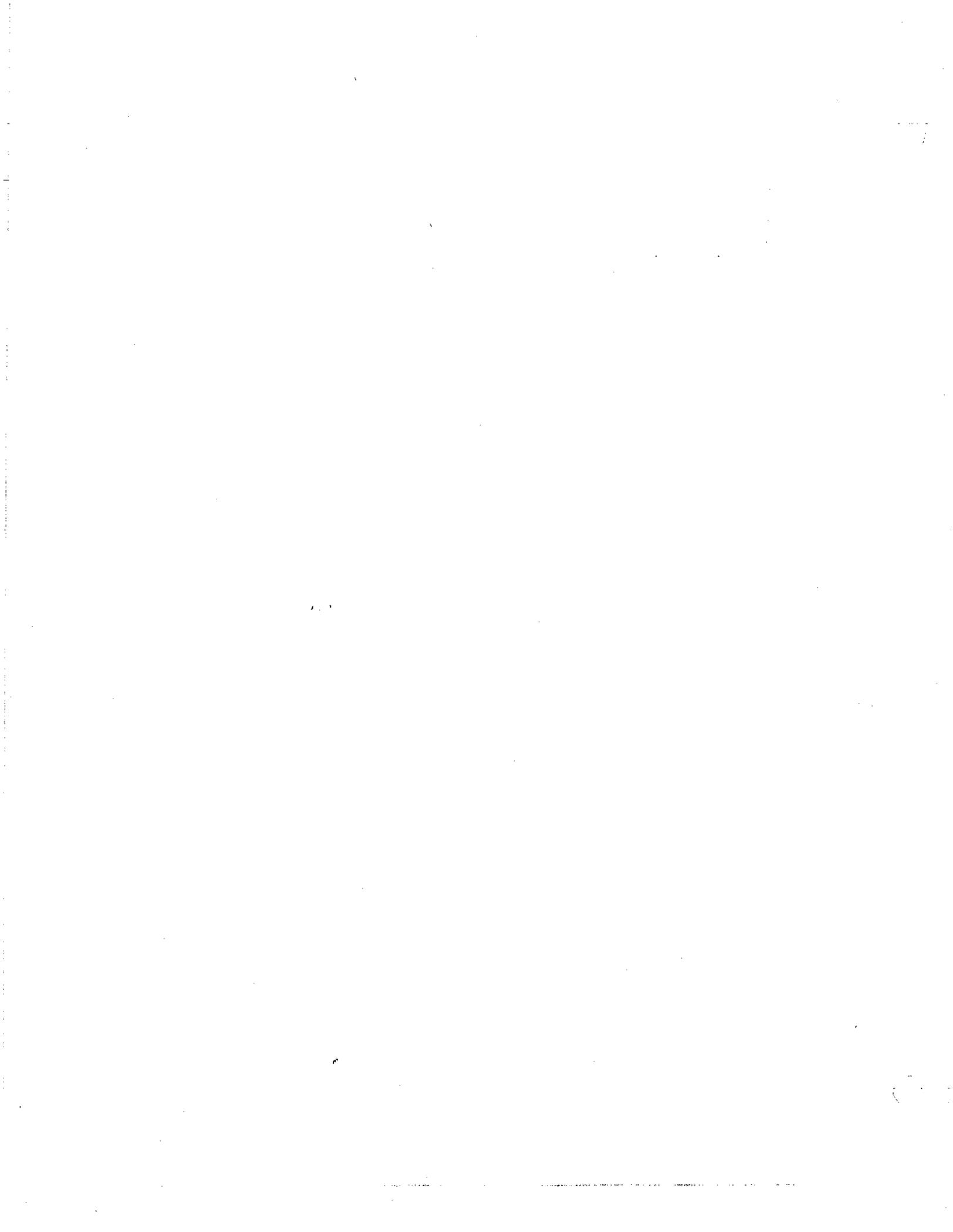




Objective:
To allow children to present what they have learned about recycling to the school and/or community.

Organize a play or a fair (or both) centered around the theme of recycling and its possibilities. For the fair, you might include exhibits of artwork related to recycling, collages made out of scrap, and inventions made entirely out of recycled materials. You could display drawings showing how recycling works, present information on recycling centers, and show how to prepare materials for recycling (separation, cleaning, etc.). This might also be a good opportunity to perform the skit, "Throwaway Three," at the back of the guide.

If your town does not recycle, this class learning experience could turn into an educational opportunity for your whole community.



Appendix IX-B
School Curriculum
Grade 10

What Is Waste?



Objective:

To investigate the origins and vocabulary of waste.

Vocabulary:

waste garbage trash junk
 refuse rubbish scrap

Q

What is *waste*?

Q

What types of waste does an average household produce?

Q

Which types are in the greatest quantity?

Q

What are some of the other names we have for waste?

Using a good dictionary, look up and discuss the cultural origins of the words *garbage*, *trash*, *junk*, *refuse*, *rubbish*, *scrap*, and any other words the students come up with. Have students list the above words in order of their offensiveness.

Q

Does this list have any relation to the origin of the various words?



Objective:
To identify the components of waste and their sources.

Have students identify the types of waste that result from the production, consumption, and disposal of a can of beef stew or some other prepared food that students are familiar with, such as a TV dinner or frozen pot pie. Have each student make a list of components and their waste, then call on volunteers to write them on the board one at a time. For the stew, the main components to be traced are the meat, potatoes, tin can, and paper label.

For example: MEAT — beef comes from steers, steers eat grain, grain grows in the earth. Wastes produced — grain waste, manure waste, slaughter waste, table scraps, sewage waste.



Objective:
To familiarize students with the Garbage Gremlin as a representation of our wasteful habits.

Show students the cover of the curriculum guide or photocopy the Clip Art page in the front and distribute. Tell students that the creature driving the beatup car at the bottom of the page is a character known as the Garbage Gremlin. Explain that the U.S. EPA has chosen the Garbage Gremlin to represent our wasteful habits and careless attitudes toward the garbage problem in this country. The Garbage Gremlin is portrayed as a creature who loves garbage and revels in any action that contributes to the evergrowing solid waste heap. On the other hand, anyone or anything that decreases waste makes him furious! He appears throughout this guide, as well as in a number of other U.S. EPA publications.

Discuss with students how the use of a character such as the Garbage Gremlin might help foster a more responsible attitude toward our solid waste problem. Encourage students to use their imagination to think of other possible characters, symbols, or slogans that might accomplish the same purpose.

UNIT TWO

How Do We Manage Our Waste?

7-12



Objective:

To explore current methods of waste disposal and management.

Vocabulary: landfill combustion composting recycling
source reduction Department of Sanitation
integrated waste management

- Q** What is meant by “throwing something away”?
- Q** Where is away?
- Q** What do we do with waste in our society? (littering, landfill, waste combustion, composting, recycling)

Elicit from students different methods of waste disposal and management and talk a little bit about each one. Help students understand that *landfill* involves controlled burying of waste in the ground, *waste combustion* means controlled burning of waste for energy recovery, *composting* involves converting food and yard wastes into a material capable of enriching soil, and *recycling* means reusing waste to make new materials. All of these topics are discussed in more detail later in the guide.

- Q** How does our town manage its residential waste?

If students cannot answer this question, you might want to research it as a class by contacting the *Department of Sanitation* or town planning board or arrange to have a representative from the Department of Sanitation or a town planning official visit the classroom to discuss local waste management options. Ask students to prepare some questions in advance.

You may want to plan a field trip to a local landfill, waste combustion plant, or recycling facility so that students can see firsthand how waste is managed in your community.

Define for students the concept of *integrated waste management*. Tell them that most communities cannot rely exclusively on one method of waste disposal or management. For example, even if a community combusted most of its waste, the ash would need to be disposed of in a landfill and some materials would not burn. To effectively manage all of a community's waste requires a combination of techniques. The techniques currently available are *source reduction* or reducing the amount and toxicity of waste generated, recycling or reusing waste materials, and waste combustion for energy recovery and landfilling. A plan that combines all of these techniques to safely and effectively handle a community's solid waste is known as integrated waste management.



Objective:
To introduce students to the principles of waste combustion.

Vocabulary: properties toxic combustors
 pollution control technologies
 scrubber filters waste-to-energy

Note: This activity should take place in a laboratory with the proper equipment, including goggles, bunsen burner, tongs, and a fume hood. If the proper facilities are not available, you should probably skip this activity. Proper ventilation and safety should be stressed at the beginning of the lesson. Tell students to be especially careful when burning plastics.

Break the class into teams. Give each team 5 to 10 materials to burn. The items should represent a variety of household waste including food, metal, plastic, paper, etc. For the plastic items, select plastic wrap and/or plastic milk jugs or soda bottles. Do not burn anything that may contain polyvinyl chloride (PVC) or cadmium (yellow or with a yellowish cast).

Prepare a data sheet or a chart for noting the initial weight and residue weight of each item burned, the color of flame and smoke, and the odors produced. You can use the chart on p. 58 to record the *properties* of each item.

After students have filled in the chart, ask the following questions:

Q Do you think any of the smoke produced could be harmful? Why and in what way?

Explain to students that some plastics and certain other materials can produce poisonous, or *toxic*, chemicals when they are burned.

Q Are there ways to make the process less harmful to our health or the environment?

Explain to students that modern waste *combustors* differ significantly from the kind of old-fashioned combustor that their experiment was designed to simulate. Modern facilities use a variety of *pollution control technologies* to greatly reduce the amount of toxic materials given off in smoke. Among these are *scrubbers*, which spray a compound into the smoke that helps to neutralize acid gases, and *filters* that remove tiny ash particles from the smoke. Burning waste at extremely high temperatures is another way of destroying harmful chemical compounds and disease-causing bacteria.

Q What are the advantages of burning waste?

1. The primary advantage of combustion is that it reduces the amount of waste. Waste combustors shrink garbage up to 90 percent by volume and 75 percent by weight.
2. Most combustors and all new *waste-to-energy* facilities create energy through the heat given off when waste is burned. In 1989, modern waste-to-energy facilities generated enough electricity to supply 1.2 million households for a year.
3. With the increasing costs of land disposal, combustion is becoming a more economical alternative, even though the costs of constructing a waste-to-energy facility are very high.

Chart for Recording Properties of Materials Burned

Material	Initial Wt.	Residue Wt.	Flame Color	Smoke Color	Odor
Tissue					
Newspaper					
Plastic Bag					
Plastic Bottle					
Tin Can					
Bread					
Banana Peel					

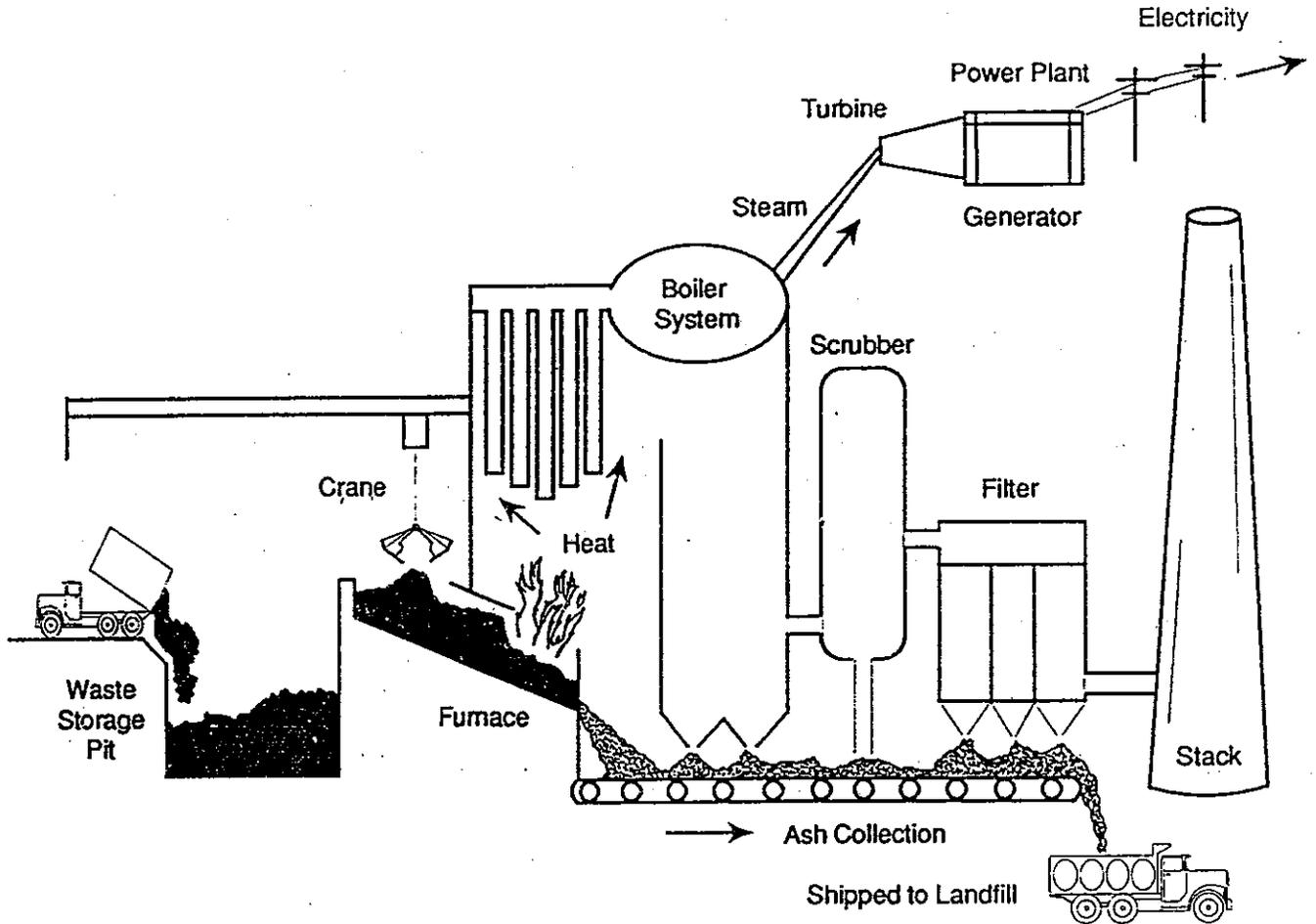
Distribute copies of, or project on an overhead, the diagram of a combustor on p. 60. Help students trace the following steps:

1. Trucks dump waste into a pit.
2. The waste is moved to the furnace by a crane.
3. The furnace burns the waste at an extremely high temperature.
4. The furnace heats a boiler that produces steam for generating electricity and heat.
5. Ash collects at the bottom of the furnace, where it is removed for disposal to a landfill.

Point out to students that the combustor in the diagram also has two pollution control devices: a scrubber and a fine-particle filter.

Remind students that, as they learned from their experiment, burning does not get rid of all the waste. There is still ash that remains. This ash can be dangerous to the environment, and should be disposed of in a specially designed landfill. One reason that ash can be hazardous is that toxic substances (such as lead in automobile batteries and cadmium in household batteries and some plastic) are more concentrated in the ash than they were in the original garbage. One way to reduce the toxicity of combustor ash is to separate potentially toxic substances from the waste before it is burned. Some of these materials may be able to be recycled. (Refer to Activity 26 for recyclable materials.)

Waste Combustion Plant with Pollution Control System





Objective:
To introduce students to the principles of land disposal.

Vocabulary: leachate wetlands ecosystem

Have students work in pairs to construct mini-dumps. Have each pair cut off the top of a 1-gallon plastic jug and fill it with moist soil. Add small pieces of the following objects: a metal barrette or paper clip, newspaper, plastic, food (apple core, potato peelings), and aluminum foil. Add a little "rain" from time to time.

Explain that the jug represents the way that garbage used to be piled in an open dump. Over the following weeks, periodically examine the objects in the jug to see what, if anything, happens to them. You might want to have students keep a log of their observations or have one log for the whole class.

Over a period of time you can expect the food and newspaper to begin to degrade. (For further discussion of the decomposition process, you may wish to refer to Activities 23 and 24.) The metal will rust. Nothing will happen to the plastic or aluminum foil. Make a chart to display your findings.

Discuss with students why some objects change and others do not. Ask them to think about what implications this has for the environment.

Q

How would an uncovered dump like this pollute the environment?

1. Liquids and metals could leak to the ground-water supply. Students should be able to observe liquid waste collecting at the bottom of the jug. Tell students that liquid waste that comes from a landfill or other solid waste source is called *leachate*. Modern landfills control any leachate that is produced.
2. Gases produced by decomposing materials pollute the air, and may even set off fires and explosions if not controlled. Some modern landfills capture this gas and use it as a source of energy.
3. Many old landfills were constructed in fragile or unstable environments, such as *wetlands*, earthquake zones, or flood plains, where they posed a threat to *ecosystems* or nearby communities.
4. Uncovered dumps produce odors and can be breeding grounds for rats and other disease-causing pests.



Objective:
To familiarize students with modern sanitary landfills.

Vocabulary: sanitary landfill contaminate

Tell students that “open dumps” similar to the one they constructed in the last activity are no longer being built. Current methods for building *sanitary landfills* are safer and more protective of the environment. You might begin this activity by asking students if they can think of ways to build a more environmentally safe landfill.

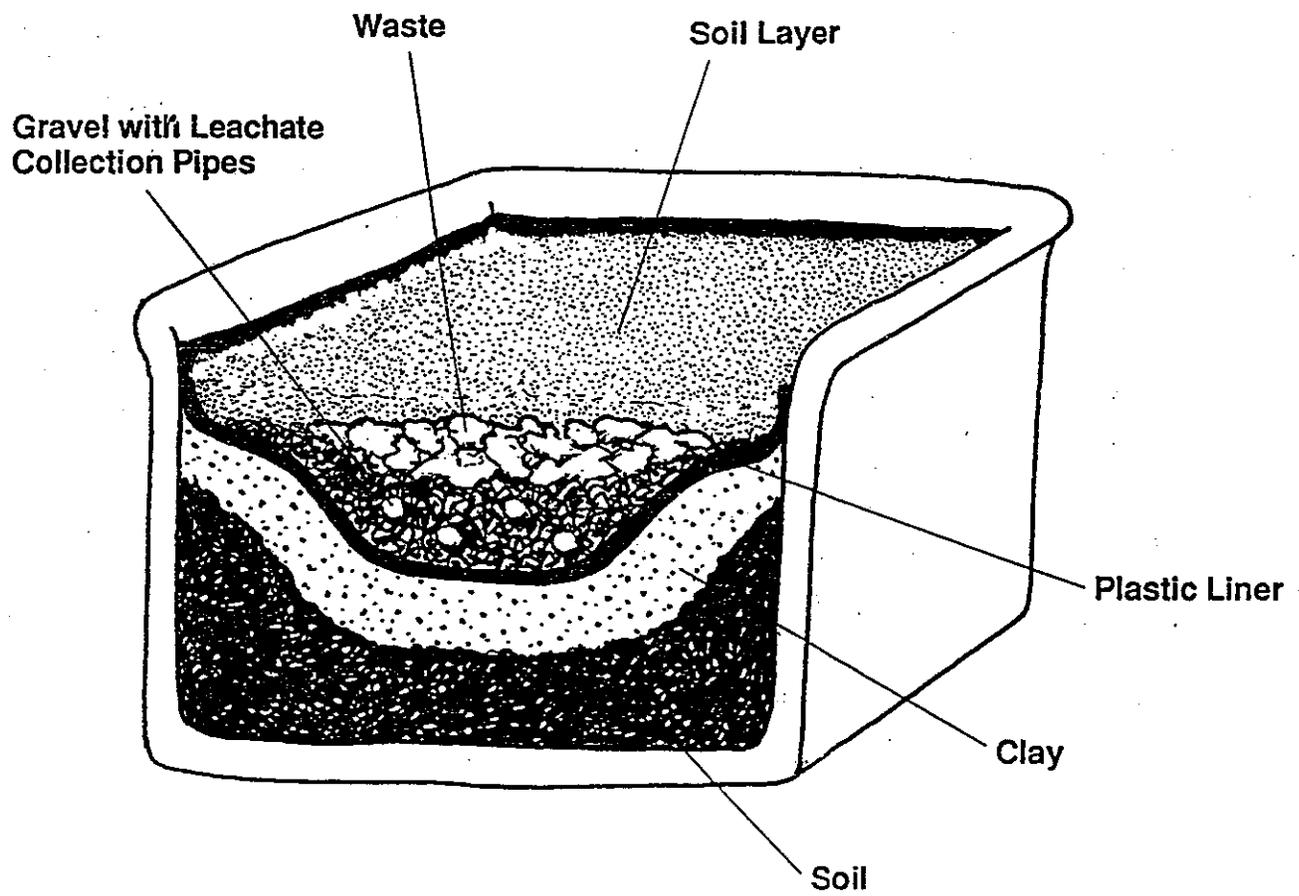
Draw on the board a simplified diagram or distribute copies of the illustration of a model landfill on p. 63. Explain to students that this is an example of one of the more protective landfill designs. Highlight the layers of soil, clay, gravel with collection pipes, plastic liner, and waste. Newly collected waste is covered daily by a layer of soil. Tell students that modern landfills now also control the leachate so that it doesn't *contaminate* the environment.

As a classroom activity, construct a “mini-sanitary landfill” in a terrarium or large glass-bottomed box. Place a variety of wastes (metal, food, paper, plastic) onto the gravel, and cover with a light layer of soil. Sprinkle occasionally with water to simulate rain. Observe changes in the waste materials over time and watch for “leachate” collecting at the bottom.

There should be far fewer changes to materials in this modern landfill than there were in the jug.

- Q** In what ways would it be better if waste was buried in a sanitary landfill—one designed to collect and prevent leachate and to collect gas buildup from decomposition?
- Q** What problems might still remain?
- Q** What might happen if we run out of space to create new landfills?

"Bathtub" Model of Modern Sanitary Landfill





Objective:
To sensitize students to the problems of litter.

Vocabulary: **litter**

Discuss litter.

- Q** What is *litter*? Name some types of litter found on the way to school.
- Q** What is the most common type?
- Q** Who are the worst litterbugs?
- Q** What are the social and environmental costs of litter?
- Q** How could littering be reduced or stopped?

Organize a litter cleanup at a community park or recreational area. Discuss ways to encourage people not to litter. If cameras are available for student use (or students have their own), encourage students to take pictures of areas of unsightly litter in the community. Create a bulletin board display, labeling the photos with captions describing where the pictures were taken, and what, if any, steps are being taken to alleviate the litter problem. Such a display might even be used at a town meeting or by a community action group.



Objective:
To increase students' awareness of the quantities of waste in their own community and the costs of disposal and management.

Vocabulary: tipping fees true costs

Discuss with students the types and quantities of waste they throw out in their own homes. As a homework assignment, have the students collect and weigh all the garbage that their household throws out in 1 day. Make sure they include newspapers, writing paper, bags, bottles, jars, cans, food wastes, yard wastes, and packages.

- Q** How many pounds of garbage does your household throw away each day? (Students will need to weigh bags of garbage at home.)
- Q** How many pounds does one person in your household throw out in 1 day? (Divide first value by number in the household.)
- Q** How does this compare to the national average of 4 pounds per person per day?
- Q** Where else except our homes do we throw things away? (Consider waste generated at school, shopping malls, at a friend's house, etc.)

Find out the population in your community. Based on the amount of waste generated each day by an individual in your household, answer the following:

- Q** How many tons of solid waste are generated in your community per week, month, and year? (Remind students that 1 ton = 2,000 pounds. You might wish to relate the weight of a familiar object, such as a car, to a ton.)
- Q** How many tons of garbage do U.S. households throw away each year based on your calculations? (U.S. population = approximately 248 million [1989 projection])

Tell students that an estimated 180 million tons of solid waste are generated in the United States each year. This is enough to fill a convoy of garbage trucks reaching halfway to the moon.

Find out from your Department of Sanitation the waste management costs of 1 ton of refuse. (Landfill *tipping fees* range among communities from \$6 to over \$100 per ton; tipping fees for

waste combustion range from \$20 to over \$60 per ton.) These costs may not include the initial capital costs of buying land for building waste facilities or the costs of cleanup of already contaminated areas. The total or *true cost* of waste management is difficult to assess and far exceeds the day-to-day costs of disposal or combustion.

Q Based on the cost of managing 1 ton of refuse, how much would waste management cost your community in 1 year?

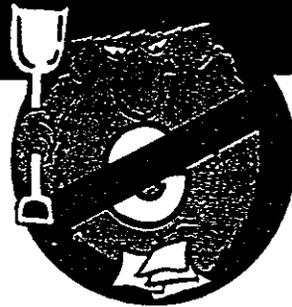
Q Where does this money come from? If this cost were divided equally, how much would your household need to contribute to waste management? Is this more than what you are able to save in a year?

To follow up, find out how much the weight and cost of waste management has changed in your community over as many years as records are available. Graph the results to show the increase. You might wish to have students speculate on the costs of waste management in another 10 years, 20 years, etc., based on current rates of increase.

UNIT THREE

How Does Waste Affect Our Resources?

7-12



Objective:
To introduce students to the concept of natural resources.

Vocabulary: natural resource

List on the blackboard the different materials that compose refuse. Trace each of these back to its original source. (Paper to wood to trees to soil to earth; glass to sand to rocks to earth; metal to rocks to earth; plastic to petroleum to fossil plants to earth; food to animals and plants to earth.) You may wish to refer to the illustration on p. 25.

Investigate where different objects in your classroom come from.

Introduce the term *natural resource* as anything that is supplied by nature that has plant, animal, or human utility.

Q

What are the natural resources in the list on the board?

Q

Why are natural resources important?

Q

Are our resources in endless supply?

Q

What will happen if we continue to waste our natural resources by burning, littering, or burying them?

Q

Can you think of anything that does not use up natural resources?

**Objective:**

To introduce the concept of renewable versus nonrenewable natural resources.

Vocabulary: renewable nonrenewable aluminum
 petroleum bauxite

Obtain a collection of items that would normally be included in the waste stream. The collection should include examples of products from natural resources that both can and cannot be renewed (or recreated).

Reproduce the "Resource Tree" on p. 69 and distribute to the class.

Using the diagram, have students identify the raw materials used to make each item and decide whether they are *renewable* or *nonrenewable*. In the discussion, point out that *aluminum*, tin, steel, and *petroleum* are all *nonrenewable resources*. Help students to understand that some materials are not renewable because they are the result of geological processes that take millions of years to complete. Nonrenewable resources are in limited supply and once they are used up, they are gone forever.

Paper and cardboard come from the *renewable* source of wood (trees), but wood is being used at a faster rate than it can be produced commercially. At the conclusion of the discussion, students should be able to place any piece of solid waste into the categories of renewable and nonrenewable resources.

Aluminum cans, from *bauxite* (nonrenewable)

Tin-plated steel cans, from iron and tin (nonrenewable)

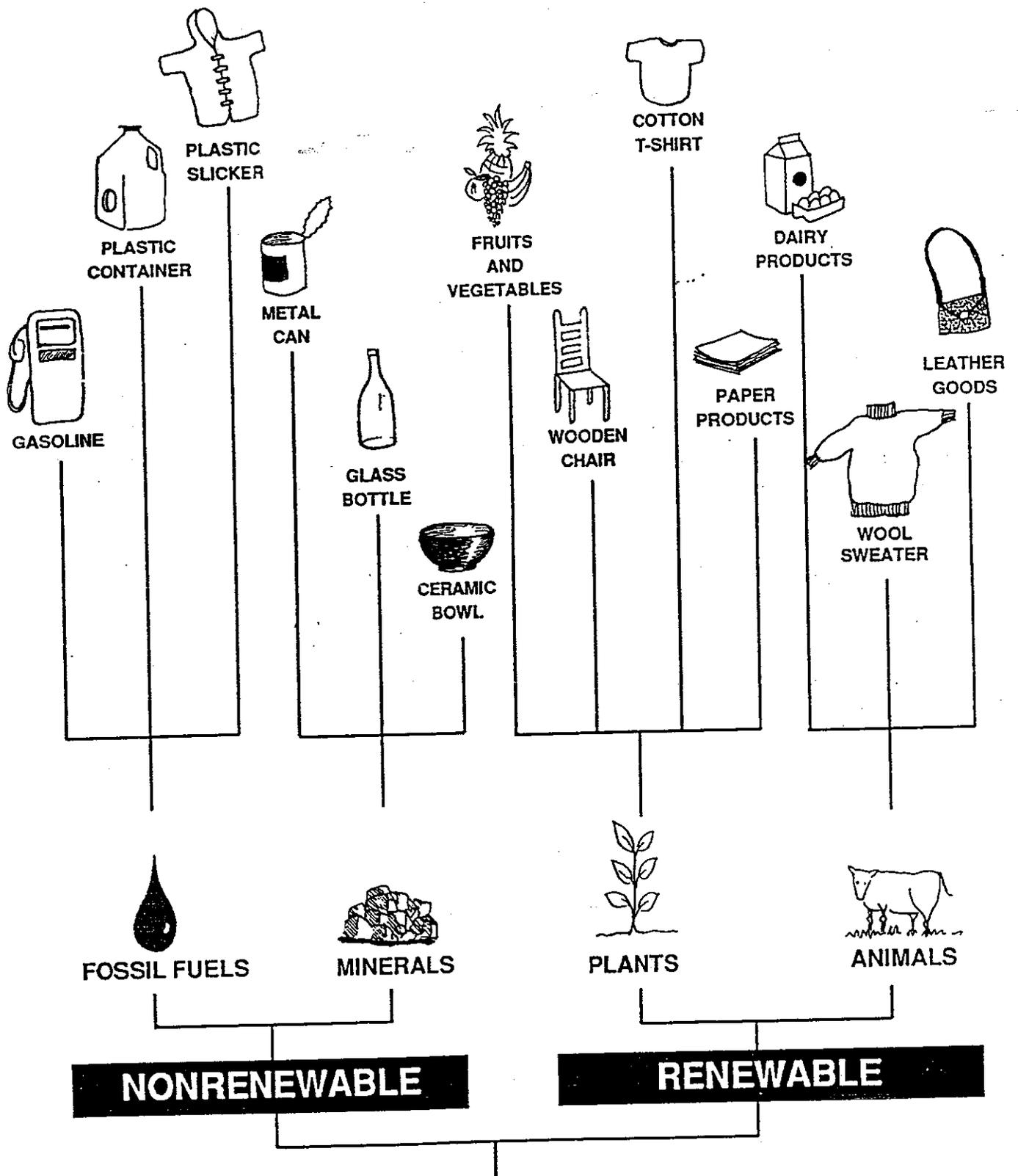
Glass bottles, from sand, soda ash, and limestone (nonrenewable, but in plentiful supply)

Paper, from wood (renewable)

Cardboard, from wood (renewable)

Organic waste, such as plant clippings and food scraps (renewable)

Plastic containers or bags, from *petroleum* (nonrenewable)



EARTH'S RESOURCES



Objective:
To acquaint students with the components of solid waste.

Vocabulary: **municipal solid waste stream**

Reproduce the "pie chart" trash can on p. 71 showing the constituents of the *municipal solid waste stream*.



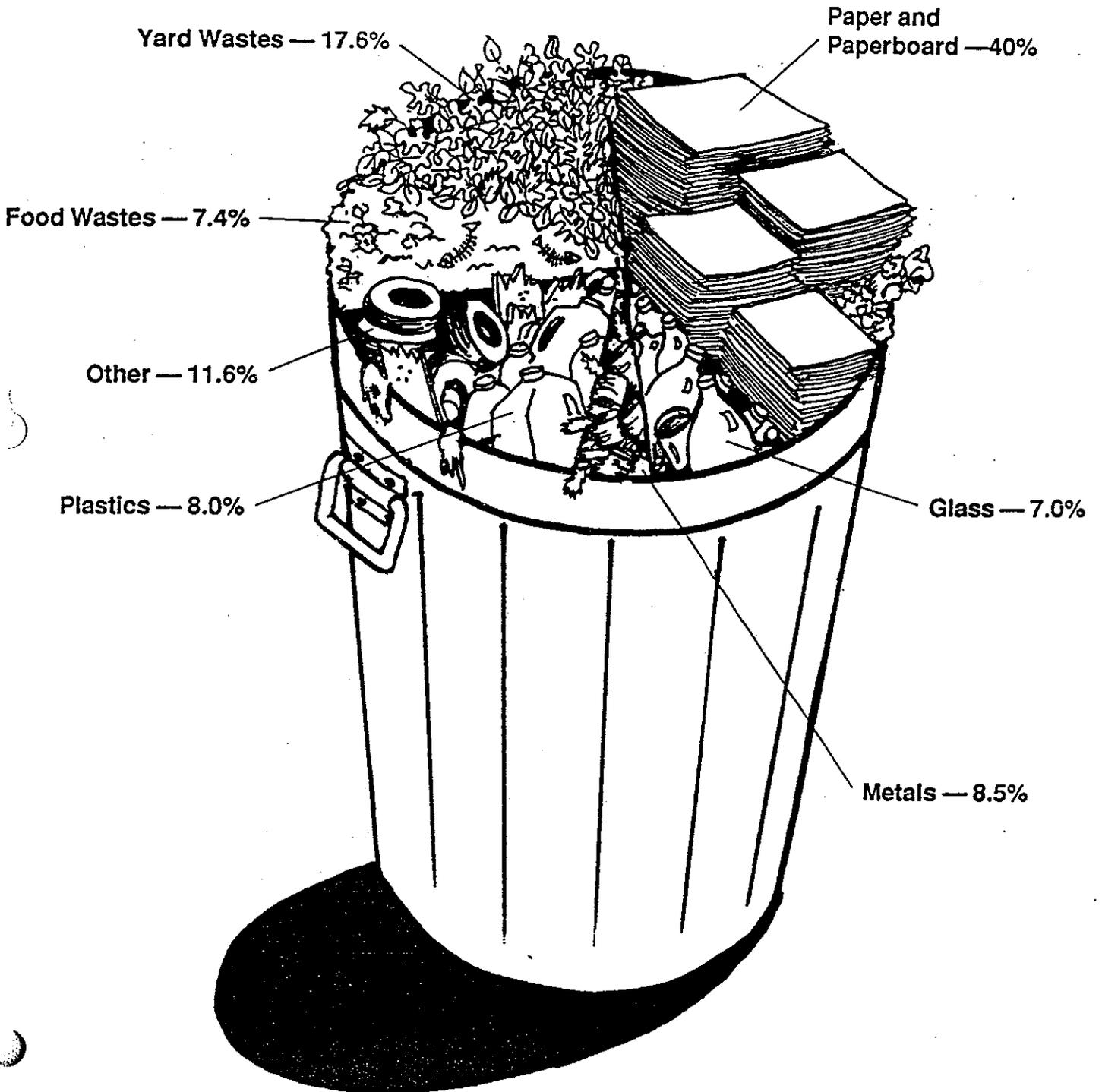
What percentage of the total solid waste stream represents nonrenewable resources?

Remind students that the total amount of waste generated by Americans each year is 180 million tons. Based on that figure, ask students to calculate approximately how many tons we generate of each of the materials on the chart.

Have the students imagine the land space required to dispose of these items. Also remember that these are only final products; much more waste is generated in the manufacturing processes for many of these items.

You might want to impress students with the "mind-boggling" statistics in Activity 14 (K-6) or reproduce the Clip Art on p. 12 for distribution to the class.

Materials Discarded into the Municipal Waste Stream*



* Numbers do not add up to 100% due to rounding.



Objective:
To identify the sources of natural resources and gain an appreciation of their scarcity.

Vocabulary: raw materials consumption import export

Mount a map of the world on the wall. Have the students list the *raw materials* used to make paper, plastic, metal cans, aluminum cans, rubber, etc. Include oil as the energy source to manufacture these products. (Activity 14 presents a more detailed discussion of energy as a resource.)

Pinpoint the primary source(s) for each material on the map. You may wish to turn this into a short research activity, providing students with encyclopedias or other reference books to locate resource suppliers.

Have students find out the populations of the United States and several other countries (for example, China, India, France, Saudi Arabia, Brazil). Then have them compare resource *consumption* among these countries.

- Q** What countries do we *import* natural resources from?
- Q** Does our consumption of resources affect the people in these countries?
- Q** What resources might we *export* to other countries?
- Q** What could happen if other countries begin to consume as much as we do?
- Q** What could happen if available resources begin to run low? What would be the effects on society?
- Q** How might scarcity of resources affect relationships between countries?
- Q** How can we begin to lessen our dependence on foreign countries for resources? How might these actions affect individuals in our society?

Discuss solutions including reducing consumption and reusing materials.



Objective:
To explore energy as a resource
and discuss different sources
of energy.

Vocabulary: solar nuclear geothermal conservation

Q Is energy a resource? Why?

Q What sources of energy are available for human use? (Answers may include oil, coal, wind, water, *solar, nuclear, geothermal*, etc.)

You might want to briefly review any energy sources or processes that students are not familiar with.

Solar - Energy from the sun. Remind students that “solar” energy keeps the earth warm and allows living things to grow. Tell them also that solar energy can be captured and stored so that it can be used to heat air and water in homes and for industrial uses.

Nuclear - The energy that is released when one of the smallest units of matter, the atom, is split. Nuclear energy is used to heat homes and power industry.

Geothermal - Energy captured from the internal heat of the earth.

Q Are any of these in short supply?

Identify and list the types of energy and points where energy is required in the mining, transportation, and manufacture of glass, paper, plastic, or metal items. Point out that resource *conservation* reduces energy use and that recycling some used materials takes less energy than manufacturing the original product (aluminum and motor oil, for example).

Q What are some of the effects on the environment of producing and transporting different types of energy?

Elicit from students some of the problems associated with energy production:

Offshore oil drilling can pollute coastal waters and can harm marine wildlife.

Oil spills, such as the 1989 *Exxon Valdez* accident, contaminate millions of gallons of water and can harm wildlife.

Dams built to produce electricity change land geography and sometimes make regions more vulnerable to flooding.

Burning coal produces air pollution.



What types of energy produce the fewest adverse environmental effects? (Answers may include solar, geothermal, and wind energy.)

Discuss the option of burning solid waste to generate energy and reduce the need for other fuels. Remind students that, as they learned in Activity 5, modern waste combustors generate electricity or steam as they burn garbage.

UNIT FOUR

How Can We Produce Less Waste?

7-12



Objective:
To introduce students to the concept of source reduction.

Vocabulary: source reduction toxicity

Q What comes to mind when you think of sources of pollution? (cars, factories, sewers, litterbugs)

Q Have you ever thought of yourself as a pollution source? In what way?

Elicit from students that whenever they throw something away, they are acting as a pollution source.

Q What do you think the term *source reduction* might mean?

Help students understand that source reduction refers to any activity that reduces waste before it can be generated — at the source. Explain that source reduction involves reducing both the amount and the *toxicity*, or harmful ingredients, of what we throw away. Important source reduction activities include:

Making products last longer.

Cutting down on product packaging.

Substituting nontoxic or less toxic products for those containing potentially harmful ingredients.

Reusing products.

Brainstorm with students on ways they could cut down the amount of waste that they produce at school or at home. Ask them to keep a running list as they work through the activities that follow.



Objective:
To explore historical changes that have contributed to increased waste.

Vocabulary: **disposable durable**

Call on volunteers to name examples of *disposable* items they have used and list them on the board. Ask students to give specific reasons why they choose certain disposable items over more *durable*, long-lasting products. (cost, availability, convenience, effectiveness, novelty, attractiveness)

Tell students that in 1989, people in the United States threw away approximately 1.6 billion pens, 2 billion razors and blades, and 16 billion diapers.

Q Do you think people living 100 years ago used as many things that could be thrown out after one use? Why or why not?

Elicit from students that people in the past often did not have the choice to buy disposable products. Because there were fewer products available and less variety, people bought what they could find and tried to make them last as long as possible. Advances in industry and technology have made certain products cheaper and easier to mass produce so that it is now sometimes less expensive to buy a new product than to fix an old one. You might ask students whether they have ever encountered this situation.

To answer the question raised above in more depth, investigate the way people lived in your community 50 or 100 years ago. Contact a local historical society or museum, or conduct research in a local library. Based on their research, have students form groups to invent

scenarios of resource use and garbage disposal for a "typical family" from a certain period in the community's history. Students will want to consider food and eating habits, clothing, energy use, cleaning, and recreational activities. Have groups compare their findings with current lifestyles and present what they discover to the class.

In a followup discussion, encourage students to discuss what choices they can make to reduce their use of disposable products and extend the life of things that they already own. Suggestions might include:

Buy reusable products and avoid disposables.

Buy durable products and repair items that can be fixed.

Reuse bags, containers, paper, boxes, and other items.

Borrow or rent things that you don't use very often.



Objective:
To help students appreciate the contribution of packaging to the solid waste stream.

Vocabulary: packaging efficiency polystyrene
 bulk quantities

Packaging materials account for more than 30 percent of all consumer waste. This packaging has increased rapidly over a very short period of time — from 24 million tons in 1960 to 56.8 million tons in 1988. In earlier times, packaging was at a minimum and items were sold in either natural or reusable containers, such as milk bottles which were refilled on a daily or weekly basis. Today, many packages are designed to be disposable, from fruit juice cartons to plastic bubble packs that hold a dozen screws.

Discuss the purposes of packaging. Some of these are reduction in waste due to spoilage, prevention of contamination, increased *efficiency* in distribution, portion control, and product attractiveness.

To demonstrate how lifestyles affect the amount and types of packaging used, have the students make up a typical meal. List all the containers and packaging that come with the items. Remember a glass bottle or can is a package. An example of such a meal might be:

Chicken — clear plastic over *polystyrene foam* plate

Carrots — plastic or paper bag, or box if frozen

Milk — waxed cardboard carton

Rice pilaf — cardboard box, one or more plastic packages

Cookies — plastic container or box with inner wrappers

Q What purposes do the packages from the meal we've selected serve? (preserve food, hold liquid, keep components of a product together, convenience, visual appeal)

Q Are any of these products overpackaged? Can you give some examples of overpackaging? (gum wrappers with each stick double wrapped and a box enclosing the entire package, individually boxed servings of drinks or snacks, microwave or TV dinners)

Q Can you suggest some alternative packaging for your imagined meal? (use of refillable containers, buying in *bulk quantities*, fewer layers of packaging, juice concentrates)

Q What kinds of packaging have changed and which have remained the same over the last few years? (Juice, milk, and soda containers have changed from glass to plastic; cereal boxes and salt containers have remained relatively unchanged.)

Q Are there any examples of packaging actually being reduced? (Some manufacturers have begun to offer detergent in concentrates, more products are available in bulk quantities, bouillon cubes have replaced some canned stock, many juices are now available in frozen concentrates.)

Ask students to speculate about why packaging practices may have changed. (to reduce the amount of waste generated, attractiveness, to make product stand out from others, in response to consumer demands for convenience, health and safety reasons)

Q Explain to students that in addition to looking at the *amount* of product packaging, they should also consider whether the packaging materials can be recycled.

Q Which of the packages chosen for your imagined meal could be recycled or could be made from recycled materials? (cardboard boxes, plastic or glass beverage containers)



Objective:
To explore options for reducing packaging.

Send students on a survey of their local supermarket looking for examples of the following three types of packaging:

1. **Natural packages (oranges, nuts)**
2. **Older and reusable packages (paper bags, paper wrapping, glass jars that become drinking glasses, returnable bottles)**
3. **Modern packages (plastic, polystyrene, tin foil, individual wrappings)**

Ask students to list five examples from category 1, five from 2, and ten from 3. Compile their findings and make a combined list for the entire class.

Q

What purpose does the packaging serve for each of the items on the list?

Q

How dependent is the product on the package?

Q

How could each package be reused or recycled?

Q

What alternate packaging could be used that is more environmentally sound?

For each item on the list, decide which packages create excessive waste and which minimize waste.

Discuss some other packaged products students might find in a grocery store. Have students distinguish between products that must be packaged the way they are, and ones that could use less packaging. Initiate a discussion of what students could do to promote the use of less packaging when they shop. Elicit from them that they could buy only products that have no unnecessary packaging and contain no materials that could be harmful to the environment. They could also bring some of their own containers (for bulk cereals, nuts, etc.) from home or reuse shopping bags. Emphasize to students that buying products in bulk quantities produces less waste.

Suggest to students that they write to product manufacturers or store managers to encourage them to make or to stock items that use less packaging. You might also want to choose one particular manufacturer, and write a letter as a class.



Objective:
To introduce students to the idea that certain types of waste can be reused.

Vocabulary: junkyards antiques

Have students think about the different kinds of things people throw away.

Q Where did the used items at scrap or *junkyards* and *antique* stores come from? What might there be in one person's trash that might be a treasure to others? Relate any personal experiences with such discoveries.

Q Has anyone in the class sold scrap metals, used appliances, or furniture for money?

Emphasize that many things that we throw away have value and can be reused.

To practice reuse in the classroom, hold a clothing drive or toy collection and donate what you collect to a local Goodwill or Salvation Army.

Ask students to think of other ways in which waste could be used rather than disposed of. Briefly discuss with students the possibility of recycling certain materials such as bottles, plastic, soda cans, and newspapers.

Q What can we do with yard wastes such as grass clippings and raked leaves?

Elicit from students the idea that yard wastes can be composted to produce fertilizer that enriches and improves the consistency of poor soils.

Note: Further discussion of recycling begins with Activity 25. Composting is discussed in more detail in Activity 24.



Objective:
To explore options for reducing the toxicity of products.

Vocabulary: household hazardous waste green products

Ask students to identify some household products that contain ingredients that may be harmful to their health or to the environment: Household batteries contain lead and cadmium, which are both toxic elements. Other examples are turpentine, drain cleaner, chlorine bleach, flea repellent, mothballs, bug spray, air fresheners, and chemical fertilizer. Discuss with students the problem of disposing of these *household hazardous wastes*. Help them to understand that these products should not be thrown away in the trash to be landfilled or combusted because the poisonous components could contaminate the environment. Instead, many communities hold special collection drives or have dropoff centers to coordinate the safe disposal of household hazardous wastes. If there is one in your community, take students to see how it is run. (Note: Do not allow students to run such a collection themselves.)

Emphasize to students that an important way to reduce the problem of household hazardous waste disposal is to use less-toxic products. Explain that nontoxic substitutes exist for many of the products named above. Baking soda, lemon juice, and vinegar are a few common items that can be used instead of many toxic cleaners.

Have students conduct the following experiment to demonstrate the use of a nontoxic substitute for silver polish. If possible, conduct this activity in a laboratory equipped with stations for pairs of students.

Boil 2 to 3 inches of water in a shallow pan with 1 teaspoon salt, 1 teaspoon baking soda, and a sheet of aluminum foil. Submerge a piece of tarnished silverware in the solution and boil for 2 to 3 minutes. Use a cloth to wipe away tarnish. Repeat the procedure if tarnish remains.

Emphasize that all of the ingredients they have just used are safe and can be found in their own homes. For some grade levels, you may want to conduct this activity in conjunction with a chemistry unit on ion exchange.

Have students research the use of nontoxic substitutes as alternatives to toxic products. Local organizations such as chapters of the League of Women Voters and local conservation commissions may be able to provide you with information about toxic products and lists of alternatives.

Tell students that the term *green products* is often used to refer to products that are "environmentally friendly" — don't harm or unnecessarily pollute the environment. Here are some examples of toxic products and nontoxic substitutes:

Turpentine — Use water with water-based paints instead

Drain cleaner — Plunger; boiling water mixed with baking soda

Flea repellent — Garlic, brewers yeast; herbs such as fennel and rosemary

Mothballs — Cedar chips or herbal sachets

Bug spray (ants and roaches) — Lines of chalk or charcoal dust, talcum powder, and cayenne peper; bōrax

Air fresheners — Baking soda, fresh flowers, herbs

Chemical fertilizer — Compost

Remind students that they can also reduce the amount of toxic material they throw away by purchasing reusable products, such as rechargeable rather than disposable batteries.

Have students compile their findings into a bulletin board display or a fact sheet for distribution to the school or community. They might also create a promotional brochure or poster for a local household hazardous waste collection.

UNIT FIVE

What Can We Do About Waste?

7-12



Objective:

To introduce students to the concept of natural cycles, and how they can be disturbed.

Vocabulary: natural cycle nutrient photosynthesis
carbon dioxide greenhouse effect acid rain

Ask students to describe what is meant by a cycle in nature. Elicit examples of *natural cycles* from students and write them on the board. Discuss the following natural cycles with students.

Nutrient Cycle

1. Plants take up *nutrients* from soil to make sugar.
2. Animals eat plants and return nutrients to soil through body wastes.
3. Plants and animals die and decay, returning nutrients from decaying parts to the soil.

Oxygen Cycle

1. Plants give off oxygen as a waste product of *photosynthesis*.
2. Animals take in oxygen for respiration.
3. Animals exhale *carbon dioxide* (CO₂).
4. Plants use CO₂ for photosynthesis.

Water Cycle

1. Sun evaporates water from oceans and lakes.
2. Cooled water vapor forms clouds.
3. Clouds release water as rain.
4. Plants and animals use water.
5. Water not used runs into lakes and oceans or seeps into the ground.

Mineral Cycle

1. Matter is continually being built up into mountains and then eroded into sediment.
2. New mineral matter is vented from volcanos while other minerals are returned to the earth's interior.

Q

Can you give any examples of ways these natural cycles are disturbed by human beings?

Oxygen Cycle. Too much CO₂ in the atmosphere may contribute to the *greenhouse effect*. CO₂ and other gases in the upper atmosphere act like a pane of glass in a greenhouse, trapping heat and reflecting it back to earth, causing a gentle warming. This warming could cause catastrophic changes in the earth's temperature. Excess carbon dioxide comes from the burning of fuels such as coal, oil, and natural gas; as well as the destruction of vast regions of forest, such as the rain forests in South America.

Water Cycle. Air pollutants react with sunlight and water vapor in the earth's upper atmosphere to form acidic compounds. These compounds then fall to the earth as rain or snow during storms, or with dust or other dry particles in the air. This *acid rain* damages both plant life and soil.



Objective:
To demonstrate the principles
of the water cycle.

Vocabulary: terrarium condensation

To illustrate the water cycle, make or show students a *terrarium*. The following materials are needed: glass container with an airtight top, gravel, soil, and various types of small plant life.

Once the terrarium is in operation, have the students observe the water droplets clinging to the top.

Q Where does this water come from? Is it necessary to ever add water to a terrarium?

To further illustrate *condensation*, point out to the students that when the weather is cold they “see their breath.” This is due to water vapor being released as we exhale warm air and condensing on contact with colder air. The same process is involved in cloud formation. Steam is another example.



Objective:
To demonstrate the
nutrient cycle.

Vocabulary: fungi bacteria

To illustrate the nutrient cycle, divide the students into groups and have each group take a soil profile by digging out a wedge of soil about 4 to 6 inches deep. Select a location where there are freshly fallen leaves. Have students observe the layers of leaf breakdown into the rich topsoil by peeling off each layer.

Q What other things besides leaves can you find in the profile that might hasten decay? Look closely.

Explain to students that plant material is returned to the soil by the action of *fungi* and microscopic *bacteria*. These organisms are vital links in nutrient cycles.

Conduct the same type of investigation using a rotting log.

Q How do its "inhabitants" hasten decay?

Explain to students that the group of organisms called fungi include mushrooms, toadstools, and molds. Together with bacteria, they feed on organic matter, breaking it down, and converting it into nutrients that can then be used by plants.



Objective:
To introduce students to the principles of composting.

Vocabulary: **composting** **windrows**

Explain to students that *composting* is a process by which plant material is returned to the soil, as it is in the nutrient cycle. The composting process enriches and improves the consistency of the soil while reducing the amount of solid waste requiring disposal.

Have students make and investigate their own compost operation.

1. Place the following or similar food wastes in a plastic bag or outdoors in a marked area: apple peels, leaves, old bread, coffee grounds, green tops of vegetables, potato peels. Meat and grease should not be included.
2. Chop and mix them up with some water and yard waste such as leaves or grass clippings.
3. Twist and tie the bag securely, or cover the mound with earth.
4. Open the bag once a day to allow oxygen inside. Explain that oxygen is needed by the microscopic organisms to break down the materials.

Discuss what is going to happen. (Wastes will begin to decompose, and to grow uniform in color and texture.) Have the students keep a record of the process of decay. Note odors, texture, and other changes.

Q Which materials decay the fastest?

Q How long does the complete decay process take?

Prepare a wet-mount microscope slide and stain to microscopically examine the organisms involved in the process of decomposition.

Q How many different types of organisms can be found?

Q What would our landscape look like if these organisms did not exist?

Q What objects would not decay if placed in our compost pile?

You might want to try using the compost generated to fertilize a garden at the school and monitor its growth.

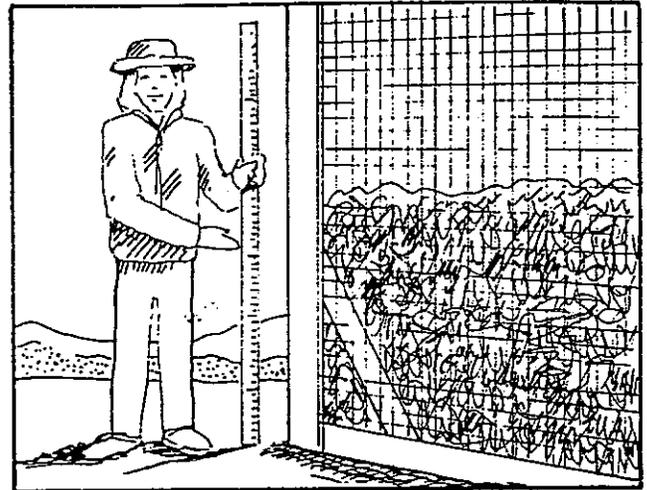
Ask students if their households have ever kept compost piles of yard or kitchen wastes. Have them discuss their experiences. Tell students that some cities use large composting operations to process a portion of their residential waste. Most often yard waste from the entire community is collected with the local trash pickup and laid out in elongated piles or *windrows*. The windrows are turned periodically and the compost is used by residents in their yards and gardens, or by landscapers on golf courses, along highways, or in local parks.

Encourage students to start their own compost piles at home with their parents' permission. Photocopy the illustration on p. 88 and distribute to the class. Go over the simple set of instructions and have students study and discuss the picture. (For more information about composting, refer to the Community Compost Education Program materials in the Resources section.)

Steps to Backyard Composting



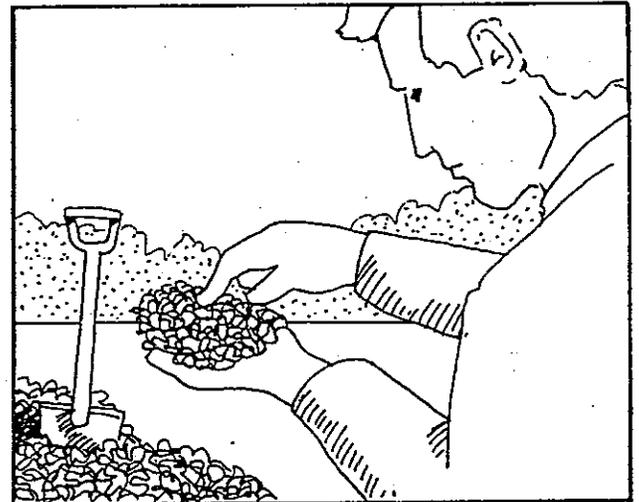
1. Spread a layer of leaves, grass, weeds, or straw inside an enclosed area. Add food wastes, garden refuse, and/or animal wastes. Avoid meat scraps, fats, and oils.



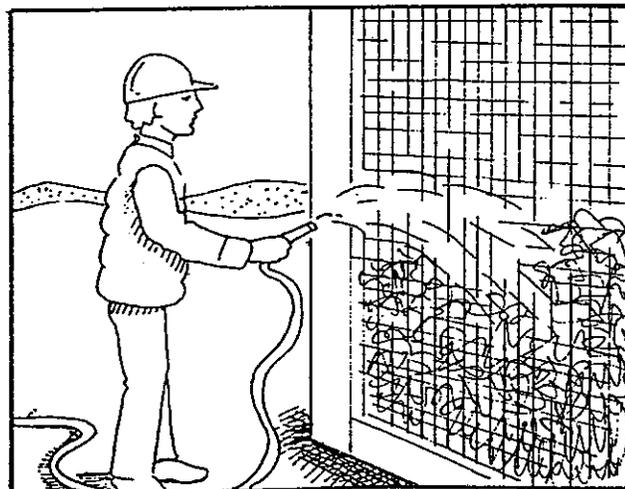
2. Layer the materials to a depth of 5 to 10 feet.



3. Sprinkle with an inch or two of soil, and moisten with water.



4. Turn the pile occasionally to circulate air and distribute moisture.



5. When pile no longer heats up, it is ready to use. Compost should be dark and crumbly.



Objective:
To acquaint students with the meaning of the word “recycle” and the recycling symbol.

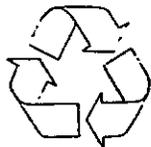
Vocabulary: recycle recyclable

Write the word *recycle* on the board. Ask students to break up the word into its parts: RE-CYCLE.

- Q** What does the prefix “re” mean?
- Q** What are some other words that begin with that prefix? (Examples: repair, redo, return, resource, renew, restore.)
- Q** What does the word “cycle” mean?

Elicit from students the meaning of the word *recycle*: to do or use over and over again. Considering what they have learned about natural cycles, ask students how the word *recycle* might apply to our use of resources.

Explain to students that although we can greatly reduce the amount of waste we generate, some waste materials will continue to be produced. Many of these, however, can be remade into useful products. Have students name some waste materials that can be recycled. Show students the recycling symbols below. Explain that the three arrows of the symbol represent the three stages necessary to recycle materials: collect, remake, reuse. Tell students that products made of recycled materials may have the symbol on a black background displayed somewhere on the package. Products made of *recyclable* materials, materials that could be recycled, display the symbol against a white background. Ask students if they have ever purchased any products that they know were made of recycled materials.



Made of
Recyclable Materials



Made of
Recycled Materials

- Q** How can recycling reduce pollution and the cost of waste disposal?

**Objective:**

To review solid waste problems and learn how glass, paper, plastic, used oil, aluminum, yard waste, and tin-plated steel cans are recycled.

Vocabulary: cullet ore caustic pulp
 fibers electrolysis ingots

Discuss the sequence of steps in recycling the following materials.

Glass is made from soda ash, sand, and lime. It can remain in a disposal site indefinitely and does not break down into its organic components. To be recycled, it must first be sorted by color and crushed into small pieces called *cullet*. The cullet is melted down into a liquid and then molded into glass containers. Other products made from recycled glass bottles are insulations and road-construction materials.

Aluminum is made from *bauxite*, an *ore* that must be mined from the ground. It takes a great amount of electricity to produce aluminum. Nature cannot decompose or break it down, so disposal is a problem. When recycled, aluminum is melted and then shaped again into new cans and other items. Making aluminum cans from old aluminum takes only 5 percent as much electricity as making cans from bauxite.

Tin-plated steel cans are made of iron ore and tin, both nonrenewable resources. The cans will eventually rust and break down, but throwing them away is a waste of valuable metals. In the recycling process, the cans are put into a huge container with holes in the bottom. This container is immersed in a *caustic* solution which dissolves the tin from off the cans. Then the steel cans are washed and sold as high grade steel. The dissolved tin is then removed from the caustic solution by *electrolysis* and made into *ingots* which are then sold to companies requiring tin.

Paper is made from trees. Paper is recycled by first shredding it into small pieces and mixing it with water. This mixture is beaten into a mush-like *pulp* which flows onto a moving screen through which most of the water passes. The wood or paper *fibers* remain. The fibers are pressed through heavy rollers that remove more water and then sent through steam-heated dryers. The result is recycled paper. You can make recycled paper in class (see instructions in K-6 section of guide, Activity 26).

Plastic is made of petroleum. It can be recycled either as a mixture of different kinds of plastic or as a single type. Separating plastic by type enables manufacturers to produce higher quality recycled products, or those closer to what could be produced from virgin materials. Polyethylene terephthalate (PET) (soft drink containers) and high density

materials. Polyethylene terephthalate (PET) (soft drink containers) and high density polyethylene (HDPE) (milk containers) are the plastics most commonly used in beverage containers and the types most easily separated. In the recycling process, plastics are melted down and reshaped into the recycled products. Some of the common uses for recycled PET are fiber, structural molding, and containers. HDPE can be recycled into bottles, toys, pipes, crates, and a variety of other products. Products of mixed batch plastic recycling include garbage pails, car stops, manhole covers, park benches, plastic "lumber," and railroad ties.

Used motor oil collected from people who change their own oil (do-it-yourselfers) can be recycled safely and effectively. It can either be cleaned and used as fuel to be burned in asphalt plants or cement kilns, or it can be rerefined and used again as motor oil. The process of rerefining used motor oil is much cheaper and easier than processing virgin oil.

Yard waste, such as grass, leaves, shrubs, and tree clippings, can be collected and composted by individual households or on a community-wide level. The composting process is described in Activity 24. The compost product from large-scale processing can be distributed to the community as fertilizer for landscaping, gardens, or agricultural uses.

In this activity, students research the "life cycle" of a particular type of waste. Break students into groups and assign one of the types of waste listed below to each group. Reproduce and give each student the questionnaire on the following page to help them tell about their particular resource.

Aluminum Can

Plastic Tube

Cardboard Box

Tin Can

Glass Bottle

Have the groups present their findings to the class. They should make use of drawings, models, or other visual aids and try to make the presentation as informative and entertaining as possible. Older students may wish to make a film or videotape showing the life cycle of their chosen object. These films could be shown to the class or combined in a presentation to the entire school.

THE STORY OF THE _____

1. What does it look like?
2. Why does it have a label?
3. What are some of the things it is used for?
4. What is it made of?
5. Where does the manufacturer get the raw materials to make it?
6. Are large amounts of these raw materials available?
7. How many years will it be before these raw materials run out?
8. Does the process of extracting these raw materials from the earth pollute the land, the air, or the water? If so, how?
9. How do manufacturers change the raw materials to make the product?
10. Does the changing of the raw materials pollute the land, the air, or the water? If so, how?
11. Is the item thrown away after it is used?
12. What effect would this item have if it was littered on the ground or in a body of water?
13. What chemicals are released when it is burned? Are they harmful if released into the environment? Can they be filtered and disposed of properly?
14. Does the item break down into earth again if it is buried? If so, how?
15. Does it disintegrate if thrown into a river, lake, or ocean? If so, how?
16. What are some ways in which it could be reused?
17. Can it be recycled? Is it currently recycled? Where?
18. How is it recycled?
19. Can it be safely burned to produce energy from heat?
20. Who pays the real cost for manufacturing this item?
The manufacturer who makes it?
The company that uses it?
The consumer who buys it?
21. Who is responsible for disposing of it? Who pays the cost for disposal?
22. Do you think this item makes a good container? Why or why not?
23. Could we have avoided using this container? How?



Objective:
 To investigate a common manufacturing process, its use of resources, and its production of waste.

Vocabulary: post-consumer waste

Visit a papermill or glass manufacturer that produces the products that become our solid waste. Try to find one that uses *post-consumer waste* that has been collected for recycling in the manufacture of its products. Arrange a question and answer session with a representative from such a factory who will talk to students about how recyclable materials contribute to their manufacturing process.



Objective:
 To encourage students to design a system to separate recyclables.

Vocabulary: commingled materials recovery facility

Tell students that sometimes recyclables are not separated before they are collected, but must be separated before they can be recycled.

Q How might a batch of mixed recyclables be efficiently categorized and separated?

Point students in the right direction by having a short discussion about the various physical properties of paper, tin-plated steel, glass, plastic, and aluminum. For example, steel is magnetic; glass is heavier than plastic and aluminum. Then have students use their imaginations to devise a mechanical system for separating these materials out of the solid waste that comes from a home.

You might want to have a contest to design the best separation process, and have students present their inventions to the class through drawings and explanations. After a "winner" has been chosen, explain to the class that there are actually operations called *materials recovery facilities* (MRFs), which some communities use to separate *commingled* recyclables — a mix of recyclable materials. If you can locate one in your vicinity, arrange a field trip so students can observe the process firsthand.



Objective:
**To involve students in a classroom
or community-wide recycling effort.**

Have your classroom recycle its wastepaper and/or other recyclable materials. Coordinate with recycling programs in the community so as not to duplicate their efforts. If one exists in your area, arrange a visit, so that students can see firsthand how one is run.

Call local government agencies or look in the Yellow Pages of your telephone directory under *recycling programs*, *waste paper*, or *scrap dealers* to find markets for your paper, aluminum, glass, plastics, tin cans, or other recyclables. (Refer also to the list of State Solid Waste Agencies in the back of this guide.) Be sure to ask exactly what kind of materials the market will accept (for example, for a paper collection: newspapers, magazines, white bond paper, etc.) so that material collected can be properly recycled.

When you have determined what kinds of materials you will collect for recycling, set up collection boxes so that students can separate their classroom waste and possibly bring in recyclables from home. Emphasize the need to remove labels or clean containers to be recycled as required by the market. The brochure, "School Recycling Programs: A Handbook for Educators," available through U.S. EPA (see Resource list at the back of this guide), contains step-by-step "how to" information on setting up and carrying out different kinds of school recycling programs, from a one-time drive to a long-term effort for the entire school system or a community-wide effort.

Have the students record the weekly or monthly results of their program. Record and graph the reduction in solid waste disposed of through old systems and the amount of glass, paper, cans, or other materials recycled.

The program can also be a money maker, especially with certain materials, such as aluminum. Follow and record the fluctuations in the selling price of the recycled materials. Research the reasons behind these changes. Calculate total money earned by your recycling program. You may want to hold a competition between grades for most money earned or greatest quantity of waste recycled. You might also have students keep a running tally of the number of trees they have saved by recycling paper. Every ton of paper recovered for recycling saves 17 trees from being cut down to make new paper.

Encourage the students to tell their parents about recycling and to bring in recyclables from home.



Objective:
**To calculate how much money
a community could save
by recycling.**

Besides reducing pollution and saving natural resources and energy, your community can save money by recycling. Using the figures from your school or classroom recycling program, estimate how many tons of solid waste have been recycled. (You might need to start by having students weigh specific quantities of different recyclables, such as a box of plastic bottles and a bag of tin cans, and then multiply by the number of each that have been collected for recycling.)

Use the information on tipping fees in your community to estimate how much money has been saved. (For example, if tipping fees are \$30 per ton and you have recycled 10 tons of materials, you will have saved the community \$300 in disposal and management costs.) Add to this amount, the total that you have earned from selling your recyclables to various markets to estimate your community's potential savings. Remind students, however, that the cost of running a recycling program will reduce the community's savings to some degree.

Note: In some areas, the cost of collecting recyclables and a lack of markets could make recycling more expensive than other waste management methods. Recycling still yields net benefits, however, because it saves energy and natural resources, reduces pollution, and conserves landfill space.

Discuss with students ways the community could make more widespread use of recycling (for example, curbside pickups, better publicity, more programs at schools or community centers). Allow them to speculate on how much money their community could save by recycling 25 percent of its solid waste (or more) using the estimate of total waste generated from the Community Profile.



Objective:
To explore attitudes toward recycling and buying products made from recycled materials.

Have the students survey at least three different people concerning their attitudes toward recycling to get an idea of the differences of opinion that exist. They should interview their friends, parents, and neighbors on issues such as whether or not they would be willing to source separate their garbage (for example, setting newspapers in stacks apart from other waste), so it could be more easily recycled.

If your class has access to video recorders or film equipment, encourage them to film their interviews for a class screening. The films can stimulate discussion about the reasons behind people's attitudes, and might also inspire a "documentary" for possible presentation to the entire grade level or school.

Sample Survey Questions

1. Would you recycle your waste? At home? In the office?
2. Why would you recycle? Why not?
3. What would encourage you to recycle?
4. Which aspect of recycling is most important to you?
Saving money?
Reducing pollution?
Reducing the need for additional combustors or sanitary landfill sites?
5. Are you willing to buy products made from recycled materials?
Why or why not?

When the interviews are completed, make a chart on the board and tabulate the results. Calculate percentages of responses to certain questions and prepare the material in the form of a newspaper article or fact sheet.

Based on the answers to question 3, you might wish to discuss with students how they could make a recycling program more attractive to the community.



Objective:
To involve students in the waste management decision-making process.

Explain to students that decisions about waste management are complex because people have different perspectives on the same problem. Everyone, however, has the opportunity to present his or her viewpoint before a decision is made.

Tell students that they are going to consider an imaginary situation in which a county must decide to change its method of waste management. Hand out the fact sheet on p. 99 that presents three different waste management options. Allow time for students to read and study it. You may want to have them work in small groups to come up with their list of specific issues and concerns. When students have finished, hold the following discussion.



What different groups in the community would be affected by the decision?

Elicit from students the following categories of community members (and/or others) and write them on the board:

Farmingtown Residents
Busy City Residents
County Real Estate Developers
Environmental Activists
City Merchants
Manufacturers
City Political Leaders
Waste Haulers

Discuss with students the concerns of each of these groups and encourage them to hypothesize what option members of each group might favor. Be sure to include in your discussion such factors as:

1. **Proximity.** People who live close to a proposed site may have concerns about noise, odor, pollution, traffic, or spoiling of landscape that a facility may cause. Residents or land owners who may lose their properties to the construction of a facility will be particularly upset.
2. **Economic Impact.** Developers may be concerned that property that they are considering building on will decrease in value because of the facility. Merchants may worry that the nearness of a facility will make an area less attractive to tourists and people who come from neighboring towns to shop. Manufacturers will be interested in ensuring that they can continue to dispose of their waste in the most cost-effective manner possible. To a lesser degree, all County residents will also be affected by rising costs of waste disposal.
3. **Social/Environmental Issues.** Environmental groups will be concerned about the effects of facilities on the surrounding environment, including the loss of parkland or open spaces for wildlife. Community members may also worry about the County's image and desirability, as well as the potential industrial growth that could follow the construction of a major waste management facility. There may also be widespread concern about perceived sanitation problems at a landfill or air pollution resulting from a combustor.
4. **Legal and Political Concerns.** Different government agencies will have a variety of concerns, depending upon their areas of responsibility. For example, one agency may have concerns about air quality, another about health, still another about trade and commerce in the County. There are also guidelines to consider in the construction of facilities, and varying costs involved in building and regulating them. Political decision-makers need to balance the needs and desires of all the groups in the community in order to ensure public support.

Be sure you introduce into the discussion the idea of long-term versus short-term solutions to the waste problem.

When you feel the issues have been covered satisfactorily, ask students to write down the option that they would choose, along with a paragraph defending their choice. Then call on volunteers to present their arguments to the class. Allow for the possibility that some students may try to modify the original options by proposing a combination of management techniques, including source reduction or recycling.

FACT SHEET

Background Information

Approximately 25,000 people live in Pleasant County: 10,000 live in Busy City, 1,200 live in Farmington, and 1,300 live outside in surrounding residential and rural areas. The County has always hauled its trash to nearby Fillup County, but the landfill has reached its capacity and is scheduled to close later this year. Pleasant County, therefore, needs to find an alternative for managing its waste. Various proposals for solutions to the problem are presented below:

1. Pleasant County could construct a major sanitary landfill on farmland adjacent to Farmington. This land would need to be purchased from local growers with federal grant money and would probably take care of the County's waste for the next 40 or 50 years. This is the least expensive option to County residents.
2. The County could construct a waste-to-energy combustion plant just outside of Busy City limits. The property to be purchased includes part of a public park that is used for recreation by the city residents. The combustion plant would be more expensive than the landfill but would continue to take care of a majority of the County's trash for the indefinite future. Some of this money would come from a federal grant; the rest would come from increased garbage collection costs. It would also require the exploration of markets for recyclables that could not be burned efficiently or safely. In addition, some additional costs would be necessary to cover hauling of ash to a landfill in Faraway State. This is the second least expensive option.
3. The County could raise garbage collection fees considerably and haul all of its waste to Faraway State. This option could also include a provision that County residents would pay by weight for the amount of garbage they had hauled away each week. Faraway State's landfill has enough capacity to receive Pleasant County's garbage for another 10 to 15 years. This would be the most expensive option for users of the waste hauling service.

A variety of groups in the community—residents, developers, politicians, merchants, people in business and industry, environmental organizations, health organizations, farmers, waste haulers, construction engineers—all have particular concerns that they would like to see addressed by decision-makers. Considering what you have learned about waste management and what you know from your own experience, write down as many of these concerns as you can.



Objective:
To determine the availability of products made from recycled materials in the marketplace.

Vocabulary: consumer demand

Have students make a survey of products in a supermarket or department store that are made from recycled materials. Tell them to look for the recycling symbol on boxes and other containers. Review the symbol with them if necessary.

Discuss the results of their survey. Then have students research why there aren't more recycled materials in the marketplace.

Q Are there any reasons that consumers or manufacturers may prefer to use new materials instead of recycled ones? (The technology may be expensive; there may be some limitations in the strength or appearance of some recycled materials; there may be a lack of a stable supply of materials.)

Q Is there anything we can do to get more recycled products on the market?

Explain that the more we recycle and request products made from recycled materials, the more recycled materials will begin to appear. The key to success in recycling is *consumer demand*. Emphasize that consumers need to use their buying power to choose products made from recycled materials. The more consumer demand there is for products made from recycled materials, the more industry will need to respond to that demand. Suggest to students that they request stores where they shop to carry more products made from recycled materials.

Q Are people willing to buy products made from recycled materials if they are competitive in price and quality?

Q Why do we all need to buy as many products made from recycled materials as possible whenever they are available?

**Objective:**

To conduct a debate on the pros and cons of the returnable versus the no-deposit, no-return bottle.

Vocabulary: bottle bill

Have students imagine that a *bottle bill* — legislation requiring that all beverage containers sold be returnable and a deposit refunded — is being considered in their town. Divide the class into two teams to research and debate the issue of the returnable container (may be glass, aluminum, or plastic) versus the no-deposit, no-return one. Have one side argue in favor of the returnable container, the other, in favor of no-deposit, no-return.

Some issues the teams may want to consider are:

1. The effect the returnable bottle would have on a recycling program. (Pro: Bottle bills have proven effective in increasing beverage container collection and reducing litter; Con: Most of the revenue obtained from recycling by curbside collection programs is from aluminum and other beverage containers. A bottle bill would remove most of this fraction from the available recyclables.)
2. The effect of mandatory returnable bottles on wholesale and retail marketers, and industry. (Pro: Returnable bottle program could create jobs, provide economic incentives; Con: Marketers would need to implement new, possibly costly procedures.)
3. The effectiveness of bottle collection for recycling versus mandatory return in reducing the volume of the waste stream. (Pro: Bottle bills reduce litter and reduce the number of containers entering the waste stream; Con: In some areas with bottle bills, returned bottles are not required to be recycled, and some bottles collected for recycling end up in landfills rather than recycling plants; beverage containers represent a fairly small percentage of the waste stream so a comprehensive recycling program that *included* beverage containers might be more effective than a bottle bill by itself in reducing waste.)



Objective:
To explore the contributions that business and government can make to the recycling effort.

Discuss ways that businesses and the government can contribute to the solution of the solid waste problem. For example, many businesses and commercial enterprises recycle their office paper, corrugated cardboard, glass, and aluminum. The U.S. EPA has a program to recycle all of its office paper and newspaper.

Q Do businesses in your community recycle their paper?

Perhaps older students can conduct a survey of local merchants and businesses to determine the amount and types of waste they produce and whether they are currently doing any recycling. Supermarkets or chain stores are a good place to start since many of them bale and recycle their cardboard wastes. Restaurants may also recycle some of their wastes. If a nearby federal government building or a private office building has an office paper recycling program, you may want to plan a class trip to see how it works.



Objective:
To allow students an opportunity to educate the school and community about solid waste management.

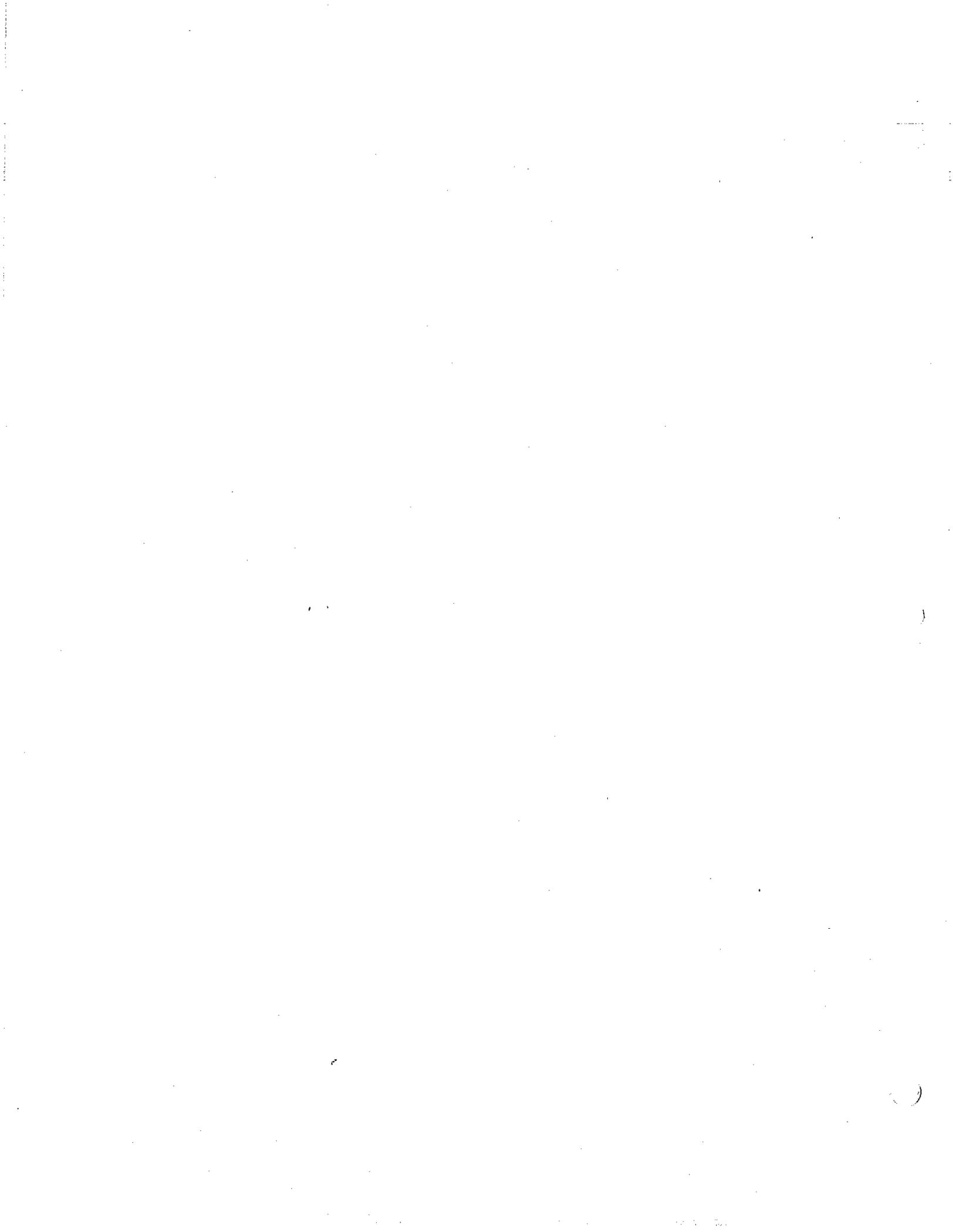
Plan a science fair that will present information to the school and community on how to reduce the amount of waste they generate, as well as how to recycle waste from the home and school. Begin by brainstorming with students about the things that they can do to solve the garbage problem based on what they have learned.

The fair can include many of the demonstrations used throughout this guide on the sources of pollution, making recycled paper, setting up a compost pile, and the recycling processes of different types of materials. It can also include displays of how to prepare and separate materials for recycling and booths on shopping and designing packaging for waste reduction. You may wish to have some students put on skits that deal with themes of source reduction and recycling, such as the waste conscious versus the wasteful way to shop.

for food, change oil (12th grade), and prepare a meal. This would also be a good opportunity to perform the skit "Throwaway Three," located at the back of the guide.

Encourage your students to think of the fair as a learning opportunity for the entire community.

End of Activities



Appendix X-A

Household Hazardous Waste

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Abrasive cleaners	trisodium phosphate, ammonia, ethanol	corrosive, toxic, irritant	Use completely, rinse container and dispose in trash.	Rub area with half lemon dipped in borax, rinse and dry. Use baking soda instead. Try using soda water to clean stainless steel.
Aerosols	nitrous oxide, propane	toxic, carcinogen, flammable	Use completely, dispose in trash.	Use non-aerosol products.
Air fresheners & deodorizers	formaldehyde	toxic, carcinogen, irritant	Use completely, rinse container and dispose in trash.	Open a window or use an exhaust fan, sprinkle baking soda on odor areas and use in refrigerator.
Ammonia based cleaners	ammonia, ethanol	corrosive, toxic, irritant	Use completely, rinse container and dispose in trash.	Vinegar, salt and water for surfaces, baking soda and water for the bath.
Antifreeze	ethylene glycol	toxic	Dispose at wastewater treatment plant. DO NOT POUR ON GROUND.	
Auto Degreasers	petroleum products	Corrosive, Poisonous, Eye and skin irritant.	Use up according to label instructions or give away.	Choose strong detergent type over solvent type
Auto waxes and polishes	petroleum products	Fumes irritating to eyes. Harmful if swallowed. Eye and skin irritant.	Use up according to label instruction or give away.	Use outside.
Batteries	sulfuric acid, lead	corrosive, toxic	Recycle. trade in or take to reclamation center.	
Batteries: mercury button type	mercury	Swallowing one may be fatal if it leaks.	Throw in trash.	
Bleach cleaners	sodium or potassium hydroxide, hydrogen peroxide, hypochloride	corrosive, toxic	Use completely, rinse container and dispose in trash.	Use powdered bleaches or add borax.
Brake fluid	glycol ether, heavy metals	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Chlorinated hydrocarbons	DDT, aldrin, endrin, chlordane, heptachlor, lindane	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Import predators (ladybugs, ground beetles, mantis).
Disinfectants	diethylene/methylene glycol, sodium hypochlorite, phenols	corrosive, toxic	Use completely, rinse container and dispose in trash.	Half cup borax in 1 gal. water.
Drain cleaners	sodium or potassium hydroxide, sodium hypochlorite, hydrochloric acid, petroleum distillates	corrosive, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Mix 1 cup each baking soda, salt and white vinegar, pour in drain, wait 15 minutes, flush with boiling water, use plunger or plumber's snake.
Flea powders, sprays and shampoos	pesticides	Moderately to very poisonous.	Use up or save for hazardous waste collection day.	DO NOT USE DOG PRODUCTS ON CATS. Vacuum house regularly and thoroughly. Launder pet bedding frequently.
Floor or furniture polish	diethylene glycol, petroleum distillates, nitrobenzene	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	1 part lemon juice, 2 parts olive or vegetable oil.
Fungicides	captan, folpet, aniazine, zinc, copper compounds	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Do not over water; keep area dry and clean.
Furniture strippers	acetone, methyl, ethyl ketone, alcohols, xylene, toluene, methylene chloride	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Sandpaper or heat gun.
Herbicides	2,3-D, glyphosate prometon	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Hoe or hand weed, keep grass short.
Lacquer and lacquer thinner	acetone, benzene	Extremely flammable. Very poisonous.	Use up according to label instructions or save for hazardous waste collection day.	Ventilate area very well. Do not use in room with pilot light, open flame, electric motors, spark-generating equipment, etc. DO NOT SMOKE WHILE USING. No substitutes.

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Medicine: unneeded or expired	variety of ingredients	Frequently cause child poisonings.	Flush down sink or toilet.	Check content of medicine chest regularly. Old medications may lose their effectiveness, but not necessarily their toxicity. No substitutes.
Mothballs	naphthalene, paradichloro-benzene	toxic	Use fully, rinse container and dispose in trash.	Cedar chips, newspapers, lavender flowers.
Motor oil	hydrocarbons (benzene) heavy metals	flammable, toxic	Recycle wastes; take to reclamation center.	
Nail polish remover	acetone	toxic, flammable	Use up according to label instructions.	
Oven cleaners	potassium or sodium hydroxide ammonia	corrosive, toxic	Use fully, rinse container and dispose in trash.	Use baking soda and water or place a bowl of ammonia in 200 degree oven overnight and clean in the morning.
Paint-enamel or oil	pigments, ethylene, aliphatic, hydrocarbons, mineral spirits	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Latex or water based paint.
Paint-Latex, water based	rosins, glycol ethers, esters, phenyl mercuric acetate	toxic	Pour over newspaper in cardboard box, let air dry then discard in trash.	Limestone based whitewash or cassein based paint.
Paint-rust	mineral spirits, glycol ethers, ketone, petroleum	flammable, toxic	Keep in tightly closed jar and allow contaminants to settle. Strain and reuse liquid. Store contaminants for Hazardous Waste Program.	Use water with water based paints.
Paint-stains	mineral spirits, glycol ethers, ketone	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE. PROGRAM	Latex paint or natural earth pigment finishes.
Paint thinner or turpentine	N-butyl alcohol, acetone, methyl isobutyl ketone, petroleum	flammable, toxic	Keep in tightly closed jar and allow contaminants to settle. Strain and reuse liquid. Store contaminants for Hazardous Waste Program.	Use water with water based paints.
Pesticides arsenicals	lead arsenate, calcium arsenate, paris green	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Live traps, remove food supply.

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Pesticides botanicals	pyrethrine, rotenone, nicotine	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Ants: use chili powder to hinder entry.
Pesticides carbamates	carbaryl (sevin) aldicarb (lemik) propoxur (baygon)	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Keep garden weed free; use insecticidal soap.
Organo-phosphates	parathion, malathion, diazanon, dichlorvoa, chlorpyritos	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Traps or baking soda/powder sugar mix.
Plant insecticide	methoprene, malathion, tetramethrin, carbaryl	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Mix bar soap and water or old dishwasher, spray on leaves and rinse.
Pool chemicals	muriatic (hydrochloric) acid, sodium hypochlorite (chlorine) algicide	corrosive, toxic	Use full, rinse container and dispose in trash.	Open lid and acid will evaporate.
Rat poison	broditacoum, coumerins (warfarin), strychnine	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Live traps; remove food supply.
Rug cleaners	naphthalene, perchloroethylene, oxalic acid diethylene glycol	corrosive, toxic, irritant	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	To deodorize, sprinkle baking soda or cornstarch on dry rug. Vacuum in 30 minutes.
Silver polish	acidified thiourea, sulfuric acid	corrosive, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Soak in boiling water with baking soda, salt and piece of aluminum.
Toilet cleaners	muriatic (hydrochloric) of oxalic acid, paradichlorraben zene, calcium hypochlorite	corrosive, toxic, irritant	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Toilet brush and baking soda or mild detergent.
Transmissionf fluid	hydrocarbons, mineral oils	flammable, toxic	Recycle wastes; bring to reclamation center	
Window cleaner	ammonia	Vapor may be irritating. Slightly poisonous.	Use up according to lable instructions or give away.	Ventilate room. Instead: spray on vinegar, then wipe dry with newsprint.

Household Hazards

This fact sheet was prepared with the assistance of Clean Water Action. David Zwick, Executive Director of Clean Water Action, is a member of Earth Day 1990's Board of Directors.

What Is Household Hazardous Waste?

Many common household products contain ingredients that are toxic, corrosive or flammable, making them hazardous when used and disposed of improperly. Such common items as fingernail polish remover, bug spray, shoe polish, cleaning products and paint can threaten a family's health and safety while in the home. When disposed of improperly, household hazardous wastes can contaminate soil, air and water. Hazardous wastes dumped in landfill may seep through the soil into groundwater, which nearly half of all Americans depend on for household use. As a result of improper disposal of household hazardous products, 20 percent of the Environmental Protection Agency's highly contaminated Superfund sites are abandoned city landfills.

Poisoning of children and pets can be an immediate result of improper use and storage of hazardous products. Fire hazards are increased and unsuspecting firefighters may be endangered.



by improperly stored flammables and poisons. Throwing out hazardous wastes with other garbage threatens the health of trash collectors. In some instances, gasoline and other flammables have been carelessly poured into sewers and have caused explosions. In addition to the more obvious problems posed by household hazardous substances, there are long-term effects that are not as well understood. Many studies have shown that common household toxics can lead to cancer and other chronic illnesses.

One of the largest sources of municipal hazardous waste is used motor oil, which becomes a major environmental hazard when poured down storm sewers. Since sewage treatment plants are not designed to deal

with such toxics, the oil is often released directly into streams, rivers or the ocean. There it pollutes water and threatens plant and animal life. Every year, do-it-yourself oil changers improperly dispose of 176 million gallons of oil — an amount equal to 16 Exxon Valdez oil spills. One quart of oil can contaminate 250,000 gallons of drinking water.

What You Can Do

- Whenever possible, use non-hazardous alternatives to household products (see reverse for suggestions).
- If you must purchase a product that is potentially hazardous, check the label and make sure it will do exactly what you want. Buy only the amount you will use and follow directions carefully. Remember that doubling the dosage does not necessarily double the product's effectiveness.
- Store hazardous products in safe places out of the reach of children.
- Before disposing of a container, use up the entire product or give it to someone who will.
- Do not drain automotive fluids into the sewer. Oil, antifreeze and batteries can be recycled at some gas stations, and transmission fluid and brake fluid should be taken to a special disposal facility.

"With today's climate of rising environmental awareness and activism, promoting change at the individual level makes more sense than ever before. Through our actions, our purchases and our votes, we can change corporate behavior and that of our society as a whole. The roles each one of us chooses to play add up to a better future for our families, our communities and our planet."

- David Zwick, Executive Director, Clean Water Action



- If a hazardous product cannot be used up or recycled, take it to a hazardous waste disposal facility. Check with your local fire department to find out if such a service is available locally.
- Avoid disposable products whenever possible. Plastics and polystyrene (styrofoam) are manufactured using extremely hazardous chemicals, and if they are incinerated release toxics into the air.

Alternatives

Most household cleaning needs can be met using vinegar, baking soda, borax, ammonia and soap. An effective all-purpose cleaner can be made using the following non-toxic ingredients:

- 1 gallon hot water
- 2/3 cup baking soda
- 1/4 cup ammonia
- 1/4 cup vinegar

For a stronger solution double all of the above ingredients except for the water.

For non-toxic commercial cleaning products contact:

Shaklee Corporation
444 Market Street
San Francisco, CA 94111
(415) 954-3000

For More Information

- Clean Water Action
317 Pennsylvania Ave., SE
Washington, DC 20003
(202) 547-1196
- Channing L. Bete Co.
200 State Rd.
South Deerfield, MA 01373
(800) 628-7733

PRODUCT	SAFE ALTERNATIVE	PRODUCT	SAFE ALTERNATIVE
Aerosol sprays	Use lotions, gels or non-aerosol sprays.	Moth balls	Spread out newspapers in closets and place cedar chips around clothes.
Air fresheners	Keep houseplants to purify air. Place baking soda in your refrigerator and in garbage areas. Keep your house well ventilated.	Oven cleaner	Wash after each use with a mixture of baking soda and warm water. To solen burned spills, leave a small dish of ammonia in the oven overnight and scrub again the next day.
Batteries	Use rechargeable batteries.	Paint	Use latex and water-based paints.
Chlorine bleach	Use dry bleach or borax.	Paint remover	Peel off paint with a heat gun or scrape and sand.
Drain opener	To prevent clogging, pour boiling water down drains twice a week and always use the drain strainer. Avoid using drains for disposing of grease. Use a plumbing snake or a plunger to unclog drains.	Pet products	Use products containing de-limonene gas derived from citrus extracts. Insecticidal soaps are biodegradable and non-toxic.
Floor cleaner	Mop floor with a solution of 1 part vinegar to 32 parts water. Use club soda to polish.	Roach spray	Set out a dish of equal parts powdered sugar and baking soda. Spray roaches with soapy water.
Furniture polish	Use a solution of 1 tsp. lemon oil and 1 pint mineral oil. Toothpaste gets rid of water stains and salt helps with grease spots. Crushed raw nuts provide an oily polish.	Rug cleaner	Sprinkle on dry cornstarch and then vacuum. For red wine spills apply salt immediately.
Insecticides	Introduce predator insects, such as lady bugs and praying mantises, to your garden. Make your yard attractive to birds, amphibians, reptiles and bats to help control insects. Apply soapy water to leaves and then rinse well.	Shoe polish	Use polishes that do not contain trichloroethylene, methylene chloride or nitrobenzene. Wear suede or canvas.
Laundry cleaners	Use soap products and boost with washing soda.	Silver cleaner	Soak in warm water with 1 tsp. baking soda, 1 tsp. salt and a small piece of aluminum foil.
Metal polishes	Boil flatware in a solution of baking soda and salt.	Toilet cleaner	Use a solution of water and baking soda. Remove stubborn rings and lime build-up with white vinegar or pumice stone.
		Window cleaner	Mix 2 tsp. vinegar with 1 qt. and apply with newspaper.

- Citizens Clearinghouse for Hazardous Waste
P.O. Box 926
Arlington, VA 22216
(703) 276-7070
- Citizens for a Better Environment
942 Market St., Suite 505
San Francisco, CA 94102
(415) 788-0690
- Environmental Hazards Management Institute
P.O. Box 932
Durham, NH 03824
(603) 868-1496

- Greenpeace Action
1436 U Street, NW
Washington, DC 20009
(202) 462-8817
- Household Hazardous Waste Project
901 S. National Ave.
Box 108
Springfield, MO 65804
(417) 836-5777
- League of Women Voters
8 Winter St.
Boston, MA 02108
(617) 523-2999
- Local Government Commission
909 12th St., Suite 205
Sacramento, CA 95814
(916) 448-1198
- National Toxics Campaign
29 Temple Place, 5th Floor
Boston, MA 02111
(617) 482-1477
- Seattle Metro
821 Second Ave.
Seattle, WA 98104
(206) 447-5875



Chapter X - Problem Wastes

A. Household Hazardous Waste

Background

Household hazardous waste (HHW) is defined as wastes discarded from homes, apartments, motels, and hotels that if generated by an industry would be regulated under Subtitle "C" of the Resource Conservation and Recovery Act as hazardous waste. The waste can either be a listed hazardous waste or hazardous by characteristic: ignitable, corrosive, reactive, or toxic. HHW may pose a threat to sanitation workers or the environment when improperly handled or disposed. Managing this waste in the municipal solid waste stream presents obvious problems. Disposing of this waste in municipal solid waste landfills results in a more toxic leachate. In uncontained landfills leachate has the potential of moving into and contaminating the groundwater. In contained landfills, particularly aggressive chemicals may affect the containment system. HHW discarded with other trash may react or explode in waste compactors, or burn personnel handling these wastes. Improper dumping down the drain may damage septic systems, sewage treatment plants, or drinking water supplies; or it may corrode plumbing or cause treatment plant sludge to be hazardous. Illegal dumping of this waste may directly impact the environment, in particular surface water when dumped into storm sewers.

Household hazardous wastes include: paint thinners, solvents, paints and varnishes, cleaners, cosmetics (nail polish remover), pesticides, fertilizers, bleach, automobile fluids, photo and hobby chemicals, swimming pool chemicals, batteries, wood preservatives, motor oil, air conditioning refrigerants, adhesives, herbicides, fungicides, etc. The benefits of HHW collection programs go beyond the collection and disposal of these potentially dangerous chemicals. The programs can include public education elements that identify HHW, outline proper ways to store the wastes, and suggest alternative products. Collection programs increase the public's awareness of HHW in the home and encourage safer use and proper disposal.

The Solid Waste Management Act of 1991 outlines a program to manage household hazardous waste. The program relies on permanent collection centers for the major population centers, Shelby, Davidson, Knox, and Hamilton Counties. The remainder of the 91 counties in the state will be serviced by mobile collection units. The law requires that each county have at least one collection center by January 1, 1995 for automotive fluids, tires and lead acid batteries.

Liability is often a concern related to the collection of HHW. If the collection event accepts wastes only from households, it is exempt from RCRA (Resource Conservation and Recovery Act) Subtitle "C" liability. RCRA Subtitle "C" is the federal law that governs the safe storage, treatment, and disposal of hazardous wastes. The superfund law, or CERCLA

(Comprehensive Environmental Response, Compensation, and Liability Act) is another liability concern. This law allows the federal government to collect cleanup costs for sites that release hazardous constituents from anyone who ever deposited wastes on that site. CERCLA does not contain an exclusion from liability for household waste or an exclusion based on the amount of waste generated. Any waste that qualifies as a hazardous substance under CERCLA is subject to the appropriate liability provisions. Hazardous substances are defined and/or listed under CERCLA. HHW may qualify as a hazardous substance if it contains any substance regulated under CERCLA. If a HHW contains a substance that is covered under CERCLA (whether or not it is a RCRA hazardous waste) potential CERCLA liability exists. It is important to note that potential liability under CERCLA applies regardless of whether the HHW was picked up as part of a community's routine waste collection service and disposed of in a municipal landfill or in a special collection event. The additional safeguards provided by a specific HHW collection and management event may reduce the likelihood of environmental and human health impacts, and therefore may also reduce potential CERCLA liability.

In the State of Tennessee contracted collection program, the Contractor is required to accept legal responsibility for the safety and well being of persons and property on site during the collection event. The contractor is required to carry certain types and amounts of insurance to cover this liability.

Goals

The specific goals for the Region in developing a HHW management program include:

DISPOSAL. Provide proper disposal, minimizing the impact on the environment due to potentially dangerous chemicals.

HOME SAFETY. Remove chemicals from homes, reducing exposure and potential injury.

EXPOSURE. Minimizing the amount of dangerous chemicals in the collection and disposal systems will reduce danger to sanitation workers.

EDUCATION. Educate consumers regarding the best methods of management of HHW; alternative product options with less potential hazards; proper storage and use of chemicals; better home management practices such as purchasing only the amount of chemicals needed.

Implementation

Acknowledging the importance of properly managing HHW, the State of Tennessee has allocated resources to implement special collection programs. The State has contracted with Laidlaw, a mobile collection contractor to manage the collection event. Laidlaw will receive, sort, categorize, and prepare the waste for transporting and disposal in accordance with all applicable regulations. Each county in Tennessee has the responsibility to provide at least one collection center by January 1, 1995. To assist the counties the State has developed the attached "Policy Guide of County Responsibilities Tennessee Household Hazardous Waste Collection Program".

The Solid Waste Management Act requires each county to provide:

a service site for the mobile collection unit to access

advertisement in the newspapers outlining the schedule and details about the collection event

at least one person assigned to the collection site who will assist in the operation

The County Executive needs to schedule the collection event with the Special Waste Section by contacting the section with a proposed date, and location along with the name and address of the County's representative who will be on site (see attached draft letter). The request needs to be submitted at least thirty days prior to the desired collection date. The County can request assistance with advertisement and educational programs from the state as well. The County needs to send to the Section a copy of the proposed ad, expected dates the ad will run, and the names of the papers which the ad will appear ten days prior to the ad appearing. To schedule a collection day, the contact information is:

Don Manning, Manager, Special Waste Section (532-0091)
Division of Solid Waste Assistance
14th floor, L & C Tower
401 Church Street
Nashville, Tennessee 37243-0455

In order to conduct an effective program a key ingredient is advertising and/or public education. The State will be liable for a set-up fee to the Contractor each time a County is serviced, regardless if participants attend. The potential users must be aware of the availability and the benefits of a program in their community. At a minimum the County needs to advertise in a newspaper of general circulation the date, hours, and location of the collection event. The ad needs to be published once at least two weeks preceding the event and once the week of the event. The ad needs to specify that only 100 pounds of waste will be accepted from each household and list the items excluded (**medical and radioactive**

wastes, explosives, and dioxins), and note that the program is funded by the state. Effective means of getting the word out include to encourage participation:

posters or handouts, distributed at existing disposal facilities (landfill, transfer station, convenience center), retail outlets, government buildings; consider distributing the information with the collection routes with municipal solid waste pick up;

special lesson units in schools, and/or notice during the school daily announcements; information presented to school age children is very effective means of reaching the entire household;

public service announcements on radio and television, coordination with local news media for press releases or articles of interest in the newspaper;

inserts in utility bills or direct mailings;

meetings with clubs, churches, civic organizations with videotape and audio-slide presentations.

The Public Information and Education Chapter (IX) provides more specific guidelines for an educational program.

Site Preparation

The County is responsible for providing the temporary site for the Collection Event. It is recommended the site be county property. If the site is not County owned, the County needs to provide proper documentation, such as a lease agreement in writing to the State (fifteen days prior to the collection day). Seven to fifteen days prior to the collection event, the County needs to allow the household hazardous waste collection contractor to inspect the site.

The site chosen needs to provide easy access to the State collection Contractor by paved, gravel or well maintained roads. In order to be effective, the site needs to be convenient and close to potential users. The site needs to have access to electricity (grounded 110 electrical outlet), telephones (within fifty feet), water and sanitary facilities. The site can utilize the parking lot of a cooperative retailer, fire or police station, public works facility, etc. At least fifteen parking spaces are needed. A paved surface is necessary to contain spills. A flat area of at least 100 feet by 100 feet is needed. Also, avoidance of areas near surface water, storm water and sewer drains is recommended. The County needs to provide waste containers to manage nonhazardous materials which come in to the site. Management of the solid, nonhazardous waste, will be the responsibility of the County. A roll off dumpster would provide for collection and easy transportation to the landfill for nonhazardous waste. It is the County's responsibility to inspect the waste containers for

questionable waste. This is critical for the County to assure all potentially hazardous waste is removed by the Contractor.

Although Laidlaw will provide the support necessary to conduct the collection program, having certain materials on hand is recommended for the County: tables and chairs, fire extinguisher, signs for traffic control and to identify the site, traffic cones, water hose and shut off valve, duct tape and staple gun, leaflets with general information on the program, pens, camera, paper weights and survey forms. A brief survey form will help determine the effectiveness of the program. A typical form is provided (the State typically provides their own form for distribution).

The operating rules of the facility need to be conspicuously displayed with guidelines for users. The users need to be aware that if a waste is not accepted they, as the generator, are responsible for the proper disposal. Limits on the volume and source of the waste need to be displayed. The State has set a maximum of 100 pounds per household (per automobile). It is imperative that no waste from industries is accepted, only household hazardous waste.

The County needs to provide a site representative, either an employee or a representative of the County. The site representative needs to be a responsible individual capable of assisting in the organization of the collection event, offering support to the Contractor and allocating county resources as needed. The County representative or a suitable back up, must be on site during the operation and clean up of the event. The County representative will inspect the site prior to the Contractor leaving, he will need to document any damages to the site and the removal of all hazardous materials. The County representative will be responsible for coordinating County volunteers and for properly managing the solid waste on site. It is advisable to contact local environmentally conscious groups to request volunteers to assist with the program. Three or four volunteers on site during the day will help with traffic control, survey distribution and to help the Contractor.

County Specific Action

The first household collection day in Wilson County was held on November 6, 1993 at the Wilson County fairgrounds. Many cars visited the site to utilize the services offered. Overall the day was a success. The advertisement used is included with this section.

It is estimated the time contribution for organization would be 20-30 hours (6-10 hours for advertising, 4-8 hours for coordinating with the State and the Contractor, 8-10 hours the day of the event, and 2 hours follow up). The County Executive would also have an investment of time from 2-6 hours depending on his/her involvement, at least communicating with the State for the initial scheduling of the event.

The overall investment for the County would be:

approximately 20 hours of staff time @ \$25/hour and the County Executives time 5 hours @ \$30/hour (including benefits) \$650

supplies approximately \$200-\$400

utilizing county property (zero for lease or rental)

managing the solid waste collected, \$150- \$550

advertising, \$500 - \$1,000

TOTAL \$1,500 - \$2,500

Long Term Program

The Solid Waste Management Act of 1991 has a five year sunset provision. The State has indicated that they intend to continue the State funded program for another three years. However, the contract is reevaluated annually. Given that, the County needs to take full advantage of the State funded program while it is available. The State program is set up to respond to specific requests from counties. Priority will be given to counties which have not had the services in the past. As available, the State Contractor can revisit counties previously serviced.

Implementation Schedule

The region will take full advantage of the State funded collection program by scheduling a state funded collection event as soon as practical. The County can contact the State periodically to schedule subsequent collection event as soon as the State allows.

The costs associated with the long term program are difficult to estimate at this time due to the lack of specific information on the participation rates for future programs. Once the State funded program has operated the data accumulated can be used to assist in the development of the Region's long term budget for HHW collection and management.

DATE	SCHEDULED TASK	ESTIMATED COSTS
annually 1994-1996	state funded collection event	\$1,500 - \$2,500
1997-2003	County funded event	\$15,000 - \$30,000

B. Waste Tires

Background

The Solid Waste Management Act of 1991 includes the regulation of waste tire disposal and a program to assist in the proper disposal of waste tires. The law outlines operational requirements for disposal of tires at landfills, as well as directing each county to provide a site to receive and store waste tires. The law reads:

Waste tires may be disposed of in the same manner as other waste except that whole waste tires may not be disposed of in the final lift or within 10 feet of the final grade unless the tires are shredded, chipped or circumferentially sliced. Whole tires or shredded, chipped or circumferentially sliced tires may be stored on site provided that the tire storage area conforms with the following standards:

- I. The storage area shall be surrounded by an 18" high earthen berm to manage run-on and run-off and be sufficient to contain water in the event of a fire, and to provide that:
 - a. All surface run-off is diverted around the site;
 - b. All rain water collected within the berm must be directed to an appropriate release point; and
 - c. All fire control water can be contained until release is approved.
- II. Tire piles shall be restricted to the following dimensions: 200' long, 50' wide and 15' high. Whole tires shall be covered by a material sufficient to shield the tires from precipitation or an effective insect vector and rodent control program shall be established.
- III. A buffer zone of at least 50' wide shall separate tire piles from each other and from active disposal areas.
- IV. In order to reduce the risk of fires:
 - a. The storage areas and the buffer zone shall be kept free of brush and high grass;
 - b. No flammable liquids may be stored nor may equipment with an open flame be utilized in or within 50' of the storage area;
 - c. Communication equipment, capable of immediately notifying the responding fire department, shall be maintained, and;
 - d. A letter assuring response from the responding fire district must be filed with the State and the telephone number of the responding fire district must be posted at the facility. If service is not available specific fire control measures must be specified by letter to the state.
- V. The storage area may not be located:
 - a. On an active disposal area
 - b. On a closed disposal area, unless no remaining area is available and remedial closure is specified in writing to the State
 - c. On an area to be utilized for disposal within one year; and
 - d. In wetlands or the 100 year floodplain.
- VI. Tires or shredded tires may not be stored for more than one year without the written approval of the State. The operator shall maintain records sufficient to establish the date each tire pile within a storage area was begun.

The law calls for a December 31, 1994 ban on disposal of whole tires in landfills. To transition into this ban, the State has funded a private contractor (Southeastern Environmental Technologies of Tennessee) to shred waste tires at no cost to local governments. The mobile tire shredder goes to each county at least twice per year. Counties with a Class I or IV landfill may store waste tires on a permitted facility until they are shredded (up to one year). Other counties can establish a separate waste tire storage site with a state permit.

In order for a county to have its waste tires shredded each site must have an accessible road and work site capable of accommodating a tractor trailer truck and tire shredding equipment weighing approximately 80,000 pounds.

Goals

The specific goals for the Region in developing a waste tire management program include:

provide for environmentally sound disposal of tires

reduce the number of illegal dumps and associated problems with old tires, this includes potential breeding ground for insects, unsightly dumping grounds, and potential for serious fires

alleviate operational problems at landfills due to the behavior of tires in the fill

investigate alternative disposal options, such as recycling or reuse of the tire material subsequent to shredding

Current System

The existing tire management program in Wilson County includes a tire storage area at the existing County Class I landfill. The State tire chipper chips the tires prior to the County disposing of the material in the Class I landfill. Since the landfill uses landfill employees and the existing landfill for disposal, it is difficult to estimate the operational costs. Once the Class III/IV landfill is permitted, constructed and operational the County can consider disposing of the tires in with the demolition waste.

The State records indicate that 42,731 tires were sold in Wilson County between October 1991 and June 1993. It is difficult to provide a quantitative estimate regarding the extent of illegal dumping problems in the Region. In general, the extent of illegal tire dumping is an issue. Based on the number of tires sold compared to the number of tires shredded, the likelihood of problematic tire dumping is high. Effective advertising/educational programs should reduce the illegal dumping problem.

Implementation

Wilson County meets the minimum requirements for the regulations, in that they have an existing tire storage area. The Region can move forward in proper tire management by addressing the issue of illegal dumping problems and investigating the feasibility of alternative disposal options. The Region can assign the responsibilities of an ongoing tire management program to the Diversion Manager discussed in Chapter VI.

To address the problem of illegal dumps the Diversion Manager needs to coordinate with the sanitation or public works departments of each participating county to establish:

establish an inventory of illegal tire piles

standard clean up protocol

educational programs to attempt to discourage illegal dumping

enforcement program to punish individuals associated with illegal dumping

The issue of developing alternatives to landfilling the tires is a matter of researching potential markets to utilize the materials.

DATE	TASK SCHEDULED	ESTIMATED COSTS
1994-2003	maintain tire storage area	\$1,000 - \$2,000/yr
1994- 2003	Diversion Manager implement educational program, illegal dump investigation	\$ 500 - \$1,000/yr

C. Waste Oil

Background

Due to the common practice of individuals changing their own automobile oil, the potential for environmental impact from improper disposal is high. The EPA estimates that every year, privately owned automobiles and light trucks generate over 300 million gallons of used crankcase oils. The majority of this oil (over 200 million gallons per year) is generated by individual consumers who change their own oil. The EPA estimates only 10% of this is properly collected and sent off for recycling. The remainder is emptied into sewers, dumped directly onto the ground, thrown in the trash or into surface water. The State of Tennessee estimates that over 1,000,000 gallons of used motor oil is generated each year in the state. Of this, up to 60% is estimated ending up eventually in the state's water resources. For instance, the Coast Guard estimates that sewage treatment plants discharge twice as much oil into coastal waters as do tanker accidents (15 million gallons per year versus 7.5 million gallons from accidents).

The facts about used oil include, re-refining used oil takes only about one third the energy of refining crude oil to lubricant quality. If all the used oil improperly disposed of by do-it-yourselfers were recycled, it could produce enough energy to power 360,000 homes each year or 96 million quarts of high quality motor oil. A gallon of used oil can ruin a million gallons of fresh water.

The State of Tennessee recognized the improper management of waste oil as a problem and required the regional solid waste plans to address this issue. The Solid Waste Disposal Act bans the disposal of waste oil in landfills after January 1, 1995 and requires each county to develop an infrastructure for accepting, storing, recycling or safe disposal of these materials by the end of 1994.

Goals

The Region's goals in regards to management of used oil include:

provide an opportunity for the public to properly dispose of their used oil, thereby minimizing environmental impact

maintain and support private entities who offer collection of used oil

educate the population regarding the potential impacts of mismanagement of used oil and environmentally sound disposal options

provide drop off used oil disposal and recycling facility at existing disposal facility to supplement the existing retail facilities

Different collection programs offer various benefits. Curbside collection offers the convenience and high participation rate of the users, however it is very expensive. Collection trucks would need to be retrofitted with used oil collection tanks or racks. Periodic special curbside collection of used oil are more economical to routine curbside collection. This "milk run" alternative requires substantial publicity and coordination with the collection program. This option is still more expensive and potentially problematic than a central drop off facility and is not recommended for the Region.

A central collection station is where do-it-yourselfers can drop off used oil in an appropriate tank or drum. The station needs to be well marked and preferably manned to ensure that it is used for uncontaminated lubricating oil only. Establishing this service at manned convenience centers provides an economical option for collection of used oil. This system can work well in concert with retail facilities. Many service stations, car dealerships and retail stores have collection tanks installed for their own use that their customers.

The used oil needs to be picked up in a timely manner by a responsible used oil hauler and sent to reputable recyclers. The hauler must have valid license and operate in a safe and environmentally sound fashion, maintain regular records of quantities, and deliver the oil to reputable management facilities. Haulers and recyclers are often listed in the Yellow Pages. Contact with existing private programs can provide a list of haulers in the area. The recycling facility should be evaluated prior to contracting. Visiting the site can indicate substandard practices. The recycler should have accurate records of the source of the used oil, routine laboratory checks for contaminated loads, etc. The facility should have containment measures to prevent losses and contain spills. Storage areas should be well maintained with containment in place. The facility needs to be in compliance with all applicable state and federal requirements. Inspection should be up to date and with any violations noted corrected.

An educational program can circulate information regarding the proper management of used oil. The State has information brochures which briefly outline the potential problems and ways to avoid them for individuals wanting to dispose of used oil (attached). Chapter IX, the Educational and Public Information Chapter presents more specific information regarding effective educational programs. In particular used oil program educational efforts should focus on:

- educate the public about the used oil problem, environmental impacts
- encourage more responsible oil management
- notify do-it-yourselfers how to use the program to recycle oil

Used oil programs can be somewhat seasonal, with do-it-yourselfers changing their oil more frequently in the spring and summer. Educational efforts need to concentrate on these times of the year. The typical do-it-yourselfer is between 15 and 45. So a high school age program is particularly effective, along with a program aimed at the general public.

A valuable resource in setting up a used oil recycling program is EPA publication "How to Set Up a Local Program to Recycle Used Oil" (EPA/530-SW-89-039A). This publication provides several examples of brochures, posters, letters, press release, and collection tank design which are included in this chapter.

Implementation

In order to comply with the requirements of the Solid Waste Management Act, each county needs to provide at least one site by January 1, 1995 to receive and store waste oil. Wilson County has provided this level of service through the City of Lebanon. The County needs to move forward with the encouraging proper coordination between government, industry and volunteer organizations working towards a more wide spread implementation. Additionally, the County can consider providing a used oil container at the landfill with a contained tank system with appropriate secondary containment, spill prevention, etc. This will allow interested individuals to utilize a means of proper waste oil disposal. The program would be low cost due to the fact that existing landfill staff could manage the program with minimal investment.

The Region's Diversion Manager can research the existence of private facilities which accept used oil to determine the adequacy of the existing system. The Region can work with the private facilities and encourage their continued involvement. The Region can coordinate with gas stations, supply stores, existing disposal facilities to circulate information. The result of the Region's research can be a listing of private facilities in the county available to potential users.

Key issues to properly implement a used oil collection program include:

ensuring proper financing for the purchase of equipment, collection operations, publicity and staffing requirements;

managing risks, programs must prevent mixing other materials which may be environmentally damaging or cause problems with haulers or recyclers; the oil must never be mixed with gasoline, solvents, pesticides, or other chemicals;

ensure the proper management of the oil once the contracted hauler removes it from the collection site;

effective educational program and advertising to encourage active participation;

accurate record keeping to chart the program's costs, effectiveness, problems, cycles, impact of advertising, etc.

The Region's Diversion Manager can be responsible for the implementation of an effective waste oil management program, since the program relies so heavily on proper education and advertising. The costs of implementing the program can be tied directly to the popularity of the program and the volume of oil received. The cost of administration can be primarily covered by the educational coordinator's time (discussed in the educational section). The cost of collection units range from simple collection barrels to more specifically designed waste oil containers. The haulers can be contracted and negotiated based on the value of the oil to them. Wilson County can have one storage container at the landfill specifically designed for used oil for a cost of \$1,000 to \$3,000 (200 - 400 gallons capacity).

D. Lead Acid Batteries

Background

Lead acid batteries provide power to most motorized vehicles. Because of the toxic properties of lead acid batteries, it is illegal for Tennessee landfills to accept them for disposal. The batteries use a chemical reaction between sulfuric acid and lead to generate electricity. Lead acid batteries can be recycled into useable lead, sulfuric acid and plastic to make new batteries.

Goals

The Region's goals in regards to management of lead acid batteries include:

maintain and support private entities to offer collection of used oil

educate the population regarding the potential impacts of mismanagement of lead acid batteries and environmentally sound disposal options

educate disposal facility operators to ensure no disposal of lead acid batteries at landfills in the Region

Current System

The Region, as every county in Tennessee, is covered by Tennessee law in that every retail store that sells lead acid batteries is required to accept used batteries as trade-ins. In fact, some retailers provide a discount on new batteries with the trade-in of old batteries. Recyclers then buy used batteries from retail stores. The landfill accepts used batteries and segregates them for storage until a scrap dealer hauls them offsite for recycling.

Implementation

The existing system complies with the minimum State requirements for lead acid battery disposal. An important aspect of maximizing the effectiveness of the program is education. The County can work with the retailers to emphasize the disposal options available to consumers. Local environmental groups, the county sanitation departments, earth science programs at schools, etc. need to encourage the recycling, which includes lead acid batteries. The County can include in the general educational program outlined in Chapter IX educational efforts towards assuring the proper disposal of more batteries. The State has information brochures which briefly outline the potential problems and ways to avoid them for individuals wanting to dispose of lead acid batteries (attached). The Region can coordinate with gas stations, supply stores, existing disposal facilities to circulate this information. The Diversion Manager can be responsible for this program.

E. Litter Grant Program

The State of Tennessee Department of Transportation (Maintenance Division) provides a litter grant program to counties for their use. The system is funded through a tax on the beverages in the state with a fund of \$3.4 million for this year. The money is allocated to the 95 counties based on number of miles in the county and population. The minimum grant is \$20,211 and the maximum is \$295,000. A list of the counties and their grants is included in this section. The counties are reimbursed for money spent on approved programs. The litter grant program is used primarily for road side pick up of litter. Counties use prison labor with the cost of the guard and transportation reimbursed by the litter grant to clean up county roads. The grant can also finance educational programs, if the county fulfills four of the five categories (government, school, business, media or public). The grant program recently started a program to encourage counties to use more of the grant on educational programs. The smallest grant recipients need to spend 5% of the grant on education and the largest recipients 20%. The program increases this percentage over the next three years to a 15% and 35% level.

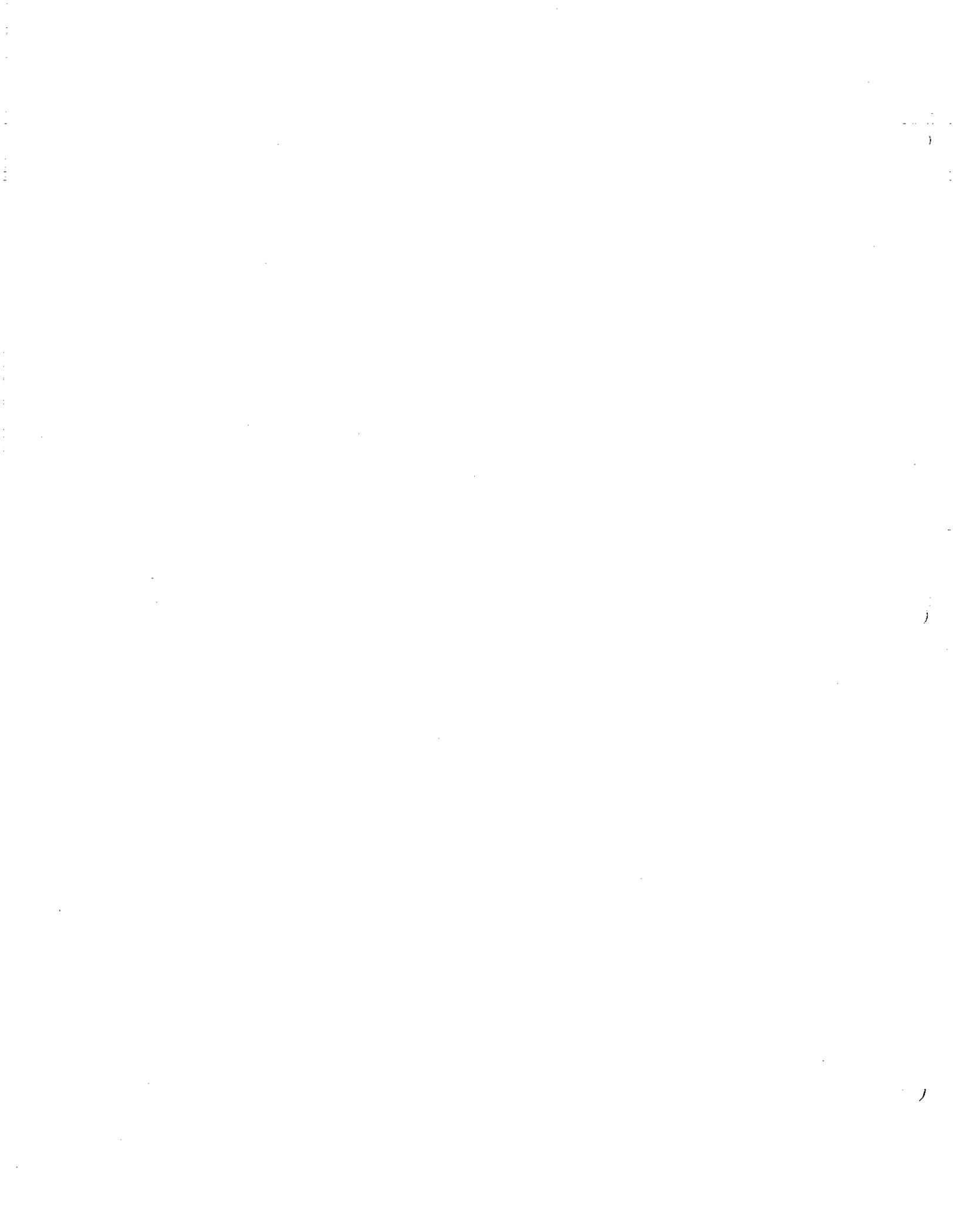
According to TDOT the 1993-1994 litter grant allocations for Wilson County was \$44,073. The litter grant program is set up as a reimbursement for money spent of clean up or educational programs. Note the TDOT emphasizes the money needs to be related to discouraging litter and approval from TDOT is needed prior to redirecting funds to new educational programs.

The Diversion Manager can submit a listing of potential educational activities to the County Sherriff along with detailed budgets. The County Sheriff can accept and fund options at their discretion.



Appendix X-A

Household Hazardous Waste



HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Abrasive cleaners	trisodium phosphate, ammonia, ethanol	corrosive, toxic, irritant	Use completely, rinse container and dispose in trash.	Rub area with half lemon dipped in borax, rinse and dry. Use baking soda instead. Try using soda water to clean stainless steel.
Aerosols	nitrous oxide, propane	toxic, carcinogen, flammable	Use completely, dispose in trash.	Use non-aerosol products.
Air fresheners & deodorizers	formaldehyde	toxic, carcinogen, irritant	Use completely, rinse container and dispose in trash.	Open a window or use an exhaust fan, sprinkle baking soda on odor areas and use in refrigerator.
Ammonia based cleaners	ammonia, ethanol	corrosive, toxic, irritant	Use completely, rinse container and dispose in trash.	Vinegar, salt and water for surfaces, baking soda and water for the bath.
Antifreeze	ethylene glycol	toxic	Dispose at wastewater treatment plant. DO NOT POUR ON GROUND.	
Auto Degreasers	petroleum products	Corrosive, Poisonous, Eye and skin irritant.	Use up according to label instructions or give away.	Choose strong detergent type over solvent type
Auto waxes and polishes	petroleum products	Fumes irritating to eyes. Harmful if swallowed. Eye and skin irritant.	Use up according to label instruction or give away.	Use outside.
Batteries	sulfuric acid, lead	corrosive, toxic	Recycle. trade in or take to reclamation center.	
Batteries: mercury button type	mercury	Swallowing one may be fatal if it leaks.	Throw in trash.	
Bleach cleaners	sodium or potassium hydroxide, hydrogen peroxide, hypochloride	corrosive, toxic	Use completely, rinse container and dispose in trash.	Use powdered bleaches or add borax.
Brake fluid	glycol ether, heavy metals	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Chlorinated hydrocarbons	DDT, aldrin, endrin, chlordane, heptachlor, lindane	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Import predators (ladybugs, ground beetles, mantis).
Disinfectants	diethylene/methylene glycol, sodium hypochlorite, phenols	corrosive, toxic	Use completely, rinse container and dispose in trash.	Half cup borax in 1 gal. water.
Drain cleaners	sodium or potassium hydroxide, sodium hypochlorite, hydrochloric acid, petroleum distillates	corrosive, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Mix 1 cup each baking soda, salt and white vinegar, pour in drain, wait 15 minutes, flush with boiling water, use plunger or plumber's snake.
Flea powders, sprays and shampoos	pesticides	Moderately to very poisonous.	Use up or save for hazardous waste collection day.	DO NOT USE DOG PRODUCTS ON CATS. Vacuum house regularly and thoroughly. Launder pet bedding frequently.
Floor or furniture polish	diethylene glycol, petroleum distillates, nitrobenzene	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	1 part lemon juice, 2 parts olive or vegetable oil.
Fungicides	captan, folpet, aniazine, zinc, copper compounds	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Do not over water; keep area dry and clean.
Furniture strippers	acetone, methyl, ethyl ketone, alcohols, xylene, toluene, methylene chloride	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Sandpaper or heat gun.
Herbicides	2,3-D, glyphosate prometon	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Hoe or hand weed, keep grass short.
Lacquer and lacquer thinner	acetone, benzene	Extremely flammable. Very poisonous.	Use up according to label instructions or save for hazardous waste collection day.	Ventilate area very well. Do not use in room with pilot light, open flame, electric motors, spark-generating equipment, etc. DO NOT SMOKE WHILE USING. No substitutes.

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Medicine: unneeded or expired	variety of ingredients	Frequently cause child poisonings.	Flush down sink or toilet.	Check content of medicine chest regularly. Old medications may lose their effectiveness, but not necessarily their toxicity. No substitutes.
Mothballs	naphthalene, paradichloro-benzene	toxic	Use fully, rinse container and dispose in trash.	Cedar chips, newspapers, lavender flowers.
Motor oil	hydrocarbons (benzene) heavy metals	flammable, toxic	Recycle wastes; take to reclamation center.	
Nail polish remover	acetone	toxic, flammable	Use up according to label instructions.	
Oven cleaners	potassium or sodium hydroxide ammonia	corrosive, toxic	Use fully, rinse container and dispose in trash.	Use baking soda and water or place a bowl of ammonia in 200 degree oven overnight and clean in the morning.
Paint-enamel or oil	pigments, ethylene, aliphatic, hydrocarbons, mineral spirits	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Latex or water based paint.
Paint-Latex, water based	rosins, glycol ethers, esters, phenyl mercuric acetate	toxic	Pour over newspaper in cardboard box, let air dry then discard in trash.	Limestone based whitewash or cassein based paint.
Paint-rust	mineral spirits, glycol ethers, ketone, petroleum	flammable, toxic	Keep in tightly closed jar and allow contaminants to settle. Strain and reuse liquid. Store contaminants for Hazardous Waste Program.	Use water with water based paints.
Paint-stains	mineral spirits, glycol ethers, ketone	flammable, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE. PROGRAM	Latex paint or natural earth pigment finishes.
Paint thinner or turpentine	N-butyl alcohol, acetone, methyl isobutyl ketone, petroleum	flammable, toxic	Keep in tightly closed jar and allow contaminants to settle. Strain and reuse liquid. Store contaminants for Hazardous Waste Program.	Use water with water based paints.
Pesticides arsenicals	lead arsenate, calcium arsenate, paris green	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Live traps, remove food supply.

HAZARDOUS HOUSEHOLD PRODUCTS

Products	Hazardous Ingredients	Hazard Properties	How to Dispose	Precautions and Substitutes
Pesticides botanicals	pyrethrine, rotenone, nicotine	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Ants: use chili powder to hinder entry.
Pesticides carbamates	carbaryl (sevin) aldicarb (lemik) propoxur (baygon)	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Keep garden weed free; use insecticidal soap.
Organo-phosphates	parathion, malathion, diazanon, dichlorvoa, chlorpyritos	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Traps or baking soda/powder sugar mix.
Plant insecticide	methoprene, malathion, tetramethrin, carbaryl	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Mix bar soap and water or old dishwater, spray on leaves and rinse.
Pool chemicals	muriatic (hydrochloric) acid, sodium hypochlorite (chlorine) algicide	corrosive, toxic	Use full, rinse container and dispose in trash.	Open lid and acid will evaporate.
Rat poison	broditacoum, coumerins (warfarin), strychnine	toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Live traps; remove food supply.
Rug cleaners	naphthalene, perchloroethylene, oxalic acid diethylene glycol	corrosive, toxic, irritant	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	To deodorize, sprinkle baking soda or cornstarch on dry rug. Vacuum in 30 minutes.
Silver polish	acidified thiourea, sulfuric acid	corrosive, toxic	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Soak in boiling water with baking soda, salt and piece of aluminum.
Toilet cleaners	muriatic (hydrochloric) of oxalic acid, paradichloroben zene, calcium hypochlorite	corrosive, toxic, irritant	DO NOT DISPOSE. STORE FOR HAZARDOUS WASTE PROGRAM.	Toilet brush and baking soda or mild detergent.
Transmission fluid	hydrocarbons, mineral oils	flammable, toxic	Recycle wastes; bring to reclamation center	
Window cleaner	ammonia	Vapor may be irritating. Slightly poisonous.	Use up according to lable instructions or give away.	Ventilate room. Instead: spray on vinegar, then wipe dry with newsprint.

Household Hazards

This fact sheet was prepared with the assistance of Clean Water Action. David Zwick, Executive Director of Clean Water Action, is a member of Earth Day 1990's Board of Directors.

What Is Household Hazardous Waste?

Many common household products contain ingredients that are toxic, corrosive or flammable, making them hazardous when used and disposed of improperly. Such common items as fingernail polish remover, bug spray, shoe polish, cleaning products and paint can threaten a family's health and safety while in the home. When disposed of improperly, household hazardous wastes can contaminate soil, air and water. Hazardous wastes dumped in landfill may seep through the soil into groundwater, which nearly half of all Americans depend on for household use. As a result of improper disposal of household hazardous products, 20 percent of the Environmental Protection Agency's highly contaminated Superfund sites are abandoned city landfills.

Poisoning of children and pets can be an immediate result of improper use and storage of hazardous products. Fire hazards are increased and unsuspecting firefighters may be endangered.



by improperly stored flammables and poisons. Throwing out hazardous wastes with other garbage threatens the health of trash collectors. In some instances, gasoline and other flammables have been carelessly poured into sewers and have caused explosions. In addition to the more obvious problems posed by household hazardous substances, there are long-term effects that are not as well understood. Many studies have shown that common household toxics can lead to cancer and other chronic illnesses.

One of the largest sources of municipal hazardous waste is used motor oil, which becomes a major environmental hazard when poured down storm sewers. Since sewage treatment plants are not designed to deal

with such toxics, the oil is often released directly into streams, rivers or the ocean. There it pollutes water and threatens plant and animal life. Every year, do-it-yourself oil changers improperly dispose of 176 million gallons of oil — an amount equal to 16 Exxon Valdez oil spills. One quart of oil can contaminate 250,000 gallons of drinking water.

What You Can Do

- Whenever possible, use non-hazardous alternatives to household products (see reverse for suggestions).
- If you must purchase a product that is potentially hazardous, check the label and make sure it will do exactly what you want. Buy only the amount you will use and follow directions carefully. Remember that doubling the dosage does not necessarily double the product's effectiveness.
- Store hazardous products in safe places out of the reach of children.
- Before disposing of a container, use up the entire product or give it to someone who will.
- Do not drain automotive fluids into the sewer. Oil, antifreeze and batteries can be recycled at some gas stations, and transmission fluid and brake fluid should be taken to a special disposal facility.

"With today's climate of rising environmental awareness and activism, promoting change at the individual level makes more sense than ever before. Through our actions, our purchases and our votes, we can change corporate behavior and that of our society as a whole. The roles each one of us chooses to play add up to a better future for our families, our communities and our planet."

- David Zwick, Executive Director, Clean Water Action



- If a hazardous product cannot be used up or recycled, take it to a hazardous waste disposal facility. Check with your local fire department to find out if such a service is available locally.
- Avoid disposable products whenever possible. Plastics and polystyrene (styrofoam) are manufactured using extremely hazardous chemicals, and if they are incinerated release toxics into the air.

Alternatives

Most household cleaning needs can be met using vinegar, baking soda, borax, ammonia and soap. An effective all-purpose cleaner can be made using the following non-toxic ingredients:

- 1 gallon hot water
- 2/3 cup baking soda
- 1/4 cup ammonia
- 1/4 cup vinegar

For a stronger solution double all of the above ingredients except for the water.

For non-toxic commercial cleaning products contact:

Shaklee Corporation
444 Market Street
San Francisco, CA 94111
(415) 954-3000

For More Information

- Clean Water Action
317 Pennsylvania Ave., SE
Washington, DC 20003
(202) 547-1196
- Channing L. Bete Co.
200 State Rd.
South Deerfield, MA 01373
(800) 628-7733

PRODUCT	SAFE ALTERNATIVE	PRODUCT	SAFE ALTERNATIVE
Aerosol sprays	Use lotions, gels or non-aerosol sprays.	Moth balls	Spread out newspapers in closets and place cedar chips around clothes.
Air fresheners	Keep houseplants to purify air. Place baking soda in your refrigerator and in garbage areas. Keep your house well ventilated.	Oven cleaner	Wash after each use with a mixture of baking soda and warm water. To solve burned spills, leave a small dish of ammonia in the oven overnight and scrub again the next day.
Batteries	Use rechargeable batteries.	Paint	Use latex and water-based paints.
Chlorine bleach	Use dry bleach or borax.	Paint remover	Peel off paint with a heat gun or scrape and sand.
Drain opener	To prevent clogging, pour boiling water down drains twice a week and always use the drain strainer. Avoid using drains for disposing of grease. Use a plumbing snake or a plunger to unclog drains.	Pet products	Use products containing de-limonene gas derived from citrus extracts. Insecticidal soaps are biodegradable and non-toxic.
Floor cleaner	Mop floor with a solution of 1 part vinegar to 32 parts water. Use club soda to polish.	Roach spray	Set out a dish of equal parts powdered sugar and baking soda. Spray roaches with soapy water.
Furniture polish	Use a solution of 1 tsp. lemon oil and 1 pint mineral oil. Toothpaste gets rid of water stains and salt heels with grease spots. Crushed raw nuts provide an oily polish.	Rug cleaner	Sprinkle on dry cornstarch and then vacuum. For red wine spills apply salt immediately.
Insecticides	Introduce predator insects, such as lady bugs and praying mantises, to your garden. Make your yard attractive to birds, amphibians, reptiles and bats to help control insects. Apply soapy water to leaves and then rinse well.	Shoe polish	Use polishes that do not contain trichloroethylene, methylene chloride or nitrobenzene. Wear suede or canvas.
Laundry cleaners	Use soap products and boost with washing soda.	Silver cleaner	Soak in warm water with 1 tsp. baking soda, 1 tsp. salt and a small piece of aluminum foil.
Metal polishes	Boil hardware in a solution of baking soda and salt.	Toilet cleaner	Use a solution of water and baking soda. Remove stubborn rings and lime build-up with white vinegar or pumice stone.
		Window cleaner	Mix 2 tsp. vinegar with 1 qt. and apply with newspaper.

- Citizens Clearinghouse for Hazardous Waste
P.O. Box 926
Arlington, VA 22216
(703) 276-7070
- Citizens for a Better Environment
942 Market St., Suite 505
San Francisco, CA 94102
(415) 788-0690
- Environmental Hazards Management Institute
P.O. Box 932
Durham, NH 03824
(603) 868-1496

- Greenpeace Action
1436 U Street, NW
Washington, DC 20009
(202) 462-8817
- Household Hazardous Waste Project
901 S. National Ave.
Box 108
Springfield, MO 65804
(417) 836-5777
- League of Women Voters
8 Winter St.
Boston, MA 02108
(617) 523-2999
- Local Government Commission
909 12th St., Suite 205
Sacramento, CA 95814
(916) 448-1198
- National Toxics Campaign
29 Temple Place, 5th Floor
Boston, MA 02111
(617) 482-1477
- Seattle Metro
821 Second Ave.
Seattle, WA 98104
(206) 447-5875



HHW MOBILE COLLECTION UNIT REPORT

COUNTY: Wilson

DATE: December 4, 1993

HOUSEHOLDS PARTICIPATING: 124

PRODUCT	% BY WEIGHT	WEIGHT	COST PER POUND	TOTAL COST	% OF COST
Flammable Liquid	1.87%	265	\$0.32	\$84.80	1.85%
Flammable Solid	0.08%	11	\$2.20	\$24.20	0.53%
Poisonous Material	4.23%	599	\$2.20	\$1,317.80	28.74%
Non-latex Paint	27.91%	3,953	\$0.32	\$1,264.96	27.59%
Aerosols	1.37%	194	\$0.90	\$174.60	3.81%
Waste Oil	14.40%	2,040	\$0.32	\$652.80	14.24%
Acidic Material	0.21%	30	\$1.80	\$54.00	1.18%
Oxidizing Material	0.00%	0	\$2.20	\$0.00	0.00%
Latex Paint	29.90%	4,235	\$0.20	\$847.00	18.47%
Antifreeze/Coolant/ Surfactant	1.10%	156	\$0.56	\$87.36	1.91%
Alkaline Batteries	0.46%	65	\$0.50	\$32.50	0.71%
Automotive Batteries	18.30%	2,592	\$0.00	\$0.00	0.00%
Caustic Material	0.18%	25	\$1.80	\$45.00	0.98%
Misc. Non-Alkaline Batteries	0.00%	0	\$0.50	\$0.00	0.00%
TOTAL POUNDS/COST		14,165		\$4,585.02	
ONE-DAY COLLECTION (LABOR)		1		\$3,150.00	
ONE-DAY COLLECTION (EQUIPMENT)		1		\$350.00	
MOBILIZATION CHARGE Mileage X cost		60	\$3.70	\$222.00	
TOTAL COST				\$8,307.02	
02/24/94					

February 1994

Department of Environment and Conservation
Division of Solid Waste Assistance
401 Church Street
Nashville, Tennessee 37243

**Subject: Request for a Household Hazardous Waste Collection Event
Wilson County Solid Waste Region**

This letter serves to request scheduling of a household hazardous waste collection event in Wilson County. The date desired is _____, 1994. The contact person who will serve to coordinate the fulfillment of the county's responsibilities will be _____. The contact person can be reached at _____, the address is _____, He/she can be reached at _____, the address is _____.

The site choice is _____ (description and directions). The site is approximately _____ (size). The site provides for water, electricity, sanitary facilities, and telephone available within. (If the site is not owned by the county, include the agreement with the land owner). Specifically, the site meets the requirements outlined in the Policy Guide. The telephone numbers for the appropriate emergency agencies are listed below:

FIRE: _____

POLICE: _____

NEAREST MEDICAL FACILITY: _____

Volunteers for this event will be recruited from the:

The County intends to advertise for the event starting _____ (two weeks prior to the event), with the attached advertisement (include the advertisement).

If you have any questions or objections to the date or location chosen please contact me directly. We would appreciate your prompt attention to this request.

Sincerely,

Mr. Don Simpson, Wilson County Executive

**HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM
WILSON COUNTY SOLID WASTE MANAGEMENT REGION**

DATE: _____

To determine the effectiveness of this program and improve future efforts, the user of this household hazardous waste collection service is requested to fill out this brief survey form.

1. How did you hear about this service? _____
2. Suggestions for more effective advertizing? _____
3. What is the primary reason you decided to utilize this service?
 - ___ interest in protecting the environment
 - ___ concern over health risks of having these chemicals in your home
 - ___ concern over throwing these chemicals in with solid waste and the danger to sanitation workers
 - ___ just wanted to get rid of the waste
 - ___ other: _____
4. What sort of waste did you bring today? _____
5. Approximate volume of waste? _____
6. How convenient is this location? _____
7. How far do you live from here? _____
8. Where do you live(City and County)? _____
9. Suggested alternative locations? _____
10. Please rate the service received today (1 to 5, 5 being excellent and 1 being unacceptable). _____
11. Demographic data:
 - Age group: ___ <20; ___ 20-29; ___ 30-39; ___ 40-49; ___ 50-59; ___ 60+ years old
 - Income: ___ <15,000; ___ 15,000-29,999; ___ 30,000-49,999; ___ \$50,000+ /year
 - Education: ___ grade school; ___ high school; ___ college; ___ post graduate
 - Currently a student? ___ no; ___ yes
12. The State of Tennessee is funding this program for a limited time. Should local funds finance future programs? Would you be willing to pay for this service in the future?

13. Comments: _____

14. Name and address (optional) _____

COUNTY RESPONSIBILITIES
HOUSEHOLD HAZARDOUS WASTE COLLECTION EVENTS
IN TENNESSEE

POLICY GUIDE
AUGUST 1993



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF SOLID WASTE ASSISTANCE

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1. Introduction
2. Site Criteria
3. Containers for Nonhazardous Household Waste
4. Advertisement
5. County Site Representative
6. Procedures for Scheduling a Collection Event
8. Volunteers
9. Answers to 13 Commonly Asked Questions

Attachments

- I. List of Acceptable Materials
- II. List of Materials Specifically Excluded
- III. Sample Newspaper Ad
- IV. Sample Public Service Announcement

STATE OF TENNESSEE
POLICY OF NON-DISCRIMINATION

Pursuant to the State of Tennessee's policy of non-discrimination, the Tennessee Department of Environment and Conservation does not discriminate on the basis of race, sex, religion, color, national or ethnic origin, age, disability, or military service in its policies, or in the admission or access to, or treatment or employment in, its programs, services or activities.

Equal Employment Opportunity/Affirmative/ADA Action inquiries or complaints should be directed to the Tennessee Department of Environment and Conservation, EEO/AA/ADA Coordinator, 401 Church Street, 21st floor, Nashville, TN 37243, (615) 532-0101.

Tennessee Department of Environment and Conservation. Authorization No. 327467. 400 copies. This public document was promulgated at a cost of \$.47 per copy. August 1993

Appendix X-B

Waste Oil

ESTIMATE OF DISPOSITION OF DIY USED OIL IN 1981

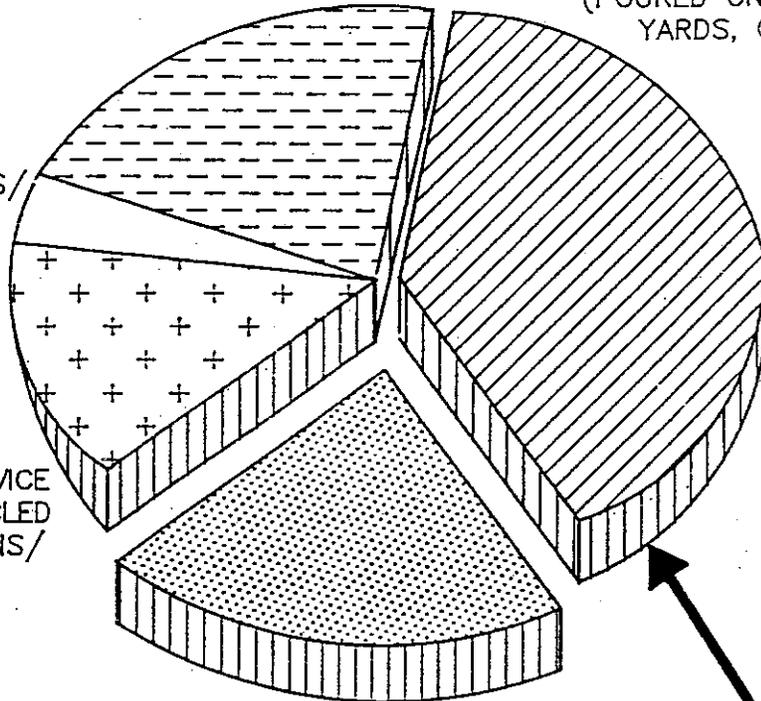
21% MISCELLANEOUS (42 MILLION GALLONS/YEAR)
(USED ON MACHINERY, STORED, USED AS A
PESTICIDE, USED TO TREAT WOOD, ETC.)

40% DISPOSAL (80 MILLION GALLONS/YEAR)
(POURED ON ROADS, DRIVEWAYS,
YARDS, OR INTO SEWERS)

4% BURNED
(8 MILLION GALLONS/
YEAR)

14% TAKEN TO SERVICE
STATIONS OR RECYCLED
(28 MILLION GALLONS/
YEAR)

21%
PUT IN TRASH OR GARBAGE TO
BE COLLECTED
(42 MILLION GALLONS/YEAR)



"DO-IT-YOURSELFERS"
MISMANAGE AT LEAST 61% OF
THE OIL THEY HANDLE.
(NOTE: SOME MISCELLANEOUS
USES CAN ALSO CONSTITUTE
MISMANAGEMENT.)



Waste Oil Handlers in Tennessee

A-1 Shipley's Waste Oil
2843 Harrison Pike
Chattanooga, TN 37406
(615) 622-7039

Able Energy Company, Inc.
1245 Channel Avenue
Memphis, Tennessee 38113
(901) 942-1523

CTC Industrial Services
1827 Latham St.
Memphis, TN 38106
(901) 942-1212

Earth Industrial Waste
Management
3536 Fite Rd.
Memphis, TN 38127
(901) 358-5695

Enterprise Oil
728 Owl Hollow Rd.
Knoxville, TN 37923
(615) 690-9751

Enterprise Waste Oil
White Wing Rd.
Lenoir City, TN 37771
(615) 986-7972

Ferguson Harbor Service
340 Rockland Rd.
Hendersonville, TN 37075
(615) 822-3295

Goins Waste Oil Company
1606 E. 48th Street
Chattanooga, TN 37407
(615) 867-2216

H & H Oil Recovery Company
Flatwoods Church Rd.
Camden, TN 38320
(901) 584-2043

Hurley's LP Gas
1288 Arden Lane
Morristown, TN 37813
(615) 586-2392

ILWD, Inc.
P. O. Box 983
Kingsport, TN 37662
(615) 246-5206

Jack Goins Waste Oil
801 15th St. NE
Cleveland, TN 37311
(615) 476-7492

Necessary Oil Company
497 Island Rd.
Bristol, VA 24201
(703) 669-4831
(process plant in TN)

North American Environmental
Corp.
2100 Board St.
Chattanooga, TN 37408
(615) 756-8116

Oil Service Company
202 Hill st.
P.O. Box 1203
Columba, TN 38401
(615) 481-4999

OSCO, Inc.
618 Grassmere Park Drive
Suite 17
Nashville, TN 37211

Petroleum Recycling Corp.
2708 Crosslane Rd.
Knoxville, TN 37919
(615) 693-7627

Petroleum Refining Company
119 Morrison St.
Gallatin, TN 37066
(615) 451-1806

Petroleum Refining Company
Crosslane Rd.
Karns, TN 37921
(615) 693-7627

Page 2

Waste Oil Handlers in Tennessee

Resource Recycling
Technologies, Inc.
1000 Market St.
Portland, TN 37418
(615) 325-9818

Robert Sun Company
240 Great Circle Rd.
Nashville, TN 37228
(615) 251-0680

Systech Liquids Treatment, Corp.
1640 Antioch Pike
Nashville, TN 37013
(615) 833-2059

United Oil and Chemical, Inc.
1015 Southern Rd.
Memphis, TN
(901) 521-0810

Volunteer Waste Oil Company
716 Currey Rd.
Nashville, TN 37217
(615) 366-7435

Used Oil and Filters: The Continuing Saga

According to Tom Tiesler, director of Solid Waste Management for Tennessee's Department of Environment and Conservation, generators have three options in disposing of used oil filters in this state.

Option 1: Recycle



You can recycle the oil and the metal from the filters. Used oil

filters are exempt from hazardous waste regulations if both the metal and the used oil from the filters are recycled. To qualify for a scrap metal recycling exemption, you must remove free flowing oil from the filters by draining and crushing or by filter disassembly prior to shipping to a metal recycler. The actual processing of filters (draining, crushing, and transporting) is not subject to hazardous waste regulations. This means you can process the filters or have someone else handle them off-site.

If you choose to disassemble your oil filters, the individual parts all have statewide special waste approval only if the filter element is mechanically compressed to remove all free-flowing oil and that oil is collected for recycling.

After the filter's drained, you then certify that it's filter element and gaskets are non-hazardous and that you've removed all free-flowing oil. The state will accept this certification without a Toxic Characteristic Leaching Procedure (TCLP) test. The state is waiving TCLP for filters handled as prescribed above because published studies show that this processing method yields material which consistently passes the TCLP.



Option 2: Recycle... and then some

Since the state is waiving TCLP for drained and crushed filters, you can also recycle the oil but dispose of the filter material in a landfill. TDEC says that after crushing, the filter material retains only about one ounce of oil. That drained filter material can therefore go in the landfill without fear of it oozing out all over the place. Of course you must properly recycle the free-flowing oil that you harvest during crushing. Several vendors exist in Tennessee who will handle your filters and used oil. TDEC doesn't care if processing's done on or off-site.



Option 3 : Dispose of as Hazardous Waste

If you don't want to crush and drain your filters, then you have to handle them as a hazardous waste. Special waste approval will NOT be granted for undrained and uncrushed filters. Nobody wants those yucky, oil-filled things in the landfill. And any oil which you drain from an unrecycled and uncrushed filter must be likewise recycled or disposed of as a hazardous waste if it's not recycled.

If this creates more questions for you than it answers, contact Garey Mabry at the Division of Solid Waste Management—615-741-3424.



THE UNIVERSITY OF TENNESSEE
CENTER FOR INDUSTRIAL SERVICES

Suite 606
226 Capitol Boulevard Building
Nashville, Tennessee 37219-1804
(615) 242-2456
FAX (615) 741-6644

DRUM RECYCLERS AND DRUM HANDLING EQUIPMENT VENDORS

The following companies may be able to recycle or dispose of used empty drums. This is not meant to be a complete listing, nor is it an endorsement of any of these companies.

Tri-State Steel Drum Company, Inc.
Graysville Road
Graysville, GA
404-891-9726

Nashville Barrel and Drum, Inc.
1607 Mallory Lane
Brentwood, TN
615-377-6801

Cowley Container Corporation
1715 Pecan
P. O. Box 5716
Nashville, TN 37208
615-242-9127

B J Fox and Son
62 Hart
Nashville, TN
615-256-3512

Allied Drum Service, Inc
401 Colorado Ave
Louisville, KY
502-637-5428

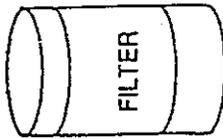
O'Bryan Barrel Company, Inc.
Evansville, IN
812-479-6741

Jehl Cooperage Company
4 Virginia Avenue East
Memphis, TN
901-775-3500

Memphis Drum Service
3299 Tulane Rd
Memphis, TN
901-396-6484

W & R Drum Company
1501 Latham
Memphis, TN
901-948-6364

About Oil Filters:



If you change your oil filter, drain the old one by punching an air hole in the top and drain a minimum of 12 hours.

Dispose of the oil filter only after it is properly drained.

Check to see if there is a filter crushing and recycling program in your community.

NOTE: Commercial handlers of used oil and oil filters may be subject to more stringent requirements than those specified for do-it-yourselfers.

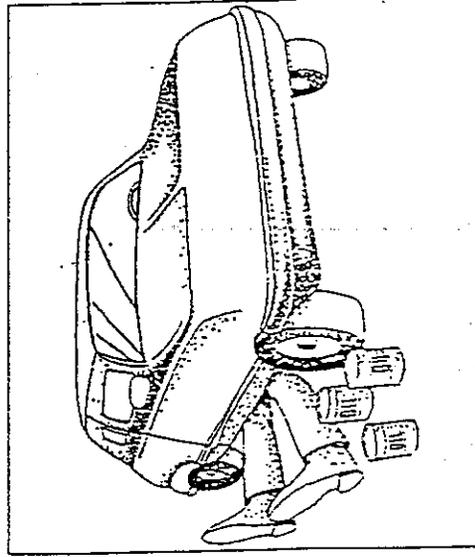
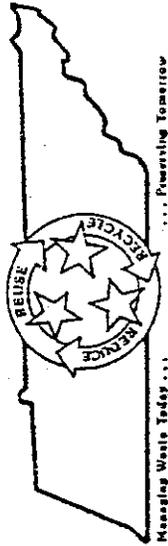
The information contained in this pamphlet is based on current state laws and best management practices. Recommendations may change over time as new laws and information are developed. Contact the Division of Solid Waste Assistance if you have any questions.

Division of Solid Waste Assistance
Special Wastes Section
14th Floor, L & C Tower
401 Church Street
Nashville, TN 37243-0455
(615) 532-0091

What Tennessee
Do-It-Yourselfers
Should Know
About
Disposing of

USED MOTOR OIL

TENNESSEE WASTEWISE



Printed on recycled-content paper



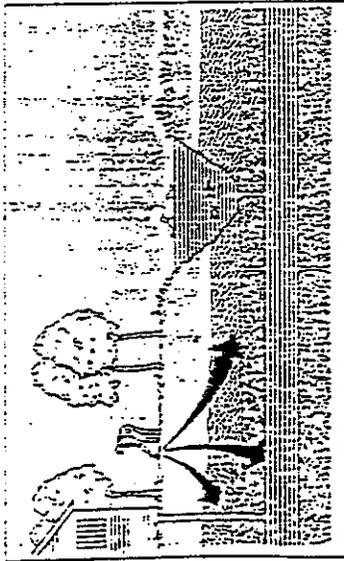
Tennessee Department of Environment and Conservation. Authorization No. 327421, 2,000 copies. This public document was promulgated at a cost of \$.09 per copy. January 1993.

Get the Facts:

Tennessee's do-it-yourselfers (DIYers) generate more than 1,000,000 gallons of used motor oil each year.

If it is not disposed of properly, waste motor oil can interfere with the operation of sewer systems and can easily get into our groundwater and streams.

In fact, it is estimated that up to 60 percent of the used motor oil generated by Tennessee's do-it-yourselfers may end up in the our streams and lakes.



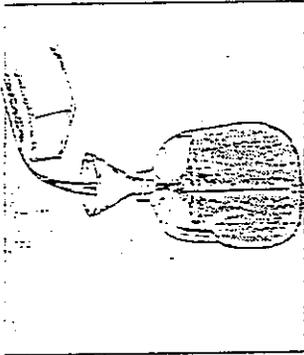
Used with permission of Project ROSE (Recycled Oil Saves Energy)

The Law

The Tennessee Water Quality Control Act of 1977, enacted to prevent water pollution, makes it unlawful (except under the conditions of a valid permit) for any person to place any waste (including oil) in any location where it is likely to move into any public or private ground or surface water. The maximum penalty is \$10,000 per each day of occurrence (T.C.A. Section 69-3-108 (b)).

Proper Disposal of Used Oil:

Put your used oil in a clean plastic container with a tight lid.



Used with permission from Project ROSE (Recycled Oil Saves Energy)

Don't mix it with anything else—paint, gasoline, solvents, antifreeze, etc.



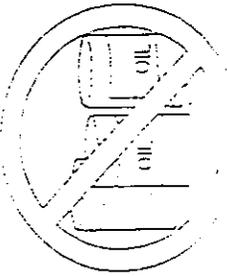
Take your used oil to a service station or other location that collects used oil for recycling.

Possible Collection Centers:

- Automotive Service Stations
- Auto Supply Stores
- Convenience Stores
- Car Dealerships
- Insight Oil Chargers
- Recycling Drop-Off Centers

Contact your county or city Public Works or Sanitation Department for other possible collection centers.

Things NOT To Do With Used Oil:



- Never pour used oil down a drain.
- Never pour used oil into a storm sewer.
- Never toss used oil on the driveway, street or ground.
- Never dispose of oil in lakes, streams or wetlands.
- Never spread oil to suppress dust or kill weeds.
- Never burn oil outdoors.
- Never mix oil with other substances.

Remember:

Oil drained from your automobile is a valuable resource when properly recycled.

Recycling used oil can conserve our nation's natural resources.

Used oil can be re-refined and purified into a high quality motor oil.

Recycling used oil can save consumers money.

Improper disposal of used oil can contaminate the soil as well as surface and ground water.

Appendix B

Sample Brochure

WHAT HAPPENS THEN?

- Used oil can be re-refined into a good-as-new lubrication oil. Oil never wears out, it just gets dirty. It takes 42 gallons of crude oil to produce 24 quarts of new lubricating oil. But just one gallon of used oil can be re-refined into the same high quality 24 quarts of lubricating oil.
- Used oil can be reprocessed into a fuel oil. One gallon of used oil reprocessed for fuel contains about 140,000 BTUs of energy and can be burned very efficiently.
- Recycling used oil could reduce national petroleum imports by 25.5 million barrels of oil per year, and save much of the energy to process it. (University of Alabama, Alabama Energy Division, 1986.)

Washington State law declares that it is the policy of the state to collect and recycle used oil (Chapter 19.114, RCW). Additionally, it is unlawful to spill oil into the ground water or surface waterways of the state (Chapter 90.48, RCW).



Printed on 100% Recycled Paper

RECYCLE USED OIL

Prevent Water Pollution

Protect Public Health

Reuse Limited Resources

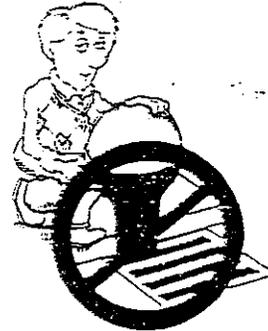


Illustrations by Tim Schiender

For Information:
Call toll-free 1-800-RECYCLE

WASHINGTON STATE DEPARTMENT
OF ECOLOGY
Litter Control & Recycling Program
Olympia, WA 98504

GO RECYCLE!



THE USED OIL PROBLEM
What Can You Do?

Waste oil has the most negative environmental impact of all automotive products because it's flammable, persistent, and contains toxic chemicals and heavy metals. Oil sticks to everything from beach sand to bird feathers. It floats on and pollutes our waterways. It is slow to degrade and evaporates. A small amount seriously contaminates large quantities of drinking water.

HOW BIG IS THE USED OIL PROBLEM?

More than 4.5 million gallons of used oil are discarded every year in Washington State.

- More than 2 million gallons of used motor oil (enough to fill a medium sized tanker) ends up in Puget Sound. Much of it is dumped into storm drains that empty into streams and lakes that feed the Sound.
- Used oil is the largest single source of oil pollution (over 40 percent) in our nation's waterways. Most is dumped by do-it-yourselfers.

In 1960, service stations performed 90 percent of the automotive oil changes. Today do-it-yourselfers change about 60 percent of the automotive oil.

Most used oil changed by do-it-yourselfers is dumped down a storm drain, poured on the ground, or sent off to a landfill in the garage.



WHAT ARE THE EFFECTS?

Drainage of used oil in storm drains and on the ground pollutes waterways, Puget Sound, and underground water supplies.

- Used oil contains toxic chemicals, carcinogenic hydrocarbons and heavy metals (lead, zinc, arsenic, chromium, cadmium) which are harmful to the environment and public health.
- One pint of oil can produce a slick of approximately one acre on surface water. Fish, waterfowl, insects and aquatic life are threatened by used oil in waterways. Floating plankton and algae to basic food sources are killed on contact with oil. Very small amounts of oil raised over shellfish beds can contaminate the flavor of clams and oysters. Less than 300 parts per million can ruin the taste of fish.
- Used oil placed in the garbage goes through the landfill to contribute to leachate and contamination of groundwater supplies. One quart of oil will foul the taste of 250,000 gallons of water.
- Used oil should not be applied to roads for a dust suppressant, as new oil sometimes is. Over 90 percent leaves the road surface as dust particles or is raised into the state's waterways with rain runoff, according to an EPA study. Used oil carries a load of heavy metals and toxics.
- Burning unprocessed used oil can pollute the air we breathe with elements potentially harmful to human health.



WHAT CAN YOU DO? RECYCLE!

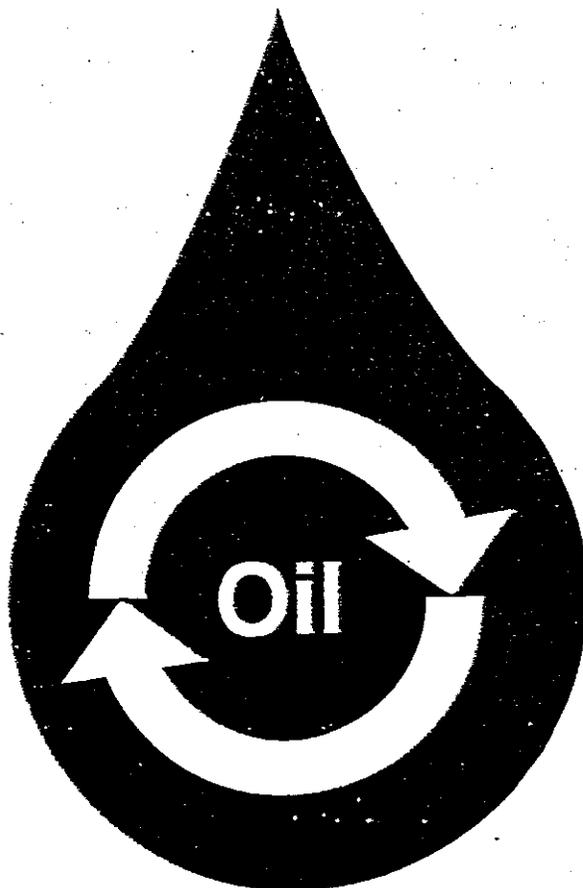
RECYCLE used oil from cars, boats, motorcycles, and lawnmowers.

HOW?

- Take it to a clean, sealed container (1-gal. milk jug) to the nearest participating recycling center or service station accepting uncontaminated used oil. For locations, call the Department of Ecology toll-free recycling hotline, 1-800-RECYCLE.

Current market fluctuations have eliminated many of the financial incentives of the used oil recycling program, and the service station owners may have to pay to have oil removed from their tanks. However, most participating stations have chosen to remain in the program. Used oil should never be mixed with antifreeze, engine degreasers, gasoline, paint thinner, solvents, cooking oil, etc. since these contaminants interfere with the reprocessing or re-refining process and are very expensive to remove.

**RECYCLE
USED OIL
HERE**



625
8/300
90
20
11
40

Sample Letter to Encourage Participation

(Date)

(Name)
(Address)

Dear _____:

Can we count on you to help our program to recover a potential source of energy, while at the same time eliminating an environmental hazard?

We are in the process of establishing a public service used oil recycling program that we feel would benefit our community and the nation. We would appreciate your advice and assistance in its development.

Used oil is a neglected but valuable energy resource. It can be recycled and put back to work as a lubricant or fuel. If used oil is not recycled and is discarded improperly, it can present a serious hazard to our environment. Throughout our community and nation, used oil is being wasted in surprisingly large amounts. (The Environmental Protection Agency and the Department of Energy estimate that the amount of oil mishandled annually in the U.S. by do-it-yourselfers exceeds 180 million gallons.)

Part of the reason for this waste is that automobile owners who change their own oil do not have proper disposal facilities for their drainings. As a result, used oil ends up in garbage or trash cans, storm sewers, or vacant lots. Eventually, it reaches and pollutes our streams and rivers. A combined effort to end this pollution by saving and re-using oil, thus conserving energy, will benefit all.

Our theme: PROTECT OUR ENVIRONMENT—CONSERVE ENERGY RESOURCES

Our slogan: RECYCLE USED OIL

A key feature of our program will be the establishment of a network of convenient used oil collection centers in our community. We hope to enlist the voluntary participation of civic-minded service station managers and business persons who are equipped and would be willing to handle used oil. Collection facilities might also be set up on public properties such as municipal garages, fire stations, or the area landfill or transfer station. Each collection point can be identified by a sign or poster. The discarded oil can then be sold to a recycler, who will ultimately reprocess it and prepare it for future marketing.

We will publicize the program and the collection centers through literature (brochures, etc.) and the media.

Your interest in, and active support of, our endeavor can help to make this much-needed public service a success. We would welcome your endorsement of our effort. Would you, or someone you designate, meet with us to share additional ideas and discuss approaches aimed at creating an effective program?

We welcome a response at your earliest convenience. You may call us at (phone) or write us at the following address: (list). Thank you for giving the program your consideration.

Sincerely,

(Name)
(Title)
(Organization)

Sample Kickoff Press Release

FROM:

DATE:

FOR RELEASE ON: _____

USED OIL RECYCLING PROGRAM
BEGINS IN (COMMUNITY, CITY, STATE)

(Date) marks the kickoff of (community) used oil recycling program.

"We only wish that every community in the nation could be kicking off its own recycling program today also," said (Name, Title) of (Organization).

The program, initiated on (date) by (identify and give desired specifics), will be the first effort of its kind staged in (community). "The objectives are many. Of utmost importance will be our desire to impress upon the do-it-yourself oil changers of (community) the importance of keeping their oil drainings out of storm drains, garbage and trash receptacles, empty lots and the ground water," said (name). (Name) also cited the need to educate new do-it-yourselfers about how to collect and recycle oil in an environmentally sound manner.

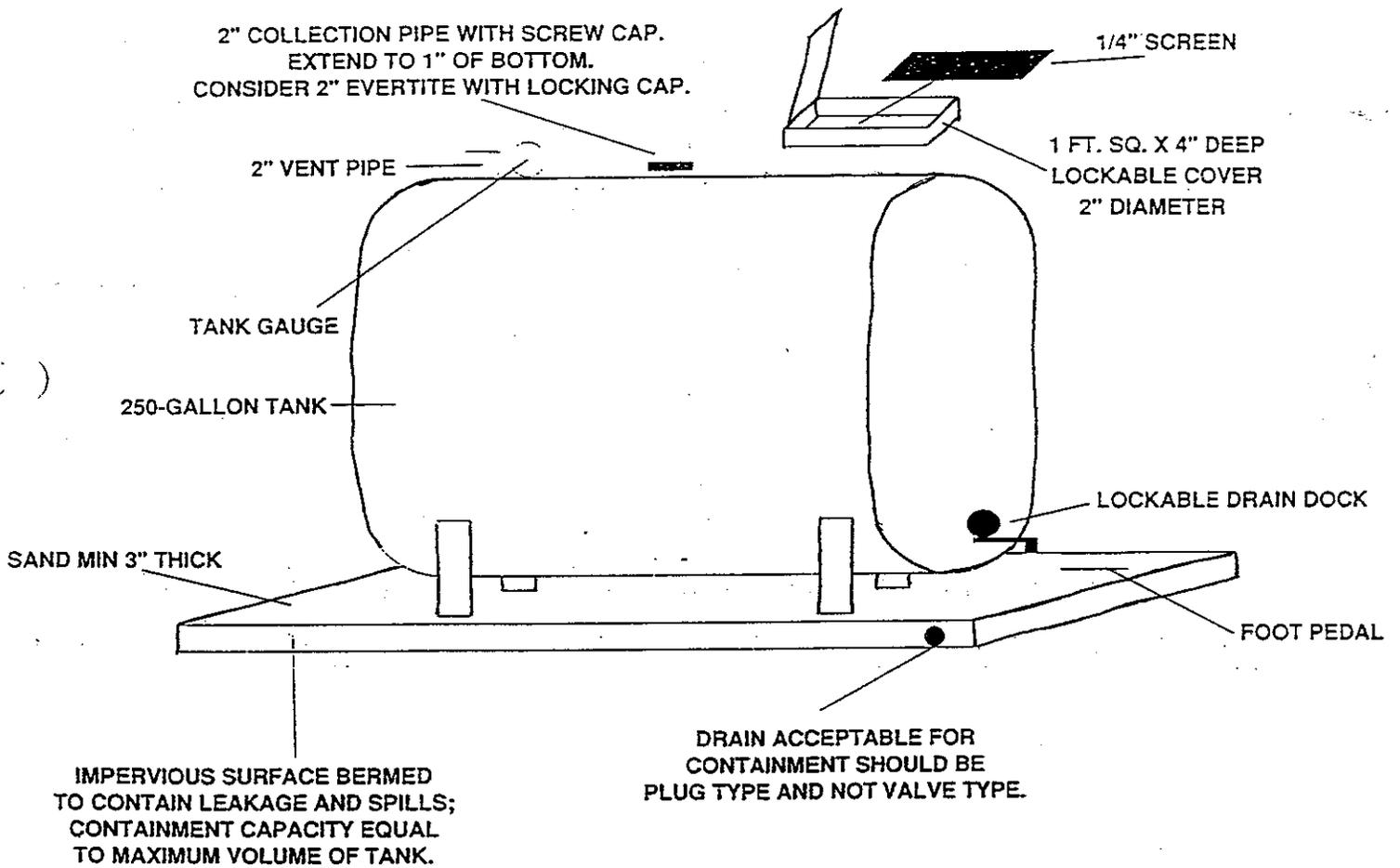
(Community's) desire to aid in doing its share to combat the harm done to the environment by improper disposal was yet another reason. Last, but by far not least, (name) said "we want to take a giant step for energy conservation through re-use of this valuable energy resource."

The U.S. Environmental Protection Agency and the Department of Energy estimate that in excess of 180 million gallons of used oil are mishandled annually by do-it-yourselfers.

The (community) program has established a network of collection centers for used oil. Service stations (and any other establishments participating) have agreed to serve as used oil collection centers. One of the incentives is that the collection centers will be able to sell the used oil to recycling conglomerates and use the proceeds as they wish (use statement only if applicable). The collection points will be identified by posters and their locations will be publicized areawide. (Name) said, "For our residents, the rest is easy. All they need is a suitable container and a cooperative frame of mind." (Organization) will have brochures, pamphlets and other informational materials to place in circulation. The (organization) has received endorsements from a number of (civic groups, organizations, etc.) and officials in the area, including: (list)

(Name of person) anticipates excellent cooperation and participation on the part of collectors and community residents. Anyone interested in obtaining more information or helping with this campaign should contact (name) at (address) or call (phone number).

SAMPLE OIL COLLECTION TANK DESIGN



Appendix X-C
Lead Acid Batteries

REMEMBER:

- Don't Trash
- Don't Burn
- DO Recycle!

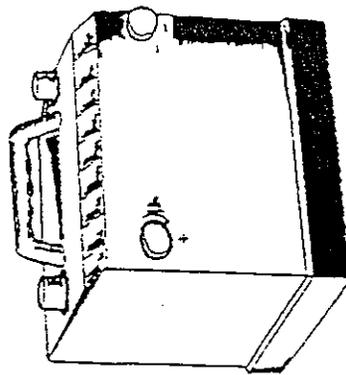
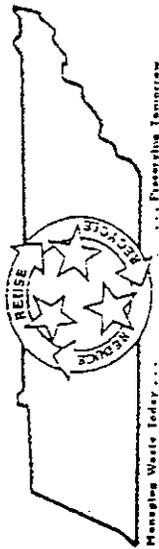
Lead-Acid Batteries.

The information contained in this pamphlet is based on current state laws and best management practices. Recommendations may change over time as new laws and information are developed. Contact the Division of Solid Waste Assistance if you have any questions.

Division of Solid Waste Assistance
Special Wastes Section
14th Floor, L & C Tower
401 Church Street
Nashville, TN 37243-0455
(615) 532-0091

**PROPER DISPOSAL
OF
LEAD-ACID
BATTERIES**

TENNESSEE WASTEWISE



Tennessee Department of Environment and Conservation, Authorization No. 327420, 2,000 copies. This public document was promulgated at a cost of \$.09 per copy, January 1993.

Appendix C

Sample Letter to Prospective Collection Center Operators

(Date)

(Name)
(Address)

Dear _____:

We would appreciate your help in a community used oil recycling project designed to conserve energy and protect our environment.

We are planning a broad-scale program aimed at capturing used oil from do-it-yourself oil changers. The residents of our town will be encouraged to participate. They will be informed of the energy potential and the value of recycled oil—that it need not be wasted but can be reprocessed and used again.

As you know, many of our citizens change their own oil and would be willing to cooperate with us in this endeavor, but they need a convenient place at which to deposit their drainings. We are in the process of setting up used oil collection centers at which do-it-yourselfers can deposit their used oil. This oil will then be picked up by reputable used oil collectors to be reprocessed and prepared for use once again.

Would you consider extending your service by establishing a collection center for our project? You would be assisting many people who are now disposing of their drained oil in ways that harm our environment and waste a valuable energy resource. The used oil brought to the collection center would be yours to sell. While rendering a significant service, you would also be playing an important role in a community project that benefits you, the car owner, and the nation.

It is our belief that such a program can and will be successful if we work at it TOGETHER. Sponsors of the program include: (names).

We hope that you will join us and will place a "Recycle Used Oil Here" sign at your station.

Please let us know at your earliest convenience if we can count on you. Write us at the following address: _____ or call _____ (phone).

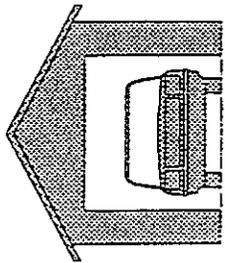
Thank you for giving the program your consideration.

Sincerely,

(Name)
(Title)
(Organization)

Lead-Acid Batteries provide electricity to the electrical systems of most motorized vehicles. There are millions of these batteries in use today. Lead-acid batteries are used by such things as:

Automobiles,
Motorcycles,
Trucks, Tractors,
Boats, Jet Skis,
Riding Lawn-
mowers, Off-Road
Vehicles



The electricity produced by these batteries is generated by a chemical reaction between sulfuric acid and lead.

Never throw your battery in the trash.

While today's landfills are constructed and operated to protect the environment, the best protection is to keep harmful substances out of them.

Because of the toxic properties of lead-acid batteries, it is illegal for Tennessee landfills or incinerators to accept lead-acid batteries for disposal.



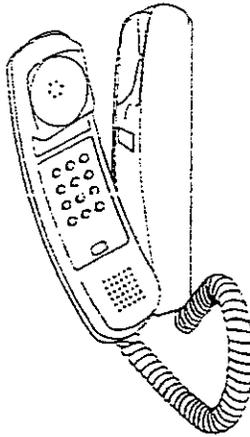
Always Recycle Your Old Batteries

Lead-acid batteries can be recycled. The components in a battery do not wear out, they just get dirty. Battery recyclers convert spent batteries into useable lead, sulfuric acid and plastic.

Where Can I Recycle?



Every retail store that sells lead-acid batteries in Tennessee is required by Tennessee law to accept used batteries as "trade-ins." Recyclers then buy used batteries from retail stores.



Call your local auto parts store, service station or discount department store.

Many battery retailers will even accept used lead-acid batteries even when you are not actually purchasing a battery. Just ask!

Appendix X-D

Litter Grant

1993-1994
LITTER GRANT ALLOCATIONS

ANDERSON	\$38,290	LAUDERDALE	\$23,911
BEDFORD	\$29,001	LAWRENCE	\$36,127
BENTON	\$21,435	LEWIS	\$20,211
BLED SOE	\$20,211	LINCOLN	\$30,102
BLOUNT	\$49,378	LOUDON	\$24,903
BRADLEY	\$42,971	MCMINN	\$35,582
CAMPBELL	\$28,524	MCONAIREY	\$28,007
CANNON	\$20,211	MACON	\$21,572
CARROLL	\$30,111	MADISON	\$46,087
CARTER	\$32,387	MARION	\$22,039
CHEATHAM	\$23,293	MARSHALL	\$23,664
CHESTER	\$20,211	MAURY	\$40,604
CLAIBORNE	\$26,124	MEIGS	\$20,211
CLAY	\$20,211	MONROE	\$32,297
COCKE	\$27,357	MONTGOMERY	\$52,500
COFFEE	\$32,332	MOORE	\$20,211
CROCKETT	\$20,211	MORGAN	\$20,211
CUMBERLAND	\$30,841	OBION	\$30,943
DAVIDSON	\$193,053	OVERTON	\$23,092
DECATUR	\$20,211	PERRY	\$20,211
DEKALB	\$20,211	PICKETT	\$20,211
DICKSON	\$32,590	POLK	\$20,871
DYER	\$29,702	PUTNAM	\$36,520
FAYETTE	\$27,993	RHEA	\$22,187
FENTRESS	\$20,211	ROANE	\$33,926
FRANKLIN	\$29,637	ROBERTSON	\$34,052
GIBSON	\$39,192	RUTHERFORD	\$62,607
GILES	\$30,724	SCOTT	\$20,211
GRAINGER	\$20,616	SEQUATCHIE	\$20,211
GREENE	\$46,049	SEVIER	\$39,515
GRUNDY	\$20,211	SHELBY	\$295,270
HAMBLEN	\$30,007	SMITH	\$20,211
HAMILTON	\$122,457	STEWART	\$20,211
HANCOCK	\$20,211	SULLIVAN	\$71,130
HARDEMAN	\$26,855	SUMNER	\$57,843
HARDIN	\$26,935	TIPTON	\$29,852
HAWKINS	\$35,032	TROUSDALE	\$20,211
HAYWOOD	\$22,982	UNICOI	\$20,211
HENDERSON	\$27,189	UNION	\$20,211
HENRY	\$30,720	VAN BUREN	\$20,211
HICKMAN	\$26,260	WARREN	\$23,448
HOUSTON	\$20,211	WASHINGTON	\$50,914
HUMPHREYS	\$22,891	WAYNE	\$24,745
JACKSON	\$20,211	WEAKLEY	\$33,637
JEFFERSON	\$28,729	WHITE	\$23,382
JOHNSON	\$20,211	WILLIAMSON	\$47,513
KNOX	\$144,080	WILSON	\$44,073
LAKE	\$20,211	TOTAL	\$3,400,000

Chapter XI - Implementation: Schedule, Staffing and Funding

A. System Definition

In order to meet the requirements of "The Solid Waste Management Act of 1991" Wilson County needs to implement or upgrade the following components to provide an integrated solid waste management system to meet its solid waste demands in the next ten years:

Waste Reduction (Chapter IV)

Wilson County must reduce or divert 13,367 tons beginning in 1995. In order to meet this reduction a combination of programs will be implemented including construction a Class III/IV landfill, expanding the yard waste composting program in the City of Lebanon, implement educational programs for source reduction at all industries and commercial businesses, and through a drop-off recycling program.

Collection and Transportation (Chapter V)

Wilson County currently has eight convenience centers in place which exceeds the minimum requirement of three centers. Recommendations are for the County to continue operations as is. The County is planning to build a transfer station to be in place by the Summer of 1994 and at that time will transport Class I waste to private landfill for disposal.

Recycling (Chapter VI)

Recycling programs that need to be implemented to insure the 25 percent reduction is obtained include: provide drop-off containers at all eight convenience centers for newspaper, aluminum cans, corrugated cardboard, ferrous containers, and glass; provide recycle bins at county schools for white paper and corrugated cardboard; expand recycling at commercial business and industries; provide curbside collection for newspaper in the City of Lebanon.

Disposal (Chapter VIII)

Wilson County will operate its current Class I landfill until capacity is reached in Summer 1994. The County has contracted for disposal at a private landfill for most of the Class I waste. The County has a permit pending for an expansion of a Class I landfill. This expansion will serve as an alternate means of disposal.

Education (Chapter IX)

Institute education programs for fifth and eleventh grade students as per curriculum provided. Also education programs will be established for area industries, civic groups, offices and ministerial alliances, and a source reduction program will be implemented for area industries.

Problem Waste (Chapter X)

Provide once a year collection through 1995 using the state collection program for household hazardous waste (HHW) and provide a permanent drop of site in the county in 1996.

B. Implementation Schedule

<u>Activity</u>	<u>Date</u>
Solid Waste Plan Submitted	June 1994
Apply for Convenience Center Grant	Summer 1994
Solid Waste Plan Approved	September 1994
Begin White Good/Scrap Metal Collection	Summer 1994
Diversion Manager In Place	October 1994
Begin Drop-off Recycling Program	January 1995
Class III/IV Landfill On-Line All Regulatory Bans	Summer 1995
Begin School Recycling and Education Program	August 1995
Begin Lebanon Curbside (if needed)	November 1995
All Planned Programs Associates w/ Diversion Operating at 100%	December 1995
25% Diversion Goal Met	January 1, 1996

C. Staffing and Training Requirements

Wilson County's current solid waste staff includes the following positions:

<u>Position</u>	<u>Number</u>
Solid Waste Manager	1
Equipment Operator @ Landfill	2
Truck Driver for Collection	2
Attendant @ Landfill	1
Maintenance @ Landfill	2
Attendant for Convenience Centers	10

D. Budget

The following cost estimate is based on the Proposed Solid Waste Budget for FY 94-95 provided by Wilson County. 1995 - 2003 figures based on 1994 cost plus a 5% inflation rate per year.

EXPENDITURES FOR INTEGRATED SOLID WASTE MANAGEMENT SYSTEM

WILSON COUNTY

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Waste Reduction ¹	10,000	126,609	132,939	139,586	146,565	153,893	161,588	169,667	178,150	187,058
Collection & ² Transportation	509,700	535,185	561,944	590,041	619,543	650,520	683,046	717,198	753,058	790,711
Recycling ³	8,000	8,400	8,820	9,261	9,724	10,210	10,721	11,257	11,820	12,411
Disposal ⁴	859,300	775,656	814,439	855,161	897,919	942,815	989,956	1,039,454	1,091,427	1,145,998
Education	5000	5,250	5,513	5,789	6,078	6,382	6,701	7,036	7,388	7,757
Problem Waste	1500	2000	2500	15,000	15,000	20,000	20,000	25,000	25,000	30,000
TOTAL	1,393,500	1,453,100	1,526,155	1,614,838	1,694,829	1,783,820	1,872,012	1,969,612	2,066,843	2,173,935

¹ Waste Reduction includes transportation cost for recycling, and Class III/IV landfill beginning in 1995.

² Cost includes operation of the convenience centers and transportation cost to the disposal facility.

³ Cost includes administrative cost of recycling only. Cost for transport to market is included in the Waste Reduction budget.

⁴ Cost include disposal at a private landfill and operation of the current landfill. In 1995 cost for operation of a new Class III/IV landfill was included in the Waste Reduction category and operations cost at the current landfill were reduced by the same amount as the current landfill will be closing. Cost for closure of the current landfill are not included in this budget.

E. Financing Plan

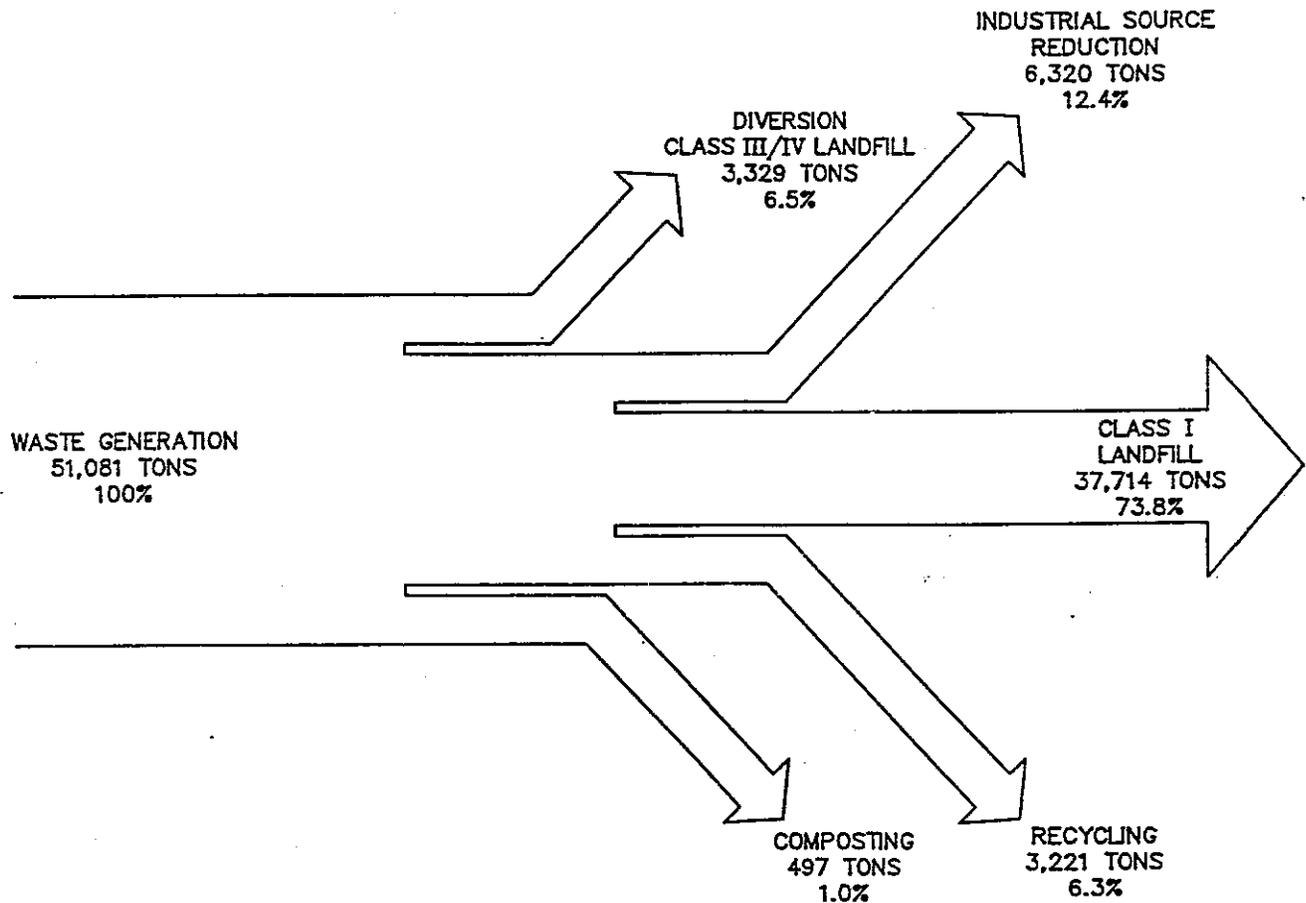
Wilson County will fund its solid waste programs by a combination of tipping fees at the landfill and from the Solid Waste Budget funded by county revenues. The following budget estimates the tipping fee revenues and the amount that will come from the County Solid Waste Budget.

TOTAL OPERATING BUDGET FOR WILSON COUNTY

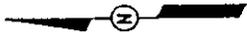
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Expenditures	1,393,500	1,453,100	1,526,155	1,614,838	1,694,829	1,783,820	1,872,012	1,969,612	2,066,843	2,173,935
Revenues ¹	240,000	252,000	264,600	277,830	291,722	306,308	321,623	337,704	354,589	372,318
Total Budget	1,153,500	1,201,100	1,261,555	1,337,008	1,403,107	1,477,512	1,550,389	1,631,908	1,712,254	1,801,617

¹ Revenues based on estimated tipping fees at the current landfill and a 5% increase per year. It is assumed revenues will not decrease when the county closes the Class I facility and opens a Class III/IV landfill as most of the current Class I waste is transported to a private landfill.

THE FOLLOWING FLOW DIAGRAM INDICATES
DIVERSION IN 1995 FOR WILSON COUNTY:



FLOW DIAGRAM FOR WILSON COUNTY



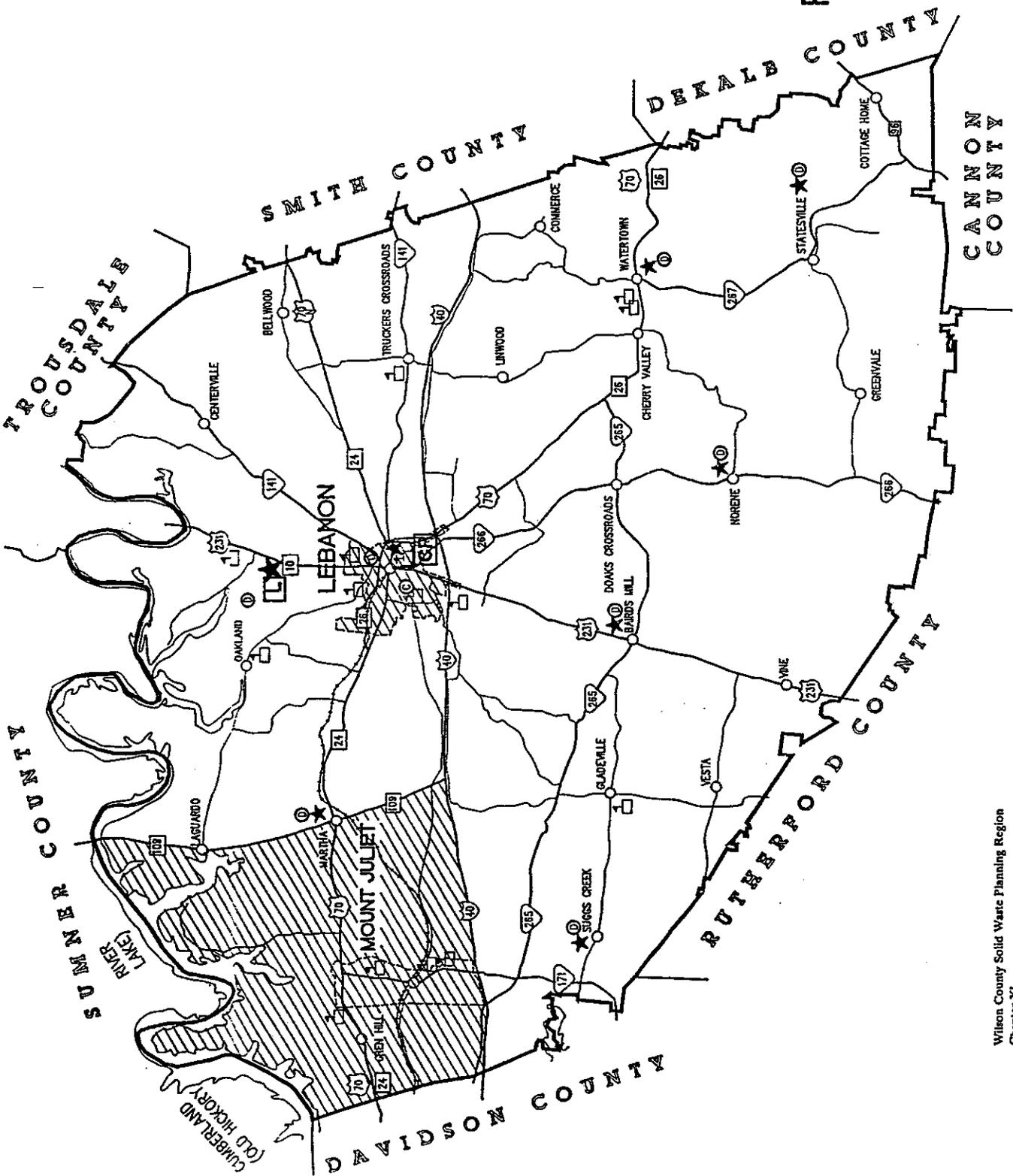
LEGEND

- CLASS I LANDFILL
- TRANSFER STATION
- GREEN BOXES
- INCINERATOR (BRUSH)
- CONVENIENCE CENTERS
- DROP-OFF RECYCLING CENTER
- COMMERCIAL RECYCLERS
- COMPOSTING FACILITY
- HOUSE TO HOUSE PICK-UP
- SCHOOLS (EDUCATIONAL PROGRAMS)



**RECOMMENDED SYSTEMS
MAP
WILSON COUNTY SOLID WASTE
PLANNING REGION**

Draper Aden Associates
CONSULTING ENGINEERS
Bledsoe, Va. - Richmond, Va. - Nashville, Tenn.



Chapter XII - Allocation of Implementation Responsibilities: Plan Adoption and Submission

The Wilson County Solid Waste Planning Board has developed this regional plan and formally adopted it as indicated in the minutes. The Board presented the plan to the Wilson County Commission and was adopted by resolution. Although implementation will be by the planning board, the county commission is responsible for funding. This plan was also submitted to the Wilson County and the City of Lebanon Planning Commission for review and comment. The resolutions and minutes of the commission meeting review of this plan are included in Appendix E.

Chapter XIII - Flow Control and Permit Application Review

A. Flow Control

Total waste generation in Wilson County was approximately 47,700 tons per year in 1993. Of this total, the County only controls approximately 12,000 tons per year which equates to 25 percent of the waste stream. The remainder of the waste is handled by the City of Lebanon, Green Hills Utility District, and the industrial and commercial businesses. At the current time, Wilson County will implement the reduction programs as outlined in Chapter IV and flow control is not needed. If the programs are not successful, then the County may need flow control to help control waste flow in the county in order to meet the waste reduction goal.

A report on flow control prepared by Mr. John Williams, an environmental attorney in private practice, located in Nashville, is located in the appendix. This report defines flow control and gives opinions on whether flow control can be enforced.

B. Permit Application Review

The following is the proposed permit review process with estimated time periods:

1. Basis for Review

The review of any application for landfill approval with the Wilson County Solid Waste Planning Region will be based upon compliance with the intent of the plan as written, approved, and adopted. The primary questions which must be answered will be as follows:

- a. Will the additional landfill volume be needed for the Region to maintain environmentally acceptable and cost-effective Class I disposal volume for the waste generated within the region?
- b. Will the location of the new landfill or extension within the region provide for more cost-effective disposal of Class I waste without sacrificing environmental acceptability?
- c. Is the location of the facility suitable for a landfill to serve the Wilson County Region? In other words, landfills which are located at the outer edges of the region (away from major Lawrence County Region population centers) and designed to serve out-of-region waste will be considered to be not suitably located to serve the region.

- d. Will the cost impacts for providing infrastructure (roads, water, etc.) for bringing out-of-region waste into the county exceed the cost savings provided by the additional landfill facility?

2. Application and Review Procedure

- a. A copy of the Part I Solid Waste Disposal Facility Permit Application shall be submitted to the Chairman of the Wilson County Solid Waste Planning Board prior to submittal of said document to the Division of Solid Waste Management. In addition to the DSWM Part I Application, this submittal shall include the following information:
 - i. Estimated Total Volume of the Facility in Tons of Waste
 - ii. Estimated Daily Tonnage of the Facility
 - iii. Proposed Service Area of the Facility
 - iv. Map showing the location of the site suitable for advertisement.
 - v. Map showing current zoning of the site with a description of any special permits or re-zonings required and the status of same.
- b. The Chairman of the Planning Board will then place an advertisement in the local newspapers of the county in which the disposal facility is proposed as well as in the newspapers of any counties which have a portion of their land mass within 5 miles of the proposed facility. This advertisement will include the following information:
 - i. Date, time, and location of public hearing (must be at least 28 days after advertisement runs).
 - ii. Road address and location relative to incorporated or unincorporated municipalities.
 - iii. Map showing the location of the site.
 - iv. Dates of public comment period.
 - v. Address for mailing of public comments.
- c. The Chairman of the Planning Board will send copies of the application to each member of the Planning Board as well as to the design consultant for the board.
- d. The Chairman of the Planning Board will call a special meeting of the board which will act as the public hearing.

- e. The public hearing will be in presentation format. The applicant will present a 15 minute discussion of the proposed project. This will be followed by a fifteen minute report from the design consultant for the solid waste planning board, this will be followed by the public comment period. Comments will be limited to 5 minutes in duration.
- f. At the end of the public hearing, the Planning Board will schedule another special meeting to be a minimum of two weeks and a maximum of four weeks after the public hearing.
- g. At the second special meeting the Planning Board will discuss the issue and then will vote and render a decision to the owner. The vote will be decided by simple majority. In the event of a tie vote, any abstentions will be re-pollled for a vote. In the event that the vote remains tied, the option with the fewest votes will be dropped and the other two options will be re-voted. In the event that the vote remains tied at this point, a new special meeting will be called within two weeks and the application will be voted on again. IN the event that the outcome remains a tie, the application will be automatically tabled until the Part II Permit Application is available. One of three votes will be possible:
 - i. Reject the application;
 - ii. Do not reject the application;
 - iii. Table the application until a Part II Permit Application is available.
- h. In the event that the Planning Board votes to table the application until the Part II Permit Application is available, the Board will have the option of foregoing the public hearing at that point.
- i. Also in the event that the Planning Board votes to table the application until the Part II Permit Application is available, the Board will be required to render an opinion within eight weeks after the Part II Permit Application is submitted. In the event of a tie, the abstentions will be re-pollled. In the event there remains a tie vote, a second special meeting will be called within two weeks for a re-vote. In the event of a tie at that point, the vote will automatically be considered to be "Do not reject the application". The two options for a vote at this point will be:
 - i. Reject the application;
 - ii. Do not reject the application.

Appendix XIII

Flow Control



FLOW CONTROL

The term "flow control" refers to the power of a state or local government to direct the flow of municipal solid waste to a particular processing or disposal facility or facilities. Flow control is not a new concept. Several states have enacted statutes (or have allowed local governments to enact ordinances) requiring that the solid waste collected in a particular jurisdiction be taken to a particular landfill, incinerator, processing facility, or transfer station.

If the solid waste facility is publicly owned and financed through bonds, the revenue received from tipping fees is generally used to pay the principal and interest on the bonds. Therefore, the facility must receive sufficient waste to generate revenue adequate for that purpose. The tipping fee revenue may also be used to pay for recycling and composting programs and other components of an integrated solid waste management program.

Many states (including Tennessee) have enacted solid waste management acts which set waste reduction goals. Flow control is considered an essential tool to enable a local government to meet the waste reduction goal because it allows the local government to direct waste to recycling and composting facilities.

Opponents of flow control contend that it undermines competition and may result in inefficiencies in the solid waste management system.

This memorandum discusses the legal authority by which a municipal solid waste region in Tennessee may exercise flow control power and the legal issues related to that exercise of flow control power.

I. Solid Waste Management Act of 1991

For most municipal solid waste regions in Tennessee, the Solid Waste Management Act of 1991 will be the legal basis for enacting flow control. The only exception is counties with municipal solid waste incinerators (Davidson and Sumner), which may also utilize the Energy Production Facilities law (T.C.A. §7-54-103(d)) as a legal basis for imposing flow control.

The Solid Waste Management Act is Public Chapter 451 of the Public Acts of 1991. Most of the act is codified at T.C.A. §§68-211-801 et seq.

Pursuant to T.C.A. §68-211-814(b)(1)(A), a municipal solid waste region may "regulate the flow of collected municipal solid waste generated within the region." Such regulation may occur only after the region's 10-year plan has been approved by the State Planning Office.

If a region decides to implement flow control, the mechanics for doing so are set forth in T.C.A. §68-211-814(b)(1)(A). First, the region's board must conduct a public hearing. Then the board must adopt a resolution stating that it is implementing flow control. Then each county and municipality in the region must adopt an ordinance implementing flow control. The resolution and ordinances should specify the facility or facilities to which the flow of municipal solid waste is being directed.

Before a region's board may adopt a flow control resolution, the region must demonstrate to the State Planning Office that the region has considered the utilization of any municipal solid waste management facility in existence within the region on July 1, 1991, which meets Subtitle D regulations. If the region decides not to use an existing facility, the region must show that its decision not to use the facility is based upon three findings:

- 1) the facility is environmentally unsound or inadequate to meet the region's 10-year capacity assurance plan;
- 2) the costs for using the facility are inconsistent with (i.e., higher than) comparable facilities in Tennessee, or the facility is operating in a manner which is inconsistent with the plan; and
- 3) the waste subject to flow control will be sent to a facility or facilities which meet all state and federal regulations.

T.C.A. §68-211-814(b)(1)(C) allows an "aggrieved person" to appeal the region's decision to implement flow control to any chancery court within the region.

A region's flow control power extends only to solid waste. A region may not restrict the flow of "recovered materials" (i.e., those materials which have been removed from the solid waste stream for sale, use, reuse, or recycling). T.C.A. §68-211-814(b)(5).

Another part of Public Chapter 451 of the Public Acts of 1991 was the Solid Waste Authority Act of 1991, which contains flow control provisions applicable to a solid waste authority. If any local government(s) within a municipal solid waste region choose(s) to establish a solid waste authority, T.C.A. §68-211-906(b) gives that Authority the power "to exercise exclusive jurisdiction and exclusive right to control the collection of solid waste within its boundaries, and to control the disposition of solid waste collected within its boundaries." The governing body of each county and municipality which formed the Authority must concur in the exercise of flow control power by the Authority.

Under §68-211-906(b), then, a Solid Waste Authority is given the power to control the collection and disposal of municipal solid waste within its boundaries. By contrast, a region may regulate only the flow of collected municipal solid waste generated within the region. This means that a

region may regulate the place of disposal of the waste, but not the collection itself.

T.C.A. §68-211-907 contains additional flow control language for solid waste authorities, supplemental to that of §68-211-906(b). §68-211-907 provides that a Solid Waste Authority may "regulate the flow of all municipal solid waste within the county or counties constituting the authority" and may "require the disposal of any transported waste at a specific solid waste disposal facility."

Violation of any ordinance or resolution enacted by any local government which has formed an Authority is a Class A misdemeanor, and each day of continued violation is a separate offense. Any court of competent jurisdiction is empowered to enjoin violations of an ordinance enacted by a local government which has formed an Authority. T.C.A. §68-211-918.

An Authority's decision to exercise flow control power is appealable to any chancery court in the county or counties which have formed the Authority. T.C.A. §68-211-814(b)(1)(C).

No Solid Waste Authority may be formed unless each county governing body in the municipal solid waste region has approved its creation. T.C.A. §68-211-903(a). However, an Authority may be formed prior to the State Planning Office's approval of a region's 10-year plan.

Once an Authority has been formed, there is nothing in the Solid Waste Authority Act of 1991 which expressly forbids the Authority from exercising flow control power before the region's plan has been approved by the State Planning Office. The use of the words "region or solid waste authority" in T.C.A. §68-211-814(b)(1)(A) could be interpreted to forbid the Authority from exercising flow control power before the region's plan has been approved. This is an ambiguous point in the statute.

Another ambiguity is whether an Authority must justify its decision not to use an existing municipal solid waste management facility within the region served by the Authority (as a region's board is required to do). The use of the

words "region or authority" in T.C.A. §68-211-814(b)(1)(A) suggests that an Authority must do so. However, no comparable language is found in T.C.A. §68-211-906(b) or §68-211-907, and those sections do not adopt by reference the requirements of §68-211-814(b)(1)(A).

II. Court Cases Involving Challenges to Flow Control

Just as flow control is not a new concept, neither is the litigation over flow control. In 1896 the Board of Supervisors of the City of San Francisco granted by ordinance to a particular company the exclusive right to collect and incinerate the city's garbage. The ordinance made it unlawful for any person to take the city's garbage anywhere except to the grantee's incinerator. A competitor challenged the constitutionality of the ordinance. In California Reduction Co. v. Sanitary Reduction Works, 199 U.S. 306 (1905), the U.S. Supreme Court upheld the ordinance as a valid exercise of the city's police power. The Court rejected the argument that the ordinance deprived people of their property without due process of law in violation of the Fourteenth Amendment. The Court found that the ordinance was enacted as a means to protect the public health.

In recent years the primary legal challenge to flow control laws has been under the Commerce Clause of the United States Constitution. Article I, Section 8, Clause 3 of the Constitution provides: "The Congress shall have Power ... To regulate Commerce ... among the several States." This Clause gives Congress the power to enact laws regulating interstate commerce. It has also been interpreted to limit the power of states to erect barriers to interstate trade. This latter doctrine is known as the "dormant Commerce Clause" doctrine.

In the last 12 years, several federal courts have evaluated the constitutionality of state and local laws

in light of the dormant Commerce Clause doctrine. The courts are evenly divided between those which have upheld flow control laws and those which have invalidated flow control laws.

These cases have one common element: they all involve the transportation of solid waste from one state to another state. The plaintiff is generally a hauler who collects waste in one state and transports it to a landfill or incinerator in another state. The enactment of a flow control ordinance has the effect of preventing the hauler from taking the waste to the out-of-state disposal facility.

Two federal circuit courts of appeals (the First and the Eighth) have ruled that the flow control ordinance places an unconstitutional burden on interstate commerce. Two other circuit courts of appeals (the Third and the Sixth) have ruled that the flow control ordinance does not discriminate against interstate commerce and is therefore constitutional.

Because of this split of authority in the federal courts, the U.S. Supreme Court has agreed to hear an appeal involving a flow control ordinance enacted by the Town of Clarkston, New York. The Supreme Court's decision will likely be rendered sometime in 1994.

Because Tennessee is located within the jurisdiction of the Sixth Circuit Court of Appeals, the decisions of that court are binding on federal courts in Tennessee. In Hybud Equipment Corp. v. Akron, 654 F.2d 1187 (6th Cir. 1981), remanded on another issue, 455 U.S. 931 (1982), the Sixth Circuit upheld the constitutionality of a flow control ordinance adopted by the city council in Akron, Ohio. That decision is the law in Tennessee until the Supreme Court renders its decision in the Clarkston case.

Appendix A to this memorandum contains a discussion of each reported federal court decision on flow control, as well as a discussion of the case pending before the U.S. Supreme Court.

III. Likely Effect of the Supreme Court Decision on Tennessee

If the Supreme Court upholds the Town of Clarkston's flow ordinance, the constitutionality of flow control ordinances under Tennessee law will be absolutely clear.

If the Supreme Court invalidates the Town of Clarkston's flow control ordinance, the Court's decision will be a problem only in municipal solid waste regions where waste is being transported to a landfill or incinerator in another state. If such a region adopted a flow control resolution, it might impose an unconstitutional burden on interstate commerce in waste. However, in those regions where no hauler is transporting waste across state lines, the Court's decision will likely have no impact. A flow control ordinance will be held invalid only if it places a significant burden on interstate commerce. The courts are unanimous in holding that a flow control law is a valid exercise of the state's police power and its power to protect the public health and safety, so long as no significant burden is placed on interstate commerce.

IV. Possible Congressional Action on Flow Control

Flow control is a widely discussed subject throughout the country. The U.S. Environmental Protection Agency recently conducted three public meetings to gather information for a report on flow control which will be submitted to Congress in September 1994.

Under the Commerce Clause, Congress has the power to regulate commerce "among the several States." This means that Congress could pass a federal statute expressly allowing state and local governments to enact flow control laws. The EPA study may include a recommendation as to the need for federal legislation. Two bills have already been

introduced in Congress this year to allow the use of flow control by state and local governments.

Congress will not likely act until the Supreme Court has decided the Town of Clarkston case. If the Town loses that case, there will be strong pressure from state and local governments to enact federal legislation.

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APPENDIX A

I. Cases Upholding Flow Control Laws

Because Tennessee is one of four states within the jurisdiction of the Sixth Circuit Court of Appeals, the decisions of that court are binding on federal district courts in Tennessee. In Hybud Equipment Corp. v. Akron, 654 F.2d 1187 (6th Cir. 1981), remanded on another issue, 455 U.S. 931 (1982), the Sixth Circuit Court of Appeals upheld the constitutionality of an Akron, Ohio flow control ordinance requiring that all solid waste collected in the city be taken to an incinerator owned and financed by the city. The ordinance adversely affected the plaintiffs in three ways:

- 1) the income of landfills which previously received the waste was reduced;
- 2) there was no longer any competition among disposal sites, which meant the tipping fee at the incinerator was artificially high; and
- 3) collectors could no longer recover and sell recyclables from the waste they collected.

The court rejected the plaintiffs' Due Process and Commerce Clause arguments, finding that the ordinance was a valid exercise of the police power and not a protective measure which discriminated against or otherwise burdened interstate commerce.

The most frequently cited decision upholding a flow control ordinance against a Commerce Clause challenge is J. Filiberto Sanitation, Inc. v. New Jersey Department of Environmental Protection, 857 F.2d 913 (3rd Cir. 1988). In that case a New Jersey county adopted a rule requiring that solid waste collected in that county be deposited at a county-owned transfer station which charged tipping fees to the haulers who brought waste there. Plaintiff (a hauler of solid waste) objected to the rule because the tipping fee

at the transfer station was \$100 a ton, whereas the tipping fee at a nearby Pennsylvania landfill was about \$50 a ton. Ironically, the waste taken to the transfer station was eventually taken to that same Pennsylvania landfill. The operation of the transfer station was paid for by the tipping fees charged to the haulers who were required to bring waste there.

The Third Circuit Court of Appeals defined the issue in Filiberto as "whether the challenged regulation confers an advantage upon in-state economic interests -- either directly or through imposition of a burden upon out-of-state interests -- vis-a-vis out-of-state competitors." 857 F.2d at 919. The court concluded that the plaintiff failed to establish that the ordinance was "protectionist in purpose."

The court found in Filiberto that the flow control rule serves several purposes:

- 1) to assure that all trash produced in the county is properly disposed of;
- 2) to reduce truck traffic on county roads;
- 3) to give the county an accurate gauge for planning purposes of the amount of waste generated;
- 4) to allow the county to enter long-term and short-term contracts for final disposal of waste generated in the county;
- 5) to assure that all haulers have a practical outlet for trash as the distance to landfills grows longer; and
- 6) to allow trash to be compacted for long-distance transport.

The court also found that the burden of the rule fell equally on in-state as well as out-of-state haulers operating in this county, and that the transfer station was not in competition with out-of-state landfills because the transfer station was a customer of the out-of-state landfills. The court held that "the Rule was, both in purpose and in effect, a proper exercise of the state's authority to protect the welfare of its citizenry which

placed no cognizable burden on interstate commerce." 857 F.2d at 923.

Another decision upholding a flow control statute is Harvey & Harvey v. Delaware Solid Waste Authority, 600 F. Supp. 1369 (D. Del. 1985), in which a federal district court upheld a statute requiring all waste originating in Delaware to be disposed of at public facilities in Delaware. The statute stopped the interstate transportation of waste from Delaware to out-of-state landfills and placed an economic burden on transporters who had to pay more to dispose of the waste at Delaware disposal facilities, but the court nevertheless concluded that the statute did not violate the Commerce Clause because it did not "impose a significant economic burden on out-of-state economic interests." 600 F. Supp. at 1380.

II. Cases Invalidating Flow Control Laws

Two recent federal appellate court decisions reveal a different approach to Commerce Clause analysis of flow control regulations. In Stephen D. DeVito, Jr. Trucking, Inc. v. Rhode Island Solid Waste Management Corp., 770 F. Supp. 775 (D. R.I.), aff'd, 947 F.2d 1004 (1st Cir. 1991), the court preliminarily enjoined enforcement of a resolution adopted by the Rhode Island Solid Waste Management Corporation (RISWMC) (a public corporation created by state statute) requiring that all waste collected in Rhode Island be disposed of at the state's publicly owned Central Landfill (CLF). Because the tipping fee at the CLF was so high, the plaintiff trucking company preferred to haul waste collected in Rhode Island to waste-to-energy facilities in Massachusetts and Maine, where the tipping fees were considerably lower. The court found that this flow control rule would put the plaintiff out of business. The court concluded that "the proscriptions of the Commerce Clause apply to restrictions on transporting items out of a state as well as into a state."

770 F. Supp. at 780. The court said this rule is "an essentially protectionist measure" and its "immediate purpose and effect are to increase RISWMC's revenues by preventing commercially generated waste from being transported out of Rhode Island for disposal and requiring instead that it be deposited at the CLF." 770 F. Supp. at 781. RISWMC would gain a direct benefit from this rule at the expense of out-of-state facilities and interstate commerce in waste, which is totally eliminated. After analyzing the purposes of the rule, the court held that "RISWMC has failed to establish that a total ban on interstate commerce is necessary to achieve this long term goal and that it cannot be accomplished by some less intrusive alternative." 770 F. Supp. at 785.

A similar result was reached in Waste Systems Corp. v. County of Martin, 985 F.2d 1381 (8th Cir. 1993). In that case, two Minnesota counties built an \$8 million composting facility and then enacted flow control ordinances requiring that all the compostable waste collected in those counties (about 40% of the total waste stream) be taken to the composting facility. Prior to the enactment of the flow control ordinances, about 2/3 of this waste had been going to an Iowa landfill. The county-guaranteed bonds issued to finance the composting facility were to be paid primarily from the tipping fees collected at the facility.

The Eighth Circuit Court of Appeals found that the ordinances discriminate against interstate commerce and that the burden they place on interstate commerce is "not incidental." 985 F.2d at 1387. The tipping fee at the Iowa landfill was \$30 a ton, whereas the tipping fee at the composting facility was \$72 a ton. The court found that the ordinances are "economic protectionist measures" because they "insulate the [composting facility] from competition with cheaper out-of-state alternatives." 985 F.2d at 1387-1388. The court recognized that the purpose behind the composting facility included legitimate environmental concerns, but found that "the purpose behind the Ordinances is solely economic." 985 F.2d at 1389.

In Waste Recycling, Inc. v. Southeast Alabama Solid Waste Disposal Authority, 814 F. Supp. 1566 (M.D. Ala. 1993), the plaintiff companies collect solid waste in southeastern Alabama and transport it for disposal at a landfill in northern Florida. The defendant is a public nonprofit Alabama corporation which plans to build a regional solid waste disposal facility and three transfer stations to serve a four-county area in Alabama. Three Alabama cities have signed "user contracts" with the defendant, requiring each city to adopt a flow control ordinance directing that all waste collected in each city be delivered only to the Authority's facilities. The cities adopted these ordinances.

The court held that these ordinances "impermissibly interfere with and discriminate against interstate trade" and that "the intended effect of the ordinances is pure economic protectionism." 814 F. Supp. at 1577. "By expressly limiting the disposal of waste to the Authority's facility, the ordinances have at the same time prohibited disposal outside the state of Alabama." 814 F. Supp. at 1578. One of the three ordinances allowed waste to be taken out-of-state, but imposed additional recordkeeping requirements on such waste shipments. The court found this to be impermissible discrimination against interstate commerce because the same recordkeeping requirements were not imposed on waste disposed of at the Authority's facilities.

The court rejected the defendant's argument that the ordinances "support the legitimate public purpose of ensuring a steady waste stream by creating an infrastructure of public facilities for the transportation and disposal of waste." 814 F. Supp. at 1581. The court suggested that the Authority finance its facilities through any one of several alternative means (other than tipping fees): direct bank loans, county financing, charging competitive rates, private investors, property taxes, or utility bill assessments.

The court invalidated all three flow control ordinances because they violate the Commerce Clause by "insulating [the] four-county region from the rough and tumble of interstate commerce and the economic competition that comes with it."

814 F. Supp. at 1583.

III. Case Pending Before the Supreme Court

C & A Carbone, Inc. v. Town of Clarkston, 182 A.D.2d 213, 587 N.Y.S.2d 681 (1992), cert. granted, 61 U.S.L.W. 3783 (U.S. May 25, 1993) (No. 92-1402)

C & A Carbone, Inc. and Recycling Products of Rockland, Inc. are interrelated corporations which receive and process solid waste at a facility located within the Town of Clarkston, New York. At that facility, the waste is sorted into two portions: waste which is recyclable and waste which is not recyclable. The waste which is not recyclable is shipped to disposal facilities outside the state of New York.

This privately owned facility received a permit from the New York Department of Environmental Conservation in 1987, authorizing it to operate as a transfer station. C & A charges a tipping fee of \$70 per ton to process waste at its facility. Its permit was valid for five years.

The Town of Clarkston closed its municipal landfill in 1989, but decided to open a transfer station on the closed landfill site and contracted with Clarkston Recycling Center, Inc. to build and operate the transfer station. Under its contract with Clarkston Recycling, the Town must deliver to the transfer station a specified tonnage of waste annually or pay a penalty to Clarkston Recycling. Under an ordinance adopted by the Town, Clarkston Recycling is allowed to charge haulers a tipping fee of \$81 per ton for processing the waste. The New York Department of Environmental Conservation issued a permit for this transfer station, valid for five years.

The Town amended its zoning code to provide that the Town shall have only one designated transfer station. The Town also enacted Local Laws 1990, No. 9, which provides that all solid waste generated within the Town must be delivered to the Town's transfer station. This ordinance also makes it unlawful to import waste from outside the Town and dump it on any property within the Town other than the Town's transfer station. In effect, then, Local Law No. 9 mandates that all solid waste

processed or otherwise handled within the Town of Clarkston (regardless of the point of origin of the waste) be processed or handled at the Town's transfer station.

Despite the passage of Local Law No. 9, C & A continued to receive and process solid waste at its transfer station. The waste processed at C & A's transfer station had been generated both within and outside the Town, including some waste from New Jersey. Vehicles leaving the C & A transfer station were headed to locations in Illinois, Indiana, West Virginia, and Florida.

The Town sought injunctive relief against C & A in the Supreme Court for Rockland County. (In New York, the trial court for a county is called the Supreme Court.) The Town alleged that C & A's actions were depriving the Town of thousands of dollars daily in uncollected revenues. The Supreme Court for Rockland County granted the Town's motion for summary judgment and enjoined C & A from operating its business in violation of the Town's ordinances.

On appeal, the Appellate Division of the New York Supreme Court held that the regulation of solid waste collection and disposal is "a function traditionally entrusted to State and local governments," is "fundamentally related to the public health and welfare," and is within the scope of the Town's police power. 587 N.Y.S.2d at 685. The Appellate Division also rejected C & A's Commerce Clause challenge to Local Law No. 9 (the "flow control" ordinance).

While recognizing that garbage is an article of commerce and that neither states nor municipalities may erect barriers to the free flow of commerce, the court stated that "the Commerce Clause protects the interstate market, not particular interstate firms." 587 N.Y.S.2d at 686. The court said the Town's ordinance "imposes no special fees, taxes, prohibitions, or duties on those transporting out-of-state articles of commerce. Rather, the local law applies evenhandedly to all solid waste processed within the Town, regardless of point of origin."
Id.

The court noted the \$11 difference in the tipping

fee charged at the two transfer stations, but found that the higher fee charged at the Town's transfer station could have "nothing more than an incidental effect on interstate commerce." Therefore, the court concluded that this effect was not "impermissibly burdensome...", particularly when the 'burden' is weighed against the legitimate and significant public concerns underlying the local law." 587 N.Y.S.2d at 687. The Appellate Division upheld the lower court's grant of summary judgment in favor of the Town.

The New York Court of Appeals (New York's highest court) denied leave to appeal. Town of Clarkston v. C & A Carbone, Inc., 591 N.Y.S.2d 138 (N.Y. Ct. App. Oct. 27, 1992).

On May 25, 1993, the U. S. Supreme Court granted certiorari and will hear arguments in the case this fall. C & A Carbone, Inc. v. Town of Clarkston, 61 U.S.L.W. 3783 (U.S. May 25, 1993). In its petition for certiorari, C & A Carbone argued that the Town's flow-control ordinance ensured a captive supply of waste for the Town's transfer station, forced waste haulers to subsidize the Town's facility, and prevented waste haulers from selecting a more competitive facility in the interstate market. 24 ER 186 (May 28, 1993).

The issue upon which the Supreme Court based its grant of certiorari is stated as follows:

"Does a local law requiring the disposal of all trash, regardless of origin, at a designated local facility, and prohibiting the export of such trash out of state, constitute a burden on and discrimination against interstate commerce in violation of the Commerce Clause?"

DISINCENTIVES TO OUT-OF-REGION WASTE

Under the Solid Waste Management Act of 1991, a municipal solid waste region has two options to discourage the delivery of waste generated outside the region to a landfill located within the region.

I. Restrictions on Access

T.C.A. §68-211-814(b)(1)(B) allows a region to "restrict access" to a landfill located within the region "by excluding waste originating with persons or entities outside the region" in order to effectuate the region's 10-year plan. However, §68-211-814(b)(1)(B) contains a "grandfather" clause which provides that a landfill may continue to accept "waste from a specific source outside the region" if the landfill received waste from that source prior to July 1, 1991. The words "specific source" are not defined in the statute, although the legislative history indicates that the word "source" refers to a county or municipality.

There is also an exception to the grandfather clause. It does not apply if a landfill's acceptance of waste generated outside the region would "significantly impair" the region's ability to effectuate its 10-year plan.

If a solid waste authority is formed by one or more counties in a municipal solid waste region, the Authority may "restrict access to its solid waste disposal facilities by excluding waste originating with persons or entities outside the region." T.C.A. §68-211-907. However, an Authority may exercise this power only to the extent that the region's plan permits the Authority to do so. §68-211-907 does not contain the grandfather clause found in §68-211-814(b)(1)(B), but the use of the word "its" in §68-211-907 suggests that, under §68-211-907, an Authority is allowed to restrict access to its own solid waste

disposal facilities, but is not allowed to restrict access to those facilities which are owned by others. An Authority's power to restrict access to facilities owned by others depends upon §68-211-814(b)(1)(B), which contains the grandfather clause previously discussed.

Is there any question about the constitutionality of these provisions of the Solid Waste Management Act of 1991? Ironically, the answer is: only with respect to out-of-state waste.

In Fort Gratiot Sanitary Landfill, Inc. v. Michigan Department of Natural Resources, 112 S. Ct. 2019 (1992), the U.S. Supreme Court held that solid waste is an article of commerce and that neither a state nor a political subdivision of the state (e.g., a solid waste region) may impose a substantial burden on interstate commerce by excluding solid waste coming to a landfill from another state. The constitutional basis for this decision is the Commerce Clause of the U.S. Constitution, which provides: "The Congress shall have Power ... To regulate Commerce ... among the several States." The Commerce Clause gives Congress the power to enact laws regulating interstate commerce and has been interpreted to limit the power of states to erect barriers to interstate trade. The latter doctrine is known as the "dormant Commerce Clause" doctrine.

By its very terms, however, the Commerce Clause applies only to interstate commerce. It does not apply to intrastate commerce (i.e., articles moving in commerce within a state).

Therefore, while a region could not constitutionally rely upon T.C.A. §68-211-814(b)(1)(B) as a basis for excluding waste originating in another state, there is no reason to believe that a court would invalidate T.C.A. §68-211-814(b)(1)(B) as a proper basis for excluding waste moving from one solid waste region in Tennessee to another region.

It is also possible that Congress will enact federal legislation overruling the Supreme Court's decision in the Fort Gratiot case and expressly allowing state and local governments to enact laws erecting barriers to out-of-state waste. Such legislation would clarify the legal uncertainties which exist in this area. Several bills have been introduced in Congress this year to accomplish this goal.

II. Local Surcharge

T.C.A. §68-211-835(f)(1)(A) allows a county, municipality, or solid waste authority to impose a local "surcharge on each ton of municipal solid waste" received at a private landfill located within the county, municipality, or solid waste authority. There is no upper limit or "cap" on the amount of the local surcharge which may be imposed. However, the revenues generated by the local surcharge must be used by the county, municipality, or solid waste authority "for solid waste collection or disposal purposes." The local surcharge is sometimes referred to as a "host fee."

Where the region chooses to allow out-of-region waste to go to a landfill within the region or where the grandfather clause allows delivery of waste to a landfill from a specific source, the county hosting the landfill may desire to impose a local surcharge to fund its own solid waste management program in whole or in part. A local surcharge would also discourage the delivery of large quantities of out-of-region waste to a landfill located within the region if the surcharge were high enough.

Part III
Appendices

Appendix A

Legal Documentation And Organization Of Region

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS
OF WILSON COUNTY, TENNESSEE
CREATING A MUNICIPAL SOLID WASTE PLANNING REGION
FOR WILSON COUNTY

WHEREAS, the adoption of the Subtitle D landfill regulations by the United States Environmental Protection Agency and companion regulations adopted by the Tennessee Solid Waste Control Board will impact on both the cost and method of disposal of municipal solid waste; and

WHEREAS, at the urging and support of a coalition of local government, environmental, commercial, and industrial leaders, the 97th Tennessee General Assembly enacted T.C.A. 68-211-801, et. seq. titles "Solid Waste Management Act of 1991"; and

WHEREAS, with the view that better planning for solid waste will help control the additional costs that will be imposed by the new landfill regulations, help protect the environment, provide an improved solid waste management system, better utilize our natural resources, and promote the education of the citizens of Tennessee in the areas of solid waste management including the need for and desirability of reduction and minimization of solid waste, local governments in Tennessee supported and work for the passage of this Act; and

WHEREAS, one of the stated public policies of this Act is to institute and maintain a comprehensive, integrated, statewide program for solid waste management; and

WHEREAS, as per T.C.A. 68-211-811, the nine development districts in the State of Tennessee have completed a district needs assessment which are inventories of the solid waste systems in Tennessee; and

WHEREAS, the Board of County Commissioners of Wilson County, Tennessee is given consideration to the needs assessment prepared by the Greater Nashville Regional Council Development District; and

WHEREAS, T.C.A. 68-211-813, requires that counties in the State of Tennessee form municipal solid waste regions no

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

Day of _____ Term, A. D., 19 _____

Commissioner Alsop questioned if a new computer was not purchased when the Finance Office was established. Commissioner Francis stated no. Original Resolution passed by a roll call vote 23 for, 1 against, 0 not voting, and 1 absent.

Resolution 93-2-18 134

Roll Call Page 134

Commissioner Bone made a motion to go back into regular session, seconded by Commissioner Graves. Passed by unanimous voice vote.

A list of Notaries for February was presented to the Commission. Commissioner Phillips made a motion to approve the list of Notaries for February, 1993, seconded by Commissioner Graves. Passed by unanimous voice vote.

Notaries Page 137

Chairman William Arnold called for an election of three members to the Agricultural Extension Committee. County Executive, Don Simpson recommended electing Dan Stewart, Judy Harris, and Cindy Crockett. Commissioner Bone made a motion to elect Dan Stewart, Judy Harris, and Cindy Crockett to the Agricultural Extension Committee, seconded by Commissioner Graves. Passed by unanimous voice vote.

Chairman William Arnold called for an election of four members to the Solid Waste Region Board. County Executive, Don Simpson recommended electing Byron Lasater, Charles Danner, Gilbert Graves, and W. J. McCluskey. Commissioner Averitt made a motion to elect Byron Lasater, Charles Danner, Gilbert Graves, and W. J. McCluskey to the Solid Waste Region Board, seconded by Commissioner Eakes. Passed by unanimous voice vote.

Commissioner Ackerman made a motion to adjourn, seconded by Commissioner Averitt. Passed by unanimous voice vote.

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

later than December Day of, 1992; and Term, A. D., 19

WHEREAS, the Board of County Commissioners of Wilson County, Tennessee has previously voted prior to the December 12, 1992 deadline to create a multi-county Municipal Solid Waste Planning Region with Sumner, Macon, Smith and Trousdale Counties but the resolution was not effective due to the Board of County Commissioners of Sumner County, Tennessee failing to pass an identical resolution; and

WHEREAS, the Act's stated preference is the formation of multi-county regions with counties having the option of forming single or multi-county municipal solid waste regions; and

WHEREAS, the State of Tennessee will provide grant monies of varying amounts to single county, two county, and three or more county municipal solid waste regions to assist these regions in developing their municipal solid waste region plans; and

WHEREAS, the primary and prevailing purpose of the municipal solid waste regions are the preparation of municipal solid waste regional plans which among other requirements must identify how each region will reduce its solid waste disposal per capita by twenty-five percent (25%) by December 31, 1995, and a planned capacity assurance of its disposal for a ten (10) year period; and

WHEREAS, the development of a municipal solid waste regional plan that results in the most cost effective and efficient management of a municipal solid waste is in the best interest of the citizens of Wilson County.

NOW, THEREFORE BE IT RESOLVED, by the Board of County Commissioners of Wilson County, Tennessee, acting pursuant to T.C.A. 68-211-801 et. seq. that there is hereby established a Municipal Solid Waste Region for and by Wilson County, Tennessee; and

BE IT FURTHER RESOLVED, that pursuant to T.C.A. 68-211-813(a)(2), that the Board of County Commissioners of Wilson County, Tennessee finds and determines that Wilson

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

County shall be Day of 19 shall constitute a single county term, A. D., 19 19
municipal solid waste region due to the following:

BE IT FURTHER RESOLVED, that pursuant to T.C.A. 68-211-813(b)(1), a Municipal Solid Waste Region Board is hereby established to administer the activities of this Region; and

BE IT FURTHER RESOLVED, that this Municipal Solid Waste Region Board shall be composed of five (5) members; and

BE IT FURTHER RESOLVED, that pursuant to T.C.A. 68-211-813(b)(1) four (4) Board members shall be appointed by the County Executive and approved by this Board of County Commissioners and, due to the fact that Lebanon, Tennessee collects or provides disposal services through its own initiative or by contract, the City of Lebanon shall have a Board member appointed by the Mayor of Lebanon, Tennessee and approved by the City Council of Lebanon, Tennessee; and

BE IT FURTHER RESOLVED, that members of the Board of the Municipal Solid Waste Region shall serve a six (6) year term except that one (1) member appointed by the County Executive shall have a two (2) year term, that two (2) members appointed by the County Executive shall have a four (4) year term, that one (1) member appointed by the County Executive shall have a six (6) year term, that one (1) member appointed by the Mayor of Lebanon, shall have a two (2) year term; and

BE IT FURTHER RESOLVED, that this Municipal Solid Waste Region Board shall have all powers and duties as granted it by T.C.A. 68-211-813 et. seq. and in addition, in the performance of its duty to produce a municipal solid waste region plan, it shall be empowered to utilize existing Wilson County governmental personnel, to employ or contract with persons, private consulting firms, and/or governmental, quasi-governmental, and public entities and agencies and to

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

utilize Wilson County's services, facilities and ~~TERRA~~ A.D., 19

completing this task; and

BE IT FURTHER RESOLVED, that at the Municipal Solid Waste Region Board's initial organizational meeting it shall select from its members a chair, vice-chair, and secretary and shall cause the establishment of a municipal solid waste advisory committee whose membership shall be chosen by the Board and whose duties are to assist and advise the Board; and

BE IT FURTHER RESOLVED, that the Municipal Solid Waste Region Board, in the furtherance of its duty to produce a municipal solid waste region plan, is authorized to apply for and receive funds from the state of Tennessee, the federal government, Wilson County, Lebanon, Tennessee, and to apply for and receive donations and grants from private corporations and foundations; and

BE IT FURTHER RESOLVED that Wilson County shall receive, disburse, and act as the fiscal agent for the administration of the funds of the Municipal Solid Waste Region and the Region's Board; and

BE IT FURTHER RESOLVED, that upon the passage of this Resolution and at no later date than December 31, 1992, the County Clerk of Wilson County shall transmit a copy of this Resolution to the Tennessee State Planning Office.

RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF WILSON COUNTY, TENNESSEE, this the 21st day of December, 1992, the welfare of the citizens of Wilson County, Tennessee requiring it.

SPONSOR

COUNTY COMMISSIONER

ATTEST:

APPROVED:

COUNTY CLERK

COUNTY EXECUTIVE

APPROVED AS TO FORM:

COUNTY ATTORNEY

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

Day of _____ Term, A. D., 19__

ROLL CALL

WILSON COUNTY BOARD OF COMMISSIONERS
FRANON, TENNESSEE

QUARTERLY TERM 12-21 1992

Motion Made by Comm. _____

Second by Comm. _____

that _____

Res # 92-12-24

Vote of the Commissioners the Afore Subject	Yes	No	Not Voting	Absent
Moo Beavers 1st	✓			
David Ackerman 2nd				
<i>W. Wiley</i> 3rd	✓			
Bobby Sloan 4th	✓			
Carolyn Thompson 5th				
Wayne Drennon 6th	✓			
Gary Eakes 7th	✓			
W. J. McCluskey 8th	✓			
Gary Tarplyn 9th				✓
James Tate 10th	✓			
Vicki Fitzpatrick 11th	✓			
Debra Alsup 12th	✓			
Wimom Amok 13th	✓			
Tommy Williams 14th	✓			
Straton Bone 15th	✓			
Gilbert Graves 16th	✓			
James Francis 17th	✓			
Ralph Ince 18th	✓			
Ross Averitt 19th				✓
Nathan Palmer 20th				✓
Cynthia Crockett 21st	✓			
Danny Cass 22nd	✓			
Jerald Phillips 23rd				✓
Arah Probst 24th				✓
J. y Bishop 25th	✓			
TOTAL	15	5	2	3

Jim ... Clerk
Wilson County Board of Commissioners

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

_____ Day of _____ Term, A. D., 19____

92-12-24

Passed by a roll call vote 15 for,
5 against, 2 not voting, & 3 absent.

WILSON COUNTY BOARD OF COMMISSIONERS MINUTES

Day of _____ Term, A. D. 19__

ROLL CALL

WILSON COUNTY BOARD OF COMMISSIONERS
LEBANON, TENNESSEE

QUARTERLY TERM 12-21, 1992
 Motion Made by Comm. Ince
 Second by Comm. Graves
 that 10 Deter
Res # 92-12-24

Vote of the Commissioners the Above Subject	Aye	No	Not Voting	Absent
Mae Beavers1st		✓		
David Ackerman2nd	✓			
Val Kelly <u>McLeod</u>3rd		✓		
Bobby Sloan4th	✓			
Carolyn Thompson5th	✓			
Wayne Drennan6th		✓		
Gary Eakos7th		✓		
W. J. McCluskey8th		✓		
Gary Tarpley9th				✓
James Tate10th		✓		
Vicki Fitzpatrick11th		✓		
Debra Alsop12th		✓		
William Arnold13th		✓		
Tommy Williams14th		✓		
Stratton Bone15th		✓		
Gilbert Graves16th		✓		
James Francis17th		✓		
Ralph Ince18th		✓		
Ross Avritt19th	✓			
Marchel Palmer20th				✓
Cynthia Crockett21st		✓		
Danny Gass22nd		✓		
Jerald Phillips23rd		✓		
Arah Preston24th				✓
Joy Bishop25th	✓			
TOTAL	5	17		3

Jim Stahl Clerk
Wilson County Board of Commissioners

RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS
OF WILSON COUNTY, TENNESSEE
RATIFYING THE WILSON COUNTY
PLANNING REGION'S SOLID WASTE PLAN

WHEREAS, Tennessee Code Annotated 68-211-301 et. seq. requires that each county in the State of Tennessee form solid waste planning regions, and

WHEREAS, said regions are responsible for developing a ten (10) year plan for the management of solid waste, and

WHEREAS, by resolution the Wilson County Board of County Commissioners created the Wilson County Solid Waste Planning Region, and

WHEREAS, this resolution creating the Wilson County Planning Region also established a Board with the responsibility of developing, administering and updating the Region's plan as per the requirements of T.C.A. 68-211-801 et. seq., and

WHEREAS, this Board has developed a ten (10) year municipal solid waste plan based upon and following the guidelines for such plans as promulgated by the Tennessee State Planning Office and T.C.A. 68-211-801 et. seq., and

WHEREAS, the guidelines promulgated by the Tennessee State Planning Office require that the municipal solid waste plan prepared by the Wilson County Planning Region be ratified by the Board of County Commissioners of the County composing said Region.

NOW, THEREFORE, BE IT RESOLVED, by the Wilson County Board of County Commissioners that it hereby ratifies the Wilson County Planning Region's solid waste plan and acknowledges Wilson County's participation and responsibilities under this plan.

BE IT RESOLVED, this 16th day of May, 1994, the welfare of the citizens of Wilson County, Tennessee requiring it.

RECOMMENDED FOR APPROVAL:
Wilson County Regional Planning Board
April 14, 1994

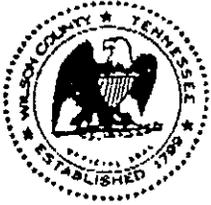
SPONSOR

Passed 24 for
1 absent

DATE _____
 RESOLUTION # 945-10
 1ST MOTION Mccluskey
 2ND MOTION Sloan
 THAT _____

COUNTY COMMISSIONERS	AYE	NO	NOT VOTING	ABSENT
1 MAE BEAVERS	✓			
2 DAVID ACKERMAN	✓			
3 JAMES MCCORD	✓			
4 BOBBY SLOAN	✓			
5 CAROLYN THOMPSON	✓			
6 WAYNE DRENNAN	✓			
7 GARY EAKES	✓			
8 W. J. MCCLUSKEY	✓			
9 GARY TARPLEY	✓			
10 JAMES TATE	✓			
11 VICKI FITZPATRICK	✓			
12 DEBRA ALSUP	✓			
13 BILL ARNOLD	✓			
14 TOMMY WILLIAMS	✓			
15 STRATTON BONE	✓			
16 GILBERT GRAVES	✓			
17 JAMES FRANCIS	✓			
18 RALPH INCE				✓
19 ROSS AVERITT	✓			
20 NATCHEL PALMER	✓			
21 CINDY CROCKETT	✓			
22 DANNY GASS	✓			
23 JERALD PHILLIPS	✓			
24 ARAH PRESTON	✓			
25 JOY BISHOP	✓			
TOTAL	24			1

JIM GOODALL, CLERK



WILSON COUNTY

DON SIMPSON
COUNTY EXECUTIVE

March 9, 1993

The Honorable Jim Goodall
County Clerk
Courthouse
Lebanon, TN 37087

Mr. Mike Jennings
Wilson County Attorney
326 North Cumberland Street
Lebanon, TN 37087

*Noted Goodall via Rob W
By Phone
3-10-93*

Dear Gentlemen:

Following the appointment and confirmation of the members of the Wilson County Regional Solid Waste Planning Committee please be advised that the terms are as follows:

Charles Danner	Six (6) Years
Commissioner Gilbert Graves	Four (4) Years
Commissioner W. J. McCluskey	Four (4) Years
Byron Lasater	Two (2) Years
John Duwaal	Two (2) Years

Should you have any questions please do not hesitate to contact this office.

Sincerely,

Don Simpson
County Executive
Wilson County, TN

MINUTES OF THE
WILSON COUNTY MUNICIPAL SOLID WASTE PLANNING BOARD

JANUARY 27, 1994

The Wilson County Solid Waste Planning Board met in regular session at 6:30 p.m. on January 27, 1994 with the following members present:

Byron Lasater
Charlie Danner
Gilbert Graves

Also present were Mike Jennings, Cliff Bryant, Bill Arnold, Wayne Drennan, and Enoch Jarrell.

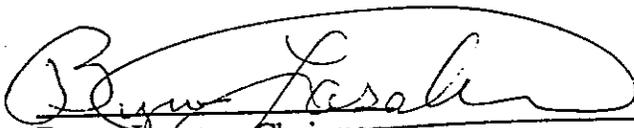
Motion made and seconded to approve invoice from Draper Aden Associates for \$5,800.

Motion made and seconded to appoint an Advisory Committee as required by the "Solid Waste Management Act of 1991". Advisory Committee members shall consist of the Urban Type Public Facilities Board and the Landfill Supervisor. These members are as follows:

Cliff Bryant
Wayne Drennan
Ralph Ince
Don Simpson
Gary Tarpley

Enoch Jarrell presented Chapters IV through VIII and discussion followed. Decisions made were to contract with a private landfill for disposal when the existing landfill reaches capacity in the summer of 1994. Wilson County will continue to pursue the planned Class I and Class III/IV landfills to obtain permits. The Class III/IV landfill should be constructed in the Fall of 1994 in order to help meet the 25% waste reduction goal. The Class I landfill will be considered as an alternate means of disposal for the future.

The Next meeting was set for 5:30 p.m., Thursday, February 24, 1994 at the Lebanon City Hall.


Byron Lasater, Chairman

Appendix B

Documentation for Adjustments to the Base Year



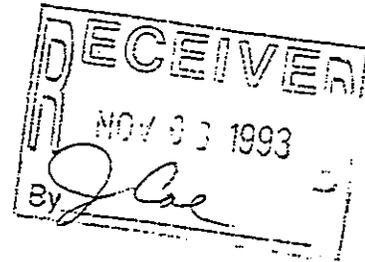
TENNESSEE STATE PLANNING OFFICE
307 JOHN SEVIER STATE OFFICE BUILDING
500 CHARLOTTE AVENUE
NASHVILLE, TENNESSEE 37243-0001
(615) 741-1676

NED McWHERTER
Governor

CAROL WHITE
Director

October 27, 1993

Mr. Jim Coe
Executive Director
Wilson County Regional Solid Waste Authority
P.O. Box 1417
Lebanon, TN 37088



Dear Mr. Coe:

I want to acknowledge and respond to your recent letter requesting an adjustment in Wilson County's base year waste generation data.

As you know, a region may request an adjustment if it can demonstrate that the 1989 data is clearly in error. I understand that the Wilson County Regional Solid Waste Authority wishes to substitute the quantity of waste delivered to the county landfill in calendar 1992 (47,546 tons), as documented by the landfill scales, for the earlier 1989 estimate (39,905 tons) as reported by the UT survey.

The request is approved. When divided by the 1992 population projections as reported in the District Needs Assessment, the per capita waste generation is 0.677 tons/person/year.

This quantity may be low, because of exports to other regions. Your planning board should be aware that Wilson County waste transporters reported that they collected a total of 73,904 tons of waste in Wilson County last year. According to their reports, about 28,000 tons were disposed at the county landfill, and about 46,000 tons (or 62% of what they collected) were shipped out of the region to landfills in 7 counties.

If these reports are accurate, and some of this waste should be disposed in Wilson County in future, the board may wish to consider these waste exports as they prepare a 10-year plan. They will need to identify them in any case. Copies of the transporters' reports may be requested from the Division of Solid Waste Management, in the Department of Environment and Conservation.

I hope that your planning work is going well. Please let me know if there is anything our office can do to help.

Sincerely,

CAROL White

Carol White

CCW/RHN/jmp

cc: Phil Armor
Tom Tiesler

Wilson County Regional Solid Waste Authority

Phone
(615) 443-1977

Fax
(615) 443-1979

June 4, 1993

Ms. Carol White, Director
Tennessee State Planning Office
Room G12, State Capitol Bldg.
Nashville, TN 37243

Dear Ms. White:

This is to request approval of an adjustment to the 1989 data used to measure waste reduction.

The 1991 University of Tennessee study uses a 1989 population estimate of 70,800 for Wilson County. The actual 1990 census of Wilson County was 67,675 and the projected 1992 census is 70,236.

Using the 1992 census projection and actual scales information from the Wilson County Landfill (see attachment 1), the per capita waste generation for 1992 is 0.667 tons per capita per year.

I have used 1992 as a base year because that is the first full year for which actual weight data (from scales) is available for Wilson County.

If the 1989 U.T. data is used, the assumed per capita waste generation would be 0.564 tons per year. This is obviously an artificially low figure and should be adjusted in order to provide Wilson County with a more realistic base figure to use in calculating the twenty-five percent (25%) reduction goal.

Your careful and prompt consideration of this request will be appreciated.

Please call me if you need further information or clarification.

Sincerely,

Jim Coe
Executive Director

Encl.

JFC:cml



Waste Received at Wilson County Landfill
January 1 - December 31, 1992

(tons)

January	3797	July	4344
February	3418	August	4242
March	4114	September	3963
April	4060	October	3938
May	3765	November	3584
June	4350	December	3971
		TOTAL	47,546 TONS

Appendix C

Public Participation Activities

MINUTES OF THE
WILSON COUNTY MUNICIPAL SOLID WASTE PLANNING BOARD

APRIL 14, 1994

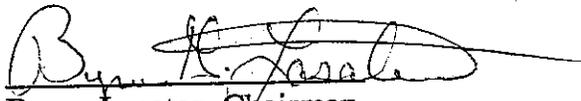
The Wilson County Solid Waste Planning Board met in regular session at 6:30 p.m. on April 14, 1994 with the following members present:

Byron Lasater
Gilbert Graves
Mac McClusky

Also present were Cliff Bryant, Wayne Drennan, and Enoch Jarrell.

Motion was made and seconded to approve the Solid Waste Regional Plan and to submit to the County Commission for approval. Motion passed unanimously.

A public hearing was set for April ²⁵~~21~~, 1994 at 6:30 at the Courthouse.


Byron Lasater, Chairman

PUBLIC HEARING

WILSON COUNTY MUNICIPAL SOLID WASTE PLANNING BOARD

APRIL 25, 1994

The Wilson County Solid Waste Planning Board held a Public Hearing on April 25, 1994 to present the Solid Waste Plan and answer any questions about the plan. Copies of the plan were available at the Wilson County Courthouse and the Lebanon City Hall for review. Notice of the hearing was published in the *Lebanon Democrat*, announced on the local radio station and the Wilson County Commission meeting on April 18, 1994.

All of those present are on the planning board or the advisory committee and very familiar with the Solid Waste Plan. Discussion centered on the 25% reduction requirement and that this was the main implementation step for the Wilson County Solid Waste Planning Region. It was stressed that education to promote recycling was very important and that construction of a Class III/IV landfill will help meet the reduction.

WILSON COUNTY SOLID WASTE PLANNING REGION
PUBLIC HEARING TO DISCUSS SOLID WASTE PLAN
APRIL 25, 1994 6:30 PM WILSON CO. COURTHOUSE

<u>NAME</u>	<u>ADDRESS</u>
1. Enoch Sartell	
2. Clifford Bryant	
3. Wayne Danner	
4. Walter Danner	
5. Byron R. Frazier	
6. W. M. Danner	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

Appendix D
Exports and Imports

Appendix E

Review by Appropriate Municipal or Regional Planning Commission

WILSON COUNTY SOLID WASTE PLANNING BOARD
Byron Lasater, Chairman

June 2, 1994

Mr. Rick Gregory
Wilson County/Lebanon Planning Department
Wilson County Courthouse
228 East Main Street
Lebanon, TN 37087

Re: Wilson County Solid Waste Plan

Dear Mr. Gregory:

Enclosed is a copy of the Wilson County Solid Waste Plan for your review. The Solid Waste Management Act of 1991 requires counties in Tennessee to develop a 10 year plan for the management of solid waste. This plan was prepared by the Wilson County Solid Waste Planning Board established by Wilson County and the City of Lebanon. This plan has been approved by the Wilson County Commission.

The Tennessee Regional (TCA 13-3-101 et seq) and Municipal (TCA 13-4-101 et seq) planning statutes emphasize that planning documents which may affect the future of an area be available to relevant local planning commissions for review. The law does not require planning commissions to approve solid waste plans nor does it require planning commissions to comment on the plans.

By a copy of this letter to Ms. Ann Roberts, Lebanon Planning Commission Chairman, and Mr. Jerry McPeak, Wilson County Planning Commission Chairman, we are notifying them that the Solid Waste Plan is available at your office for review.

If you have any questions please contact me or Mr. Enoch Jarrell with Draper Aden Associates, our engineering consultant.

Sincerely,



Byron Lasater
Chairman

cc: Ms. Ann Roberts
Mr. Jerry McPeak
Mr. Enoch Jarrell

WILSON COUNTY SOLID WASTE PLANNING BOARD
Byron Lasater, Chairman

June 2, 1994

Mr. Joe Binkley
Mt. Juliet Planning Commission
P. O. Box 256
Mt. Juliet, TN 37122

Re: Wilson County Solid Waste Plan

Dear Mr. Binkley:

This letter is to notify you that a copy of the Wilson County Solid Waste Plan is available for your review at the County Executive's office. The Solid Waste Management Act of 1991 requires counties in Tennessee to develop a 10 year plan for the management of solid waste. This plan was prepared by the Wilson County Solid Waste Planning Board established by Wilson County and the City of Lebanon. This plan has been approved by the Wilson County Commission. Wilson County is responsible for funding the proposed programs and the city will have no additional financial responsibility associated with this plan.

The Tennessee Regional (TCA 13-3-101 et seq) and Municipal (TCA 13-4-101 et seq) planning statutes emphasize that planning documents which may affect the future of an area be available to relevant local planning commissions for review. The law does not require planning commissions to approve solid waste plans nor does it require planning commissions to comment on the plans.

If you have any questions please contact me or Mr. Enoch Jarrell with Draper Aden Associates, our engineering consultant, at 259-3996.

Sincerely,


Byron Lasater
Chairman

cc: Mr. Enoch Jarrell

WILSON COUNTY SOLID WASTE PLANNING BOARD
Byron Lasater, Chairman

June 2, 1994

Mr. Jan Jewell
Watertown Planning Commission
City Hall
Watertown, TN 37184

Re: Wilson County Solid Waste Plan

Dear Ms. Jewell:

This letter is to notify you that a copy of the Wilson County Solid Waste Plan is available for your review at the County Executive's office. Also Mr. Mike Jennings has a copy. The Solid Waste Management Act of 1991 requires counties in Tennessee to develop a 10 year plan for the management of solid waste. This plan was prepared by the Wilson County Solid Waste Planning Board established by Wilson County and the City of Lebanon. This plan has been approved by the Wilson County Commission. Wilson County is responsible for funding the proposed programs and the city will have no additional financial responsibility associated with this plan.

The Tennessee Regional (TCA 13-3-101 et seq) and Municipal (TCA 13-4-101 et seq) planning statutes emphasize that planning documents which may affect the future of an area be available to relevant local planning commissions for review. The law does not require planning commissions to approve solid waste plans nor does it require planning commissions to comment on the plans.

If you have any questions please contact me or Mr. Enoch Jarrell with Draper Aden Associates, our engineering consultant, at 259-3996.

Sincerely,



Byron Lasater
Chairman

cc: Mr. Enoch Jarrell