

EXECUTIVE SUMMARY

STEWART, MONTGOMERY, and ROBERTSON COUNTIES SOLID WASTE MANAGEMENT PLAN

prepared by:
DRAPER ADEN ASSOCIATES
PROJECT # 3008
March 25, 1994

BRIEF DEFINITION OF THE REGION AND THE RATIONALE FOR FORMATION.

The SMR Planning Region is comprised of Stewart, Montgomery, and Robertson Counties in North Central Tennessee. The planning region is linear with the three member counties running east-west for a total length of about 80 miles with the average width running about 20 miles. The area of the Region is approximately 1,469 square miles. The region includes ten municipalities (1990 population) - Adams (587), Cedar Hill (347), Clarksville (75,494), Cross Plains (1,025), Dover (1,341), Greenbrier (2,873), Orlinda (469), Springfield (11,227), White House (1,693), Ridgetop (1,081).

Montgomery and Stewart Counties formed the Bi-County Solid Waste Management System Authority which pre-dated the Solid Waste Act of 1991. That authority presently operates a baling facility and balefill in Montgomery County. Robertson County has constructed and is operating a Lundell mixed waste processing system at their landfill south of Springfield. This facility is equipped to separate (either automatically or manually) several recyclable products from the waste stream and then create RDF (refuse derived fuel) pellets of the remainder of the throughput.

The SMR Planning Region was formed as a reflection of the common interests as well as common boundaries between the three member counties-- Stewart, Montgomery, and Robertson. Stewart and Montgomery Counties have operated together as Bi-County for years and are familiar with the benefits of mutual cooperation between neighbors in managing solid waste. Including Robertson County provided potential cost-efficiencies brought about by an increased population base which would expand the option horizon. This allows for more waste reduction, recycling, composting, and disposal alternatives. Furthermore both solid waste management facilities within the region were located within a reasonable distance of the I-24 transportation corridor which provides for ease of accessibility between the facilities. The existing facilities both have scales and record keeping and both have processing facilities on site.

The Regional Planning Board consists of:

Chairman: Mr. Robert Bellamy - Montgomery County
Mr. G.L. Landis - Stewart County
Mr. J.B. Whitman - Robertson County
Mr. David Haines - Clarksville
Mr. Waltan Plummer - White House, Greenbrier and Springfield

Additionally the Board has support in the expertise provided by Mr. Pete Reed, Bi-County Director of Solid Waste and Mr. Allan Ellis, City of Springfield, solid waste consultant to Robertson County.

SUMMARY OF REGIONAL NEEDS. At this time the Region has met their waste reduction requirement under the Solid Waste Management Act, 25% based on the 1989 figures. Montgomery County in particular has an aggressive waste reduction program and associated educational efforts in place. The Region needs to provide the impetus for Stewart and Robertson Counties to follow Montgomery County's efforts. The Region currently has two operating landfills with proposed expansions which will provide disposal capacity past the ten year planning period. The existing collection system is in compliance with the Solid Waste Management Act except for Stewart County. Stewart County is in the process of upgrading their green box system to convenience centers. The first convenience center is scheduled to open spring of 1994. The Region needs to devote additional attention to the issue of problem wastes. Stewart and Robertson Counties plan to take advantage of the State funded household hazardous waste collection program with scheduled collection events for spring 1994. Some additional efforts towards used oil collection, battery collection and waste tires are needed in Stewart County. Robertson County intends to provide oil collection at their processing facility in 1994.

STATEMENT OF REGIONAL GOALS AND OBJECTIVES. The Regional goals include:

- 1) To provide the citizenry with a cost effective, yet environmentally sound disposal option for their solid waste;
- 2) To continue efforts to reduce the volume of material requiring final disposal;
- 3) To maximize the public education regarding the proper management of waste, proper disposal, impacts of improper management, and effective waste reduction;
- 4) To meet the requirements of the Solid Waste Management Act.

LIST OF SYSTEM ELEMENTS INCLUDED IN THE REGIONAL PLAN.

WASTE REDUCTION. Drop off recycling facilities at the existing landfills, convenience centers (existing convenience centers for Montgomery and proposed for Robertson* and Stewart); existing materials recovery facility in Robertson County (Lundell system)

*Robertson has begun implementation of drop off recycling with 6 roll offs, 2 at existing convenience centers and the others at Kroger and Walmart

COLLECTION. Convenience centers:

Stewart County - 24 existing collection sites to be reduced to a minimum of 3 convenience centers

Montgomery County - 8 convenience centers, existing and recommended

Robertson County - 6 convenience centers, existing and recommended

DISPOSAL. Class I landfills: Robertson County Sanitary Landfill
Bi-County Balefill
Class III/IV: Bi-County demolition area at balefill

EDUCATION. Ongoing efforts with schools, civic groups and industrial contacts

PROBLEM WASTES. Household hazardous waste collection events scheduled, tire storage areas at existing disposal facilities, lead acid batteries and used oil collection facilities.

DESCRIPTION OF HOW NEW PROGRAMS, SERVICES, AND FACILITIES WILL BE COORDINATED WITH THE EXISTING SYSTEM.

WASTE REDUCTION. Drop off recycling will be part of the new convenience center construction in Stewart County. The existing convenience centers in Robertson County will be updated to include drop off recycling (2 convenience centers already provide this service). Montgomery County convenience centers already include drop off recycling. In the event Robertson County continues operation of the Lundell material recovery facility the facility should be further evaluated in an attempt to increase the effectiveness and economy of the program. In particular strong efforts towards finding a market for the pellets need to be emphasized.

COLLECTION. The collection system will be updated by phasing out green boxes in Stewart County, and phasing in at least 3 convenience centers. The transference to the convenience centers will be accompanied by strong educational efforts in an attempt to minimize problems with illegal dumps.

DISPOSAL. Several disposal options were evaluated and presented to the Solid Waste Board. The Board has chosen to continue with the existing disposal system. Stewart and Montgomery Counties will utilize the Bi-County Balefill and Robertson County will utilize the Robertson County Landfill for the ten year planning period. It is recommended each facility pursue permitting Class III/IV areas to increase waste diversion and due to the lower disposal costs compared to Class I facilities.

Since the Region expressed an interest in waste to energy this option was explored in the development of the Plan. Based on the information available, the waste to energy option does not represent the most cost effective disposal option. However, it should be recognized that the information provided from the steam customer (Fort Campbell) was suspect due to the lack of accurate metering information. As a result, the quantity of steam sold had to be estimated, this parameter has a dramatic effect on the final tip fee. If the Region decides to further pursue this option in the future, it is recommended that a detailed feasibility study be conducted which would include an in depth investigation with the Fort Campbell steam plant personnel and fuel supplier to ascertain accurate base line data.

During plan development, the option of composting was evaluated. Municipal solid waste composting was determined to be a more expensive disposal option than landfilling at this time. Yard waste composting was also evaluated. Although yard waste composting was recommended for Springfield and Clarksville, the plan does not mandate the implementation of the programs. With the 25% diversion criteria met for the Region, the decision regarding yard waste management remains with the local municipalities.

The plan includes a reevaluation of long term disposal at the five year mark. This includes considering waste to energy, municipal solid waste composting, regional landfill and continuing with the existing system. At the five year mark along with the regional disposal consideration the option of regional processing of recyclable materials will also be considered.

EDUCATION. The education program goes hand in hand with the waste reduction program. The Region will utilize a regional Director to coordinate the education/waste reduction programs with anchor staff people in Robertson County and at the BiCounty Authority.

PROBLEM WASTES. The problem waste program will expand as the Region fully implements this plan. The Educational/Waste Reduction Program will have responsibility over coordinating these programs. To date, Montgomery County has conducted a state funded household hazardous waste collection event, Stewart and Robertson have scheduled similar events in 1994. (Robertson County has held household hazardous waste collection events coordinating with a local industry for the last two years.) Annual events will follow as the State funded program allows. The waste tire program is in compliance with State regulations. The two landfills will continue to operate their tire storage areas and coordinate with the State contractor for chipping prior to landfilling the tires. The Region will work towards addressing illegal tire dumps, researching alternative disposal or reuse options, coordinating with appropriate agencies in enforcement programs, and developing educational efforts. The lead acid batteries and waste oil programs will expand on existing systems. The Montgomery County convenience centers and the landfill already accept lead acid batteries and used oil. Stewart County will provide this service as their convenience centers are developed. Robertson County currently accepts batteries at the materials recovery facility and will provide drop off facilities for used oil in 1994.

IMPLEMENTATION SCHEDULE.

WASTE REDUCTION

Implement drop off recycling at all convenience centers	September 1994
Planned diversion programs in operation	December 1995
25% diversion met	January 1996
Evaluate potential blue bag program	1999
Evaluate regional processing of recyclables	1999

COLLECTION:

Stewart County

Apply for convenience center grants	March 1994
Design/permitting of convenience centers	May 1994
Bidding/negotiation for convenience centers	July 1994
Construction of convenience centers	Feb. - August 1994
Begin operations	September 1994

Montgomery

Continue existing operations	Ongoing
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Robertson County

Complete convenience ctr upgrades for drop off recycling	December 1994
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DISPOSAL:

Robertson County

Continue operations in existing landfill	Until September 1996
Complete construction documents for horizontal exp.	February 1996
Bid construction of horizontal expansion	March 1996
Award contract for horizontal expansion construction	April 1996
Begin construction of horizontal expansion	May 1996
Begin operation in horizontal expansion	September 1996
Begin final closure on existing landfill	July 1996
Complete closure of existing landfill	December 1996

Bi-County

Redesign balefill to meet Subtitle "D", increase capacity	March-June 1994
Permit modification issued	April-July 1994
Begin construction of composite lined cells	April 1994
Begin operations in composite lined cells	June 1994

Regional

Reevaluate long term disposal to include municipal solid waste composting, waste to energy, regional landfill and current system	1999
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EDUCATION - Regional

Prepare press releases/photo ops as programs begin	Ongoing
Work with community leaders community yard sales	February 1995
Pilot community for implementing purchasing policy	February 1995
Backyard composting program kick-off	March 1995
Seminars for civic groups	March 1995
Education programs in area industries	April 1995
Meetings with ministerial alliances	May 1995
Educational programs in schools	Ongoing
Education in offices, target 3 offices/month	October 1995
Education in stores, target 3 stores/month	February 1996
First mass purchase of recycled products	February 1996

PROBLEM WASTES

Household hazardous waste

Stewart, Robertson conduct HHW collection event	Spring 1994
Stewart, Robertson, Montgomery HHW event	Annually (with State funding)

Waste oil

Robertson County implement used oil drop off at landfill Spring 1994
Stewart implement drop off at convenience centers 1994
Montgomery existing drop off at convenience ctrs, balefill Ongoing

Tires

Regional system in place 1 @ Robertson County Landfill
1 @ BiCounty Balefill

Batteries

Robertson County existing drop off at landfill Ongoing
Stewart implement drop off at convenience centers 1994
Montgomery existing drop off at convenience ctrs, balefill Ongoing

ESTIMATED SYSTEM COSTS.

WASTE REDUCTION. 10-Year Staffing Plan Administration: The current staff at BiCounty and Robertson County will implement the waste reduction program. The current Director of the BiCounty Solid Waste Management System will act as the Director for the Regional efforts towards waste reduction and education. Existing staff at BiCounty and in Robertson County will include an anchor person to work with the Director. The staff will be responsible for coordinating and providing the paperwork for the county operated systems. Currently the BiCounty Director of Solid Waste System devotes part of his time to waste reduction. BiCounty also has a recycling market coordinator and an administrative support position. Robertson County is in the process of hiring a Director of Operations who will serve as a waste management program coordinator.

10-Year Budgets The Administrative Staffing Budget (1994\$) is estimated as follows:

	BiCounty	Robertson	Regional
Salary and Benefits	\$ 5,300	\$ 3,000	\$ 8,000
Overhead	500	200	500
Supplies	500	200	500
Office Equipment	500	200	500
Travel	200	100	1,000
Printing	1,000	400	500
Advertising	1,000	400	500
TOTAL	9,000.00	4,500.00	11,500.00

The total administration of the program results in a cost of \$25,000 in 1994, estimated to increase to \$50,000 in the year 2003. The estimated portion of the tip fees at the disposal facilities to pay for administration of the waste reduction program in 1994 based on the

expected administration cost of \$25,000 with a waste flow of 111,059 is about \$.25/ton. For the year 2003 the cost would be approximately \$.40/ton based on a cost of \$50,000 and a waste flow of 128,045 tons.

Funding Plan The implementation of the waste reduction program will be funded by the Bi-County Authority and Robertson County. The recycling program for Bi-County includes primarily the drop-off program at the convenience centers. The recycling program for Robertson County includes the drop-off at the convenience centers as well as the Mixed Waste Processing Facility already in existence. As stated above the administrative budget will be funded with a portion of the tip fees at the disposal facilities.

COLLECTION (1994):

Stewart County annual cost: 6,500 tpy (\$26/ton)(1.03) = \$174,070

Montgomery annual cost: 20,000 tpy (\$19/ton)(1.03) = \$391,400

Robertson annual cost: 4,900 tpy (\$32/ton)(1.03) = \$161,504

*1.03 provides for 3% inflation over the calculated 1993 costs

1993 Regional collection annual cost: \$726,974

DISPOSAL:

1994 Bi-County annual cost: 77,473 tpy (\$21.34/ton) = \$1,653,274

Robertson annual cost: 31,822 tpy (\$35.38/ton) = \$1,125,862

1994 Regional disposal annual cost: \$2,779,134

1997 Bi-County annual cost: 83,143 tpy (\$22.40) = \$1,862,400

Robertson annual cost: 33,389 (\$38.08/ton) = \$1,271,453

1997 Regional disposal annual cost: 116,532 tpy (\$26.89) = \$3,133,853

*if Robertson County could locate another source of waste, it would result in a noticeable decrease in their tip fee; this is particularly true in the next three years, where the waste flow could increase by about 40 tpd and not impact the life of the landfill; increasing the waste flow to Bi-County would decrease the tip fee marginally.

EDUCATION

10-Year Staffing Plan Administration: The current staff at BiCounty and Robertson County will implement the educational program. The current Director of the BiCounty Solid Waste Management System will act as the Director for the Regional efforts towards waste reduction and education. Existing staff at BiCounty and in Robertson County will include an anchor person to work with the Director. The staff will be responsible for coordinating and providing the paperwork for the county operated systems. Currently the BiCounty Director of Solid Waste System devotes part of his time to education. BiCounty also has a recycling market coordinator and an administrative support position. Robertson County is in the process of hiring a Director of Operations who will serve as a waste management program coordinator.

ALLOCATION OF RESPONSIBILITIES AMONG LOCAL GOVERNMENTS, AND THE PRIVATE SECTOR.

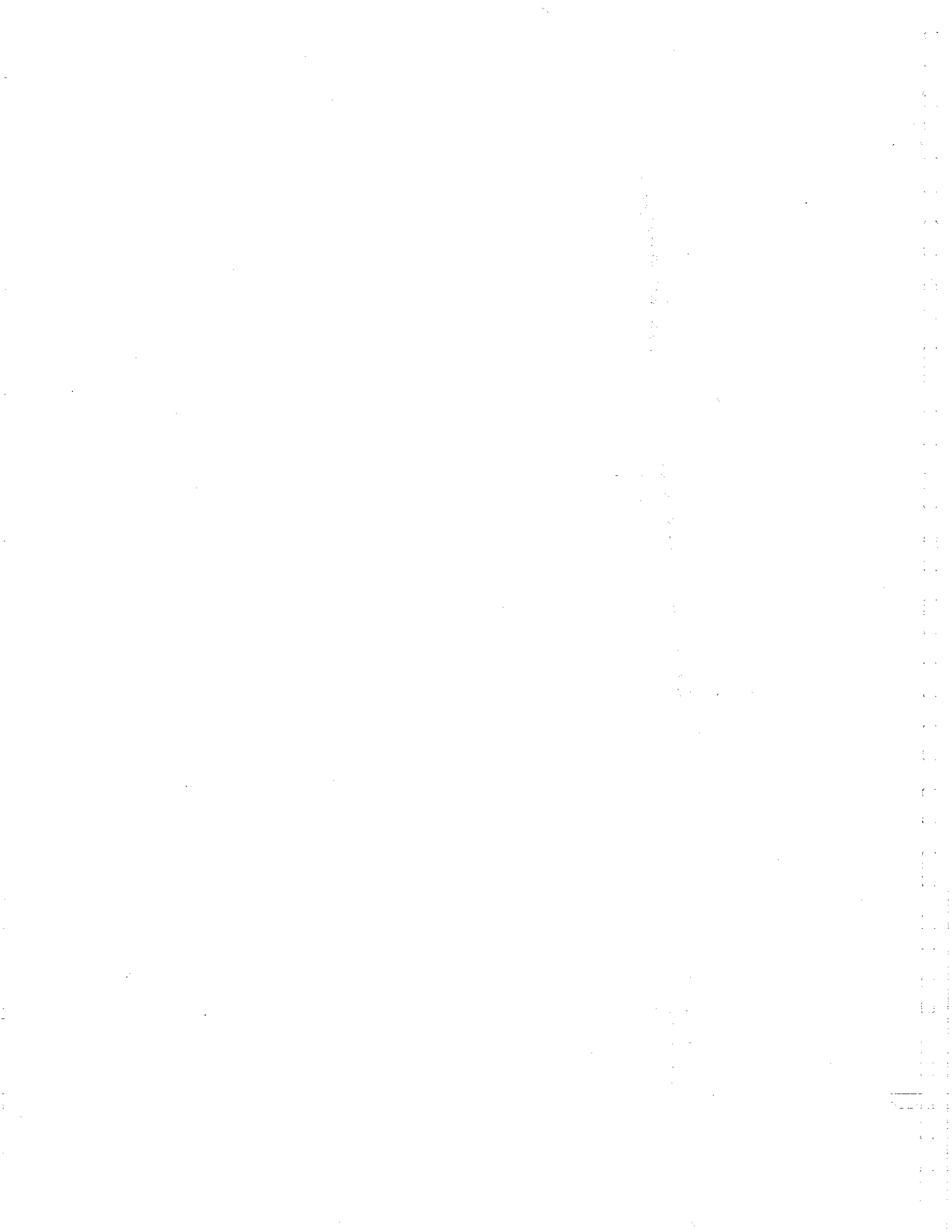
WASTE REDUCTION. The waste reduction program will be approached from a regional perspective. The Director of the BiCounty Solid waste Management System will coordinate with designated anchor people in the BiCounty Authority and Robertson County to manage the waste reduction program. The efforts will include working with local industries, commercial operations, as well as residents to accomplish waste reduction at the source.

COLLECTION. The collection program will continue with current operations. BiCounty is responsible for the collection of waste in Stewart and Montgomery counties while Robertson County is responsible for their waste.

DISPOSAL. BiCounty Authority will manage the operation of the BiCounty Balefill. This facility accepts waste from Stewart and Montgomery Counties. Robertson County is responsible for the operation of the Robertson County landfill.

EDUCATION. The educational program will be approached from a regional perspective. The Director of the BiCounty Solid waste Management System will coordinate with designated anchor people in the BiCounty Authority and Robertson County to manage the educational program. The efforts will include working with local industries, commercial operations, residents, local schools and civic groups to accomplish education on the critical solid waste management issues in the communities.

PROBLEM WASTES. A portion of the problem waste program will be handled regionally in the form of educational programs which stress proper management of potentially dangerous components of the municipal solid waste stream. The waste tire program is managed along with the two existing disposal facilities, BiCounty Balefill and Robertson County landfill. Used oil and lead acid batteries management programs are part of the collection and disposal systems under the responsibility of the BiCounty Authority and Robertson County. The litter grant program will be implemented as in the past by the individual counties.



BUDGET This program will be funded by a portion of the tip fees at the disposal facilities. The education budget is included under the waste reduction budget shown above.

PROBLEM WASTE

10-Year Staffing Plan Administration: The current staff at BiCounty and Robertson County will implement the problem waste program. The current Director of the BiCounty Solid Waste Management System will act as the Director for the Regional efforts towards problem waste management. Existing staff at BiCounty and in Robertson County will include an anchor person to work with the Director. The staff will be responsible for coordinating and providing the paperwork for the county operated systems.

BUDGET This administration budget for this program will be funded through a portion of the disposal facility tip fees. The budget for the administration of the problem waste program is included in the budget for the waste reduction program shown above. The waste tire program will be funded through the disposal facility budgets. The used oil and battery collection programs will be funded with the collection budgets associated with the management of the convenience centers. The household hazardous waste collection events will be funded by the individual Counties.

Household Hazardous Waste

- 1994-1996 annual state funded collection events: \$1,000-\$2,000/County funds
- 1996 Region investigate county funded collection events: \$500-\$1,000/Regional funds
- 1997-2003 County funded collection events: \$15,000-\$25,000/County funds

Used Oil

- 1994 Robertson County add drop off at landfill \$500-\$1,500/County funds
- 1994 Stewart County implementing with convenience centers/BiCounty funds
- operational costs part of convenience centers or landfill budgets/County funds

Batteries

- 1994 Stewart County implementing with convenience centers/BiCounty funds
- operational costs part of convenience centers or landfill budgets/County funds

Tires

- existing system part of landfill operating budgets/Disposal facility funds

Summary of problem waste implementation costs to be provided directly by the counties (the associated administrative and educational programs are covered under the waste reduction budget shown above):

- 1994: \$1,500 - \$3,500/County
- 1995: \$1,000 - \$2,000/County
- 1996: \$1,500 - \$3,000/County
- 1997-2003: \$15,000 - \$25,000/County

SMR REGIONAL SUMMARY OF SOLID WASTE MANAGEMENT SYSTEM COSTS

SYSTEM COMPONENT		1994 COSTS	2003 COSTS	COMMENTS
Waste Reduction	BiCounty	\$ 9,000	\$ 18,000	Regional Director funded by all 3 counties plus one anchor staff person in Robertson and BiCounty will allocate 10-15% of their time and resources to these programs
	Robertson Cty	4,500	9,000	
	Regional	11,500	23,000	
	Total	25,000	50,000	
Collection	BiCounty	\$ 565,470	737,810	BiCounty includes the construction of two new convenience centers in 1994
	Robertson Cty	161,504	210,726	
	Total	726,974	948,536	
Disposal	BiCounty	\$1,653,274	\$2,325,698	class III/IV disposal facility costs not broken out
	Robertson Cty	1,125,862	1,509,349	
	Total	2,779,134	3,385,047	
Education	BiCounty			administration costs covered under the waste reduction program outlined above
	Robertson Cty			
	Regional			
Problem Wastes	BiCounty	\$ 5,000	\$ 40,000	additional administration costs covered under the waste reduction program outlined above
	Robertson Cty	\$ 2,500	\$ 20,000	
	Total	\$ 7,500	\$ 60,000	
Recycling	BiCounty	\$ 33,500	\$ 42,550	
	Robertson Cty	12,000	15,600	
	Total	45,500	58,150	

The costs of the collection system and implementation of the problem waste program will be covered by BiCounty and Robertson County.

The cost of disposal will be covered by the tip fees at the disposal facilities. Also implementation of the recycling programs will be covered by a portion of the tip fees at the disposal facilities (between \$.38 and \$.46/ton).

The costs of administering the waste reduction, education and problem waste programs will be funded by a portion of the tip fees at the disposal facilities (\$.25 to \$.40/ton). This will support a part time Director of Recycling/Education as well as anchor staff in each county part time.

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**STEWART, MONTGOMERY, ROBERTSON COUNTY
SOLID WASTE MANAGEMENT PLAN**

MARCH 1, 1994
revised March 25, 1994

PROJECT #3008

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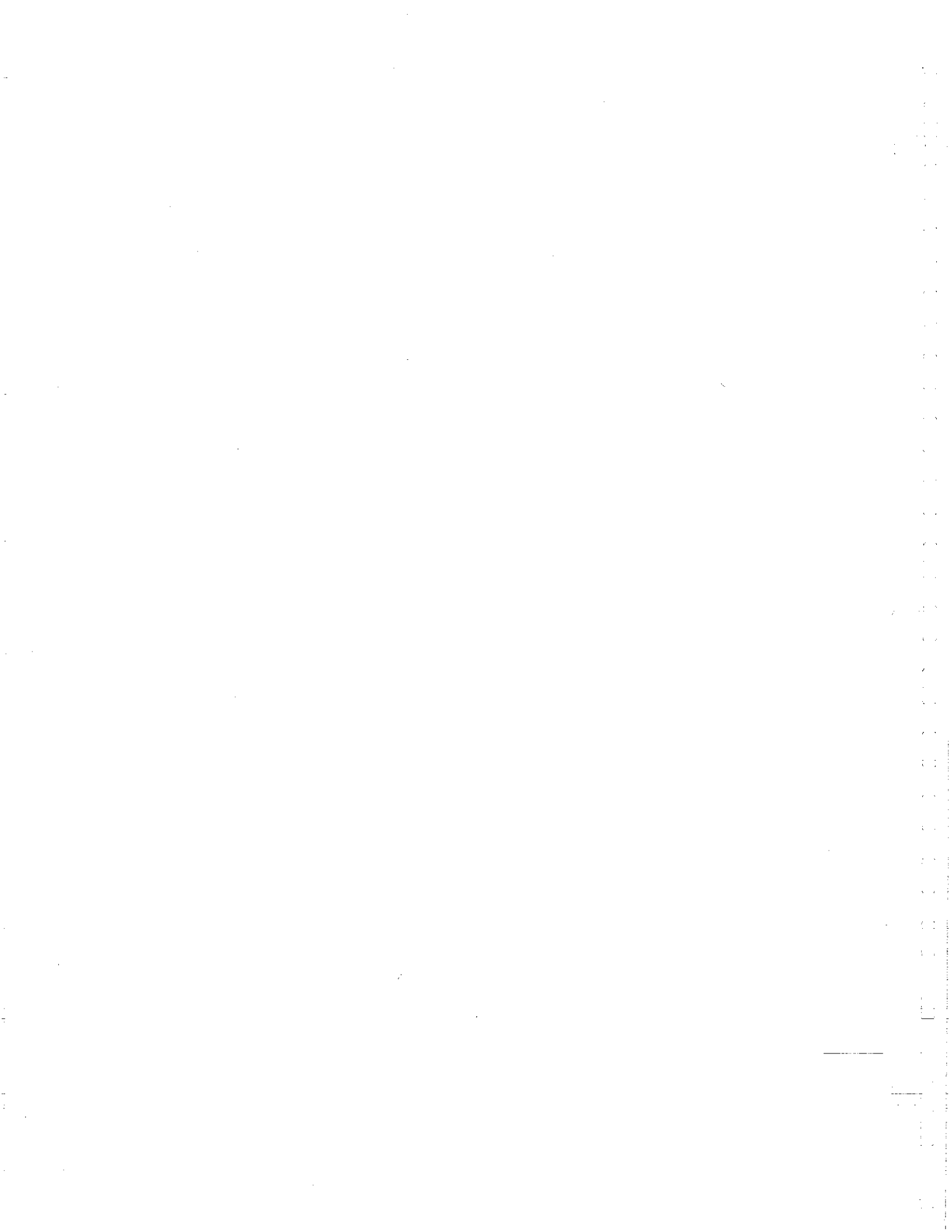


TABLE OF CONTENTS
STEWART, MONTGOMERY, AND ROBERTSON COUNTIES
SOLID WASTE MANAGEMENT PLAN
March 25, 1994

PART I. Executive Summary

PART II. Solid Waste Plan

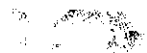
- Chapter I. Description of the municipal solid waste Region
 - Chapter II. Analysis of the current solid waste management system for the Region
 - Chapter III. Growth trends, waste projections, and preliminary system structure
 - Chapter IV. Waste reduction
 - Chapter V. Waste collection and transportation
 - Chapter VI. Recycling
 - Chapter VII. Composting, solid waste processing, waste to energy and incineration capacity
 - Chapter VIII. Disposal capacity
 - Chapter IX. Public information and education
 - Chapter X. Problem wastes
 - Chapter XI. Implementation: schedule, staffing, and funding
 - Chapter XII. Allocation of implementation responsibilities: Plan Adoption and Submission
 - Chapter XIII. Flow control and permit application review
- Review by appropriate municipal or regional planning commission

PART III. APPENDICES

Under separate cover is "Supporting Information and Calculations for the SMR Solid Waste Management Plan" which includes:







- Section 1• Legal Documentation and Organization of the Region
- Section 2• Calculations Supporting Waste to Energy Evaluation
- Section 3• Landfill Budgets
 - Calculations Supporting Landfill Options Evaluations
- Section 4• Supporting Information for Public Information and Education
- Section 5• Supporting Information for Problem Waste

Public participation activities



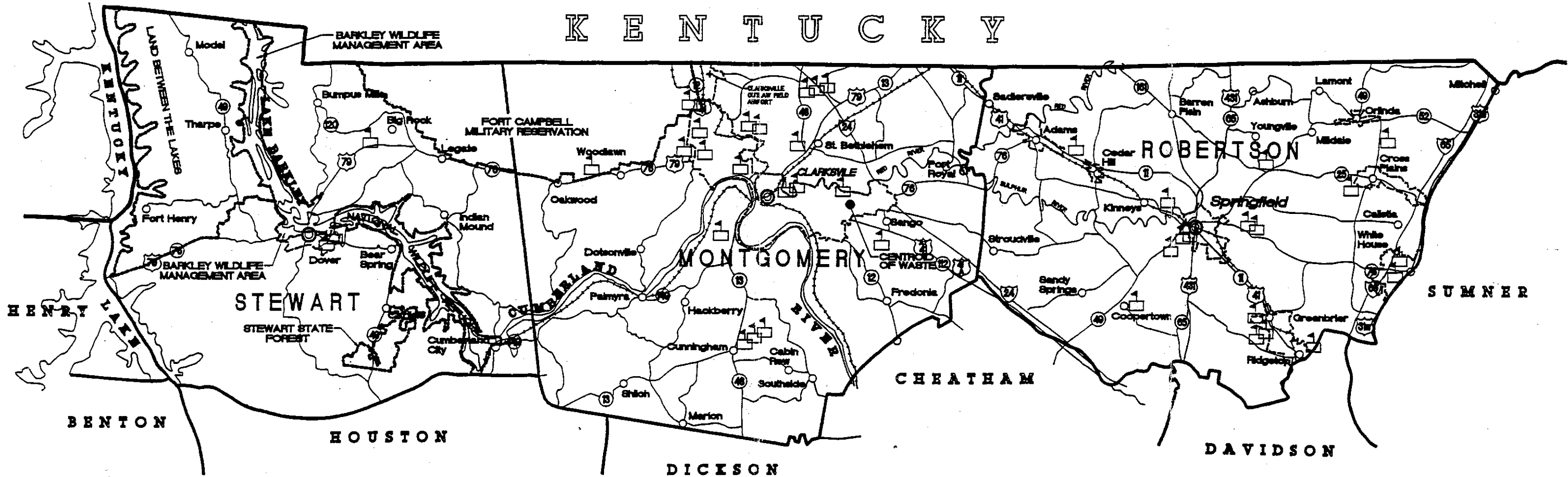
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LEGEND

-  U.S. HIGHWAY MARKER
-  INTERSTATE HIGHWAY MARKER
-  STATE SECONDARY MARKER
-  CITY LIMITS
-  PUBLIC BOUNDARY LIMITS
-  PUBLIC SCHOOL










REGIONAL INFORMATION

SMR SOLID WASTE PLANNING REGION



Draper Aden Associates
 CONSULTING ENGINEERS
 Blacksburg, VA - Richmond, VA - Nashville, TN

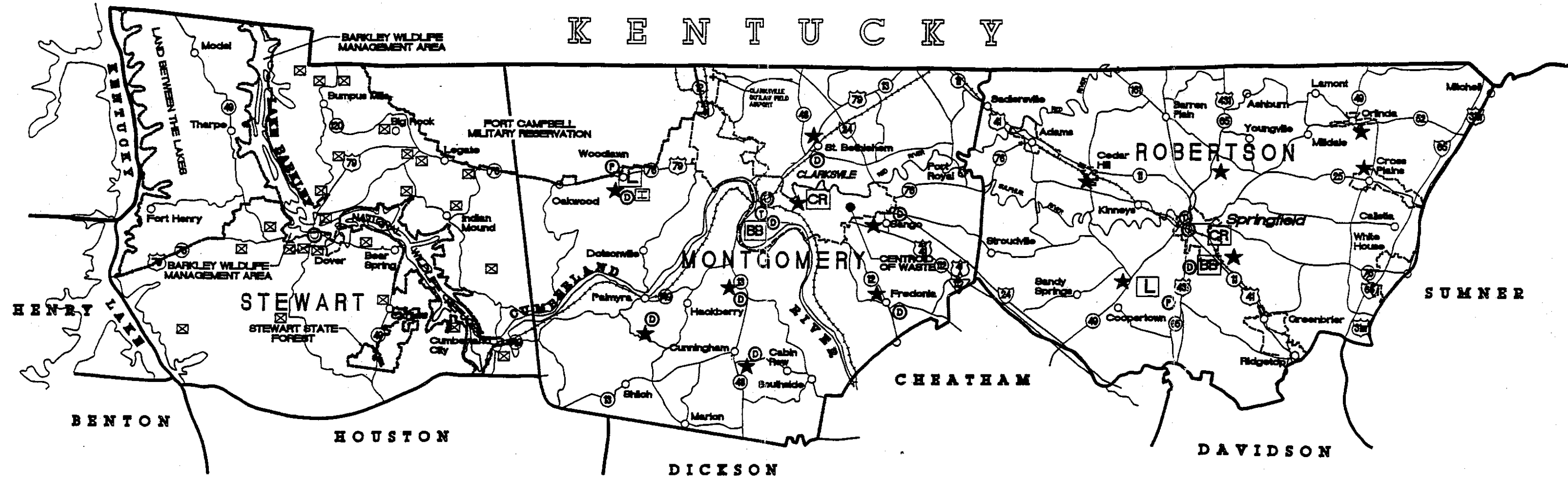
LEGEND

-  CLASS I LANDFILL
-  TRANSFER STATION
-  GREEN BOXES
-  INCINERATOR (BRUSH)
-  CONVENIENCE CENTERS
-  DROP-OFF CENTER
-  PROCESSING CENTER FOR RECYCLABLES
-  BUY-BACK SITE
-  COMMERCIAL RECYCLERS

EXISTING SOLID WASTE SYSTEM

SMR SOLID WASTE PLANNING REGION









K E N T U C K Y



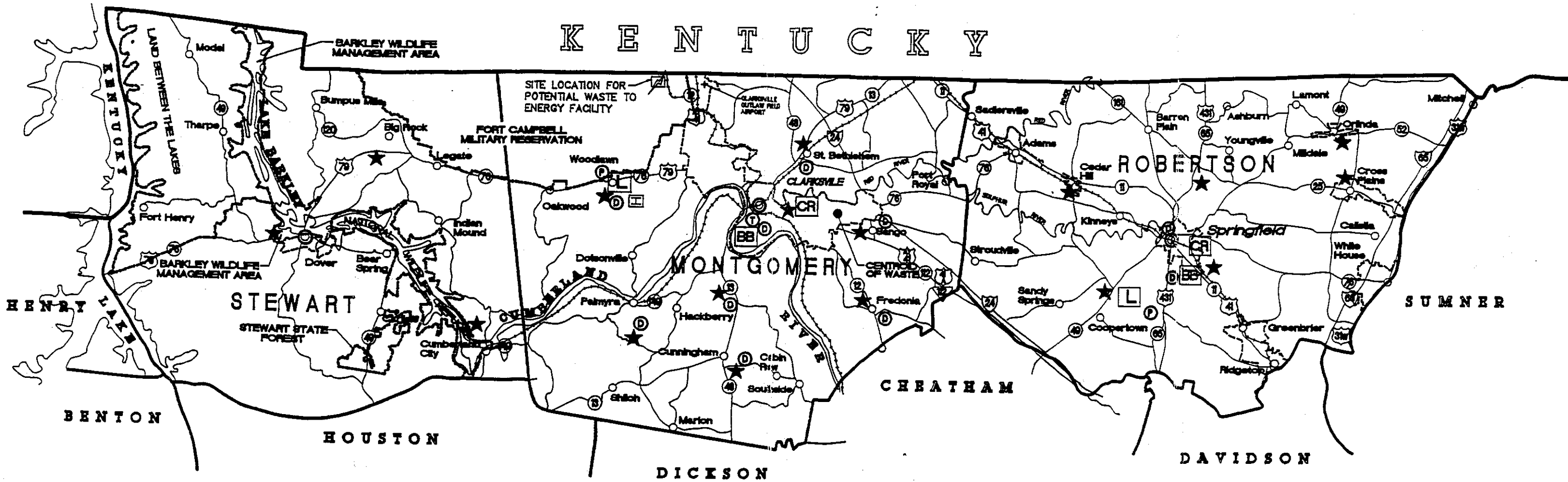
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 Blacksburg, VA - Richmond, VA - Nashville, TN



PROPOSED SOLID WASTE SYSTEM SMR SOLID WASTE PLANNING REGION

-  CLASS LANDFILL
-  TRANSFER STATION
-  INCINERATOR (BRUSH)
-  CONVENIENCE CENTERS
-  DROP-OFF CENTER
-  PROCESSING CENTER FOR RECYCLABLES
-  BUY-BACK SITE
-  COMMERCIAL RECYCLERS

K E N T U C K Y



Draper Aden Associates

CONSULTING ENGINEERS

Blacksburg, VA - Richmond, VA - Nashville, TN



CHAPTER I

DESCRIPTION OF THE MUNICIPAL SOLID WASTE REGION

A. General Description

The SMR Planning Region is comprised of Stewart, Montgomery, and Robertson Counties in North Central Tennessee. The planning region is linear with the three member counties running east-west for a total length of about 80 miles with the average width running about 20 miles. The area of the Region is approximately 1,469 square miles. The region includes ten municipalities (1990 population) - Adams (587), Cedar Hill (347), Clarksville (75,494), Cross Plains (1,025), Dover (1,341), Greenbrier (2,873), Orlinda (469), Springfield (11,227), White House (1,693), Ridgetop (1,081).

The primary natural and political boundaries impacting the region are the Kentucky State Line to the north and the Tennessee River to the west. The Tennessee River (Kentucky Lake) is traversed by the U.S. 79 highway bridge between Stewart county and neighboring Henry county. The next nearest crossing of the Tennessee River is the U.S. 70 highway bridge connecting Waverly to Camden.

The Cumberland River (Lake Barkley) bisects both Montgomery and Stewart counties. This river effectively divides these counties into a northern and southern half. The River is traversed by the TN 13 highway bridge, southwest of Clarksville; an additional bridge in the same area connecting Cumberland Drive (Highway 13) with River Road; a toll ferry connecting Cumberland City with Wilson Hollow Road; and the U.S. 79 highway bridge in Dover.

Rail service for the region exists but does not connect the member county seats in an organized fashion. There is no major rail service to Dover and the only rail service historically in Stewart County is now abandoned. This line cut through the southeast corner of the county connecting Cumberland City with Clarksville in the north and Erin (in Houston County) in the south. The rail connection between Montgomery and Robertson Counties is circuitous at best involving either leaving the state (via Guthrie, Kentucky) or using lines through Nashville. The rail line in Montgomery County begins in Clarksville and heads northeast, through St. Bethlehem, before exiting the county into Guthrie, Kentucky. The rail line through Robertson County begins in Davidson County (in the southeastern corner of Robertson County) and heads northwest connecting Ridgetop, Greenbriar, Springfield, Cedar Hill, Adams, and Sadlersville before exiting into Montgomery County. There are two rail lines with terminal in Clarksville.

TN Highway 76 runs the full length of the region beginning at the Tennessee River in the west and running eastward through the region to the Sumner County line in the east. This highway connects Dover, Legate, Oakwood, Woodlawn, Clarksville, Adams, Cedar Hill,

Springfield, and White House. Interstate I-24 connects southwestern Robertson County with Northeastern Montgomery County and runs for about 27 miles within the region. Interstate I-65 runs along the eastern boundary of Robertson County with about 18 miles within the region. The location of I-65 makes it a very small factor in the planning for the region. In addition to interstates, the region has about 215 miles of U.S. highway, 213 miles of state highway, and 1,858 miles of county and local roads.

The primary employment in Stewart County is manufacturing which accounts for about 34% of the county's employment. The county is, however, most well-known for its wildlife and tourism opportunities. The Tennessee Valley Authority's Land Between the Lakes (LBL) comprises a large portion of the northwest part of the county and the southern road access into the LBL (The Trace) intersects U.S. Highway 79 just west of Dover. In addition to the LBL, Fort Donelson National Battlefield, Cross Creek National Wildlife Refuge, Barkley State Wildlife Refuge, Barkley State Waterfowl Area, and Stewart State Forest are all located within Stewart County and the Paris Landing State Park is located in Henry County just across Kentucky Lake and less than a mile from the county line. This type of tourism in a relatively small county can cause wide variations in effective population (defined as population generating waste) between summer months and winter months and between weekends and weekdays. It should also be noted that a substantial portion of the northeast part of the county is taken up by the Fort Campbell Military Reservation. None of the major entrances into the base are located in Stewart County.

The primary employment in Montgomery County is in services which account for about 31% of the total employment. This is followed by trade and then manufacturing with 24% and 18% respectively. The large percentage of services and trade employment is directly related to the Ft. Campbell support industry that has arisen in conjunction with the main gate of the base being located on US Highway 41A just north of the county. The military personnel living off-base have contributed to a high percentage of rental housing and starter-type homes in the county. Austin Peay State University provides a significant population addition to the county and further adds to the rental population. The college population causes effective population variances of the county between school term and non-school term.

The primary employment in Robertson County is manufacturing which accounts for about 28% of the total employment. Robertson County is immediately adjacent to Nashville/Davidson County. As such, the towns of White House, Greenbriar, Ridgetop, and Cooperstown function in large part as "bedroom" communities for commuters to Nashville. The remainder of the county is primarily self-sustaining and does not rely economically on Nashville. Robertson County residents enjoy a reasonably high standard of living and a comparatively small percentage of the population is officially below the U.S. poverty line.

Montgomery and Stewart Counties formed the Bi-County Solid Waste Management System Authority which pre-dated the Solid Waste Act of 1991. That authority presently operates a baling facility and balefill in Montgomery County. Robertson County has constructed and

is operating a Lundell Front-end Separation System at the landfill south of Springfield. This facility is equipped to separate (either automatically or manually) several recyclable products from the waste stream and then create RDF pellets of the remainder of the throughput.

B. Narrative for Rationale for Forming Region

The SMR Planning Region was formed as a reflection of the common interests as well as common boundaries between the three member counties-- Stewart, Montgomery, and Robertson. Stewart and Montgomery Counties have operated together as Bi-County for years and are familiar with the benefits of mutual cooperation between neighbors in managing solid waste. The inclusion of Robertson County in the region provides additional cost-efficiencies brought about by an increased population base would expand the solid waste management option horizon across the board. This allows for more waste reduction, recycling, composting, and disposal alternatives. It was further noted that both solid waste management facilities within the region were located within a reasonable distance of the I-24 transportation corridor which provided for ease of accessibility between the facilities. The existing facilities both have scales and record keeping and both have processing facilities on site.

Another consideration was that Robertson and Montgomery Counties cooperate in other programs such as the fact that they share the same District Attorney and three circuit judges. The most important aspect of this decision was the cultural and historical ties between the citizens of this region. These ties allow for the pursuit of common goals and leaves no impediments to the implementation of region-wide systems should they appear advantageous in the plan.

Houston County was considered for regional discussions, but they opted to go alone and are currently working with a private waste company to manage their waste.

C. Definition of Institutional Structure

The Regional Planning Board consists of:

- Chairman: Mr. Robert Bellamy - Montgomery County
- Mr. G. L. Landis - Stewart County
- Mr. J. B. Whitman - Robertson County
- Mr. David Haines - Clarksville City Attorney
- Mr. Waltan Plummer - Whitehouse, Greenbrier and Springfield

The Board has support in the expertise of Mr. Pete Reed, Bi-County Director of Solid Waste and Mr. Allan Ellis, City of Springfield, solid waste consultant to Robertson County.

The responsibilities of the Board include initially to work with their consultant in the development of the Solid Waste Plan and working with their advisory boards, interested citizens and local officials toward approval of the Plan. The Board is then responsible for proper implementation of the Plan for the ten year planning period.

Details regarding the Board are included in the resolutions passed by the members, one is included as part of this chapter.

D. Demographics

The 1990 population of the region according to U.S. Census Bureau was 151,471. That is 9,479 for Stewart County; 100,498 for Montgomery County; and 41,494 for Robertson County. The Needs Assessment extrapolated the 1990 census resulting in the 1993 population being Stewart - 9,778 (approximately 1.03% annual increase); Montgomery - 106,196 (approximately 1.85% annual increase); and Robertson - 43,023 (approximately 1.2% annual increase). The total 1993 population being 158,997. The average population density for the region is 108 people per square mile based on a regional area of 1,469 square miles.

There is no information available at this time to expect the regional demographic trends to change over the next year compared to past years. The regional population growth rate is marginal at approximately 1.62%. The 2003 region population is expected to be 186,489.

In the event the region attracts new industry or unexpected increase in population growth, the population would obviously show this impact along with the associated waste production. Specific issues in the SMR Region include the status of the tourist industry, which would have a marked impact on the seasonal population. The status of Fort Campbell also directly affects the regional population. Table I-1 through I-6 gives a summary of the demographics for the SMR Region.

E. Economic Activity

The economic activity data in the District Needs Assessment County Profiles for each county were reviewed and reaggregated on the forms in this chapter. A primary impact on the generation of waste is the economic activity in the Region, i.e. increased growth due to new industries would generate additional solid waste. 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.

Tables I-7 through I-13 reaggregate information from the District Needs Assessment related to economic activity using base year 1991.

CHAPTER I: FORMS

A. REGIONAL SUMMARY: DEMOGRAPHICS

1. Name of Region: Stewart, Montgomery and Robertson Counties
2. Regional Population: 151,471 (1990 Census)
3. Regional Area 1,469 square miles
4. Population and Population Density

Table I-1

County	Area (Sq. Miles)	Population	Avg. Density Population/sq. miles
Stewart	454	9,479	20.88
Montgomery	539	100,498	186.45
Robertson	476	41,494	87.17
Regional Total	1,469	151,471	103.11

Note: Information reaggregated from the Districts Needs Assessment (1990 data)

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

Table I-2

County	URBAN		RURAL	
	Population	%	Population	%
Stewart	0	0	9,479	100.0
Montgomery	75,494	75.12	25,004	24.88
Robertson	15,824	38.20	25,670	61.80
TOTAL	91,318	60.29	60,153	39.71

Note: Information reaggregated from the Districts Needs Assessment (1990 data)

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

Table I-3

Age	Total	Male	%	Female	%
0-4	12,332	6,424	52.09	5,908	47.91
5-17	27,792	14,360	51.67	13,432	48.33
18-44	70,708	37,110	52.48	33,598	47.52
45-64	25,964	12,574	48.43	13,390	51.57
65+	14,675	6,033	41.11	8,642	58.89
Regional Total	151,471	76,501	50.51	74,970	49.49

Note: Information reaggreated from the Districts Needs Assessment (1990 data)

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

Table I-4

	Number	%
Less than 9th Grade	10,801	21.43
High School	26,983	53.52
College	8,661	17.18
Post Graduate/Professional	3,968	7.87
Regional Total	50,413	100.0

Note: Information reaggreated from the Districts Needs Assessment (1990 data)

8. Total Number of Households in Region 52,824

9. Distribution by Type of Housing and Occupancy

Table I-5

	Total Units (Persons)	Occupied	Owner	Rented
Single Family 1, Detached	60,456	58,575	48,416	10,159
1, Attached	1,766	1,698	408	1,290
Multi-Family 2	2,948	2,745	284	2,461
3-4	2,265	2,056	92	1,964
5-9	2,266	2,075	46	2,029
10-19	1,792	1,667	16	1,651
20-49	868	791	11	780
50 or more	181	181	0	181
Institutional	7,615*	NA	NA	NA
Mobile Home/Trailer	9,346	8,538	5,561	2,977
Other	574	572	350	192
Regional Total	90,077	78,898	55,184	23,684

Note: Information reaggreated from the Districts Needs Assessment (1990 data)

* institutional includes Fort Campbell

10. Regional Population Projections 1994-2003

Regional Population 1993: 158,997

Table I-6

Projection Year

County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Stewart	9,879	9,982	10,085	10,190	10,295	10,402	10,509	10,599	10,708	10,818
Montgomery	108,160	110,160	112,197	114,272	116,385	118,537	120,707	122,747	124,993	127,281
Robertson	43,543	44,070	44,603	45,143	45,689	46,241	46,795	47,249	47,816	48,390
Regional Total	161,582	164,212	166,885	169,605	172,369	175,180	178,011	180,595	183,517	186,489

Note: Information reaggreated from the Districts Needs Assessment (1990 data)

B: 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
Stewart	9,578	no	3,952	47,594,000	12,043.03	16.6
Montgomery	102,375	yes	37,778	445,491,000	11,792.34	12.8
Robertson	42,001	no	20,150	180,752,000	8,970.32	10.6
Regional Total	153,954	-----	61,880	673,837,000	10,889.42	12.4

2. Non-Agricultural Employment, by Sector, 59,620

Table I-8

% of Total Employment

County	Manufacturing	Construction	Trade	Finance	Service	Government	Transp., Pub. Utilities
Stewart	1,259	310	606	116	814	321	319
Montgomery	6,837	2,277	8,944	1,920	11,538	3,346	2,099
Robertson	5,239	1,479	4,253	1,089	4,565	753	1,536
Regional Total	13,335	4,066	13,803	3,125	16,917	4,420	3,954
%	22.4	6.8	23.2	5.2	28.4	7.4	6.6

3. Total Agricultural Employment in 1991 1,927

Table I-9
Agricultural Employees

County	Employment
Stewart	207
Montgomery	761
Robertson	959
Regional Total	1,927

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

1990 Population of the region was greater than 100,000, therefore the following is a listing of the numbers of firms employing 100 or more employees:

Industry

County	Agriculture	Construction	Mining	Manufacturing	Transportation	Wholesale Trade	Retail Trade	Finance	Services
Stewart	0	0	0	2	0	0	0	0	2
Montgomery	0	0	0	10	1	0	7	1	1
Robertson	0	0	0	9	0	0	3	0	3
TOTAL	0	0	0	21	1	0	10	1	6

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

Table I-11

County	Total Number of Institutions	Total Number of Students - Prisoners/Residents	Estimated Quantity of Waste Generated
Montgomery	1-Autin Peay State University	12,000	*
Montgomery	1-Montgomery County Jail	264	*
Regional Total	2	4,247	*

* this information is impractical to collect with a useful level of accuracy

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

County	No. of Facilities	No. of Beds	OnSite/Offsite	Type Treatment	Est. Quantity of Solid Waste Generated
Stewart	1 (Manor House of Dover)	88	offsite		*
Montgomery	1 (Memorial Hospital)	216	onsite	incinerator	*
Montgomery	1 (Montgomery County Nursing Home)	120	onsite	incinerator	*
Montgomery	1 (Blanchfield Army Hospital)	224	offsite	incinerator	*
Montgomery	1 (General Care Nursing Home)	131	offsite		*
Montgomery	1 (Palmyra Intermediate)	75	offsite		*
Montgomery	1 (Spring Meadows Health Care)	84	offsite		*
Robertson	1 (Jessee Holman Jones Hospital)	160	offsite		*
Robertson	1 (Elmhurst Nursing Home)	70	offsite		*
Robertson	1 (Robertson Co. Health Care)	120	offsite		*
Robertson	1 (Springfield Health Care)	107	offsite		*
TOTAL	11	1,395			*

* this information is impractical to collect with a useful level of accuracy

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
Stewart	X	X		X*	X
Montgomery	X	X	X	X*	X
Robertson	X	X	X	X*	X
Total	X	X		X*	X

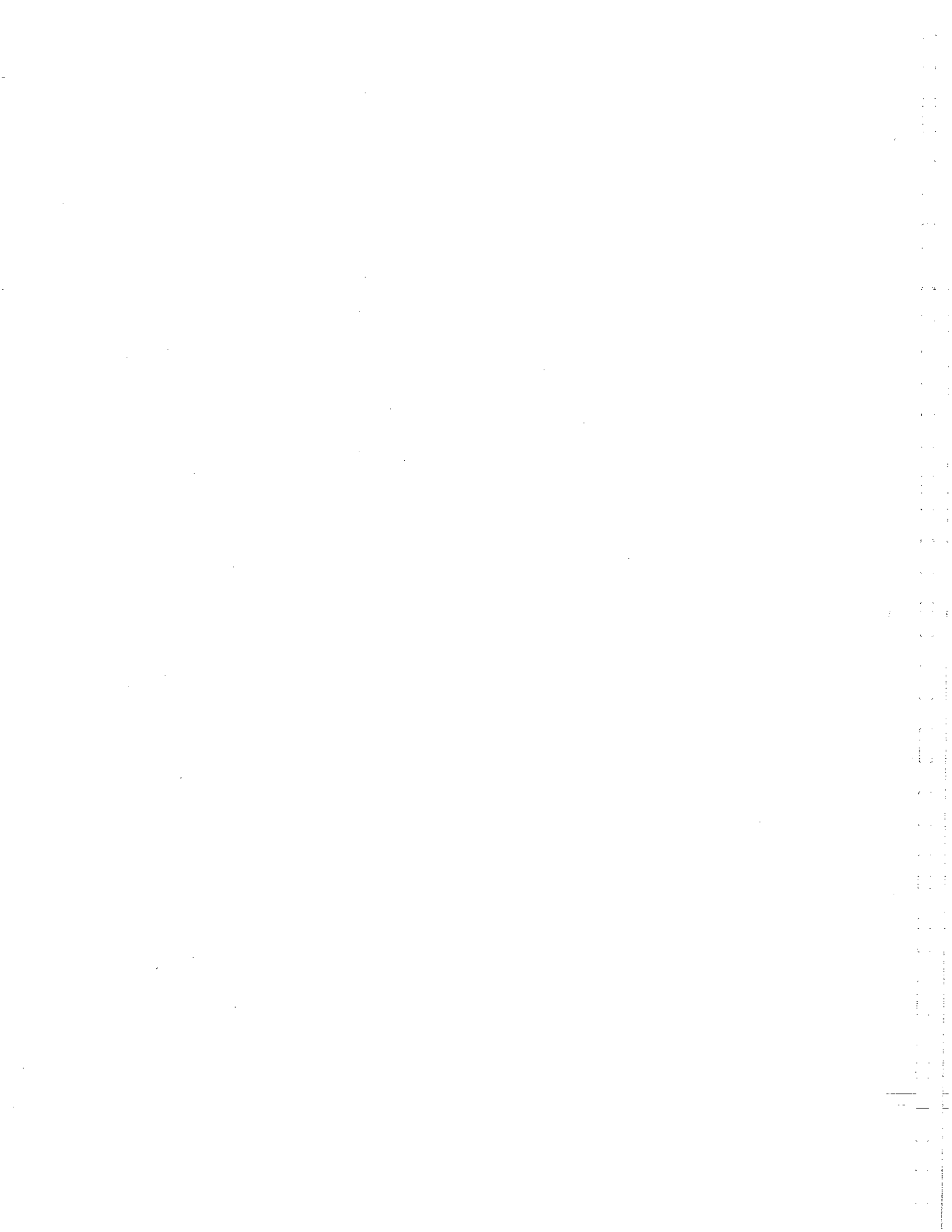
* Each county in the Region is considering implementing a user fee to be billed through the electrical company or on the tax card. The fee would be for convenience center users. Residents who utilize private haulers would be able to have the fee waived upon proof of their private collection service.

8. Provide the following data for fiscal 1993.

Table I-14

County	Total Assessed Property Value	Total Property Tax Revenue	Total Sales Subject To Tax	Total Local Sales Tax	# Registered Vehicles	Total Wheel Tax Revenue
Stewart	68,072,149	66,331,479	27,995,333	629,895	11,398	0
Montgomery	773,950,282	9,053,572	657,926,440	16,448,161	107,836	1,945,017
Robertson	346,917,551	10,747,147	200,711,244	4,516,003	38,787	1,201,068
Region Total	1,188,939,982	86,132,198	886,633,017	21,594,059	158,021	3,146,085

Information from County Trustees Office for Fiscal Year 1992



CHAPTER II

ANALYSIS OF THE CURRENT SOLID WASTE MANAGEMENT SYSTEM FOR THE REGION

A. Waste Stream Characterization

The Needs Assessments were reviewed and the information regarding the waste stream characterization was evaluated. As part of the planning process, the waste going to the disposal facilities was scrutinized for particular variations from the national average. The results of the onsite waste evaluation are included at the end of this chapter.

B. Waste Collection and Transportation

Stewart County-- The vast majority of the citizens and businesses in Stewart County, utilize the green box system in the county which is comprised of 24 sites with a total of 79 containers. Most of the containers are 6 cubic yards in volume. The City of Dover contracts with Queen City Waste Management for collection services and both Waste Management and Browning Ferris Industries have a small number of direct clients in the county. Stewart County has started preliminary construction on their first convenience center in their plans to move away from green boxes and into compliance with the solid waste regulations.

Montgomery County-- The government sponsored system for collection in Montgomery County is a system of 8 manned convenience centers. There is a large number of private haulers (18) serving the county, the largest of which is Queen City Waste Management who services 14,300 households and 1,002 businesses. Private haulers collect more of the waste than the county system.

Robertson County-- The county operates six manned convenience centers. In addition to this, the towns of Springfield, White House, and Greenbriar provide curbside service to approximately 6,687 households and 399 businesses. Six private waste haulers operate in the county. The largest of these is Waste Control who services 500 households and 100 businesses. BFI also has a strong presence in the County in the commercial sector.

C. Source Reduction and Recycling Systems:

Stewart County-- No public or private recycling programs operate at this time. However, Bi-County staff has worked with local industries in both counties in reducing or recycling their waste. The convenience center program will include recycling bins at each location.

Montgomery County-- Montgomery County operates recyclable drop-off centers at each of its 8 manned convenience centers. The horizontal baler at the balefill processes and bales

the recyclables for market. Also BiCounty recently implemented a can separator and is using a staff person to remove freon. In addition to the county system, there are four buy-back centers and one drop-off center run as joint ventures (BiCounty and Kroger) in the county.

Robertson County-- Robertson County operates a Lundell Waste Recovery System which separates out recyclables from the waste stream by mechanical and manual means. In addition, Robertson County has recently begun drop-off centers for source separated recyclables. In addition to the public program, one buy-back center and two drop-off centers (Krogers and Walmart) are privately operated in the county. Four additional private drop offs are planned for the future.

D. Waste Processing, Composting, and Waste-to-Energy Systems

Stewart County-- There are presently no waste processing, composting, or waste-to-energy systems in Stewart County. Stewart County as part of Bi-County operates at the solid waste management facility in Montgomery County, described below.

Montgomery County-- Montgomery County operates a Harris horizontal Baler (HRB-SWC-1045-BD) for processing solid waste at the balefill. The baler shares duty as a recyclable baler during off hours. The current operation has a capacity of about 250 tons per day, which could be increased with a second shift added.

Robertson County-- Robertson County presently has a materials recovery facility (MRF) located at Robertson County's landfill site in the southern half of the county, south of the City of Springfield, just off of U.S. Route 431. This facility processes a portion of the county's waste stream for removal of recyclable materials. Once the recyclables have been removed, the remainder of the waste is pelletized to be used as an alternate or supplemental fuel. The heart of the facility consists of a Lundell conveyor/separation system. This system combines manual and automated separation of recyclables from the waste stream. The system is nominally rated to process between 8 and 10 tons of MSW per hour.

Residential waste is dumped from the truck onto a small tipping floor area at one end of the facility. At this point cardboard and any paper which is reclaimable is pulled from the waste stream to be baled and sent to market. The remaining waste is fed into a small hopper by a Bobcat loader. This hopper feeds the MSW onto the main conveyor. At this point, the MSW passes under a "leveling" device. It consists of a large drum mounted horizontally at a given height off of the main conveyor belt. The purpose of this device is to level the large mounds of MSW which are difficult to sort through on the conveyor. The MSW then passes by manual picking stations. The system is designed to accommodate 11 pickers to sort through the MSW. Presently only five (5) stations are utilized. The stations are designed for the removal of glass (by color), plastics, aluminum, ferrous materials and

large bulky (cardboard) and/or hazardous materials (batteries), etc. Presently, two of the five pickers are removing plastic garbage bags, batteries, coat hangers, etc.; any hazardous, large or unusual items which might tend to jam or clog the system. The remaining three pickers are removing glass by color, aluminum and PET/HDPE plastics. After passing by the manual picking stations, the remaining MSW enters the Lundell automatic system.

The automatic separation system consists of a series of enclosed separation devices which remove ferrous items, dirt, grit, etc. (light fraction) and rocks, stones, nonferrous metals, etc. (heavy fractions). Any plastics, aluminum or ferrous items which were missed by the manual pickers are also removed at this point to be "re-processed". The remaining portion of the waste stream (which mainly consists of paper products at this point) are then carried by a blower system through a drying stage. The purpose of this stage is to remove as much moisture from the remaining MSW as possible. Cyclone separators are used at this point to separate the lighter weight portion of the waste from the heavier portion. The lighter portion then proceeds to a pelletizing machine. This machine takes the remaining MSW and compresses it into "pellets". The pellets are then marketed as fuel to replace costlier coal or wood fuels used in solid fuel-fired boilers. These pellets are approximately 3/4" in diameter by 3" to 4" long. These pellets are also used as fuel to fire the dryer of the pelletizing process.

The items which are removed from the main conveyor pass through chutes which deposit them onto smaller conveyors below the main conveyor. These smaller conveyors are laid out at right angles to the main conveyor and carry the products to additional processing equipment (such as can crushers) or to storage bins. From this point the products are readied to be shipped to market. Plastics are baled to be readied for shipment. The colored glass is crushed by a front end loader and deposited in gaylord boxes for shipment. The aluminum cans are crushed and blown into the back of a 40' trailer, while the bi-metal cans are crushed and put into containers for shipment. The pellets are stored in piles until purchased to be used as fuel in area boilers/furnaces. If a market is not available, the pellets are landfilled.

Presently the Robertson County MRF employs a total of 13 people; a plant manager, an assistant plant manager, five (5) conveyor pickers, a ferrous picker, a bobcat operator, a loader operator, a forklift operator, a maintenance mechanic and a floater (miscellaneous jobs). At this time a single shift operates on a 4 day/week, 10 hours/day schedule. With this staff level the facility is capable of processing approximately 1.9 tons per hour.

Markets - the facility has been successful in obtaining markets for the recyclables which are separated from the waste stream. Recently, a surge of requests from markets wanting to purchase the recyclables has been experienced. A year round market for the sale of fuel pellets does not presently exist. A portion of the pellets are sold to an area greenhouse during the winter months. This facility burns the pellets for heating purposes. Also, as mentioned earlier, a portion of the pellets are burned at the facility for the drying system.

(The facility has an operating permit for the incineration of up to 3 tons per day of the pellets.) There is an area industry which has contacted the MRF which will take all of the pellets produced by the facility, however, they will not pay for them. This arrangement, if acted upon, could save valuable landfill space.

E. Disposal Facilities

Stewart County-- Stewart County is a joint member with Montgomery County in the Bi-County Solid Waste Authority and shares utilization of the Authority balefill, permit #SNL 63-102-0108. The facility is described below.

Montgomery County-- The Bi-County landfill is located in Montgomery County and operated by the Bi-County Solid Waste Authority, of which Montgomery County is a member. Municipal waste from Stewart and Montgomery Counties go to the balefill. The permitted footprint of the site has a 2 acre demolition area for disposal of suitable waste. The operation also includes a pit burner for demolition debris of approved combustible characteristics. The site is located in Montgomery County on Highway 79 in the Town of Woodlawn about nine miles west of Clarksville. The balefill is adjacent to the existing county landfill and the Fort Campbell Military Reservation. The 82 acre site has 53 acres permitted for the placement of sanitary refuse bales with the remaining 29 acres available for borrow materials.

The landfill is permitted as a balefill. A Harris HRB horizontal baler onsite processes approximately 250 tons per day six days a week. At this time the baler is operating close to capacity, although a second shift could increase the operating capacity. In the event the baler cannot function, refuse is taken directly to the balefill site where the waste is landfilled by conventional methods until the baler is operational.

The balefill operates in a clay lined cell (11-12 acres) in compliance with current regulations at this time. Bi-County is in the process of modifying the design to meet Subtitle "D" requirements which include a composite liner and cap system. The design modification will likely include an increase in the site capacity. These design modifications are evaluating a vertical expansion as well as considering the current cut depths.

Robertson County-- Robertson County presently owns and operates a Class I sanitary landfill, permit # SNL 74-102-0016. The site is about 1.4 miles south of Springfield just off Highway 431 on County Farm Road. Solid waste can be directed at the landfill operator's discretion to the Lundell solid waste processing facility on site or directly to the working face of the landfill.

The existing disposal cell has no containment system. The County has a permitted horizontal expansion which is on adjacent property (27.8 acres). The horizontal expansion was designed in accordance with Subtitle "D" regulations, with appropriate liner and leachate

collection.

F,G. Costs and Revenues of the Current System

Bi-County Solid Waste Authority-- The Bi-County balefill cost approximately \$850,000 to construct and was operated in 1991 for \$1,600,000. The 1993/4 budget is for \$1,649,781. The Authority charges a variable tipping fee per ton as follows:

municipal solid waste	\$30.00/ton prepaid, \$34.00/ton at the gate
construction materials	\$10.50/ton
wood products	\$30.00/ton
asbestos (TVA)	\$26.00/yd ³
infectious waste	\$13.00/yd ³
volume discount	\$1.00/1000 tons
source separated loads of cardboard tip for free	

Note, private haulers are charged on a prepay basis for use of the balefill. Residential and municipal users do not pay for disposal services. Not all of the County's waste is charged a tipping fee. The operator estimates that 70% of the current waste is charged a tipping fee. This results in an income of about \$1.65 million per year from tipping fees. Once Fort Campbell begins to haul their waste to this facility the percentage of waste which is charged a tipping fee will increase to about 80%.

A cost analysis was conducted based on the available information on the BiCounty Landfill. The results of this analysis are included in the calculations addendum, titled "BiCounty Costs for the Current Disposal Facility". All of the cost comparisons were run with assumptions regarding certain rates: 3% inflation; 7% amortization interest rate; 5% sinking fund interest rate; for BiCounty 1.78% growth rate. The costs analysis indicated the current costs of the facility for 1993/4 are:

operation and maintenance*:	\$ 755,420
phased construction costs:	\$ 543,356
closure/post closure care fund:	\$ 347,884
TOTAL:	\$1,646,660

*O&M costs include personnel with benefits, equipment with replacement, and daily operations and maintenance (fuel, utilities, maintenance, supplies, leachate treatment, groundwater monitoring, professional services, insurance, professional development, state maintenance fee, state surcharge tax and 10% contingencies).

The tipping fee needed to cover the costs associated with the landfill are provided in the cost analysis for the life of the facility. For 1993/4 the cost should be \$21.34/ton if each ton of waste received was charged the tipping fee. This is based on the current waste flow with a 1.78% growth rate. The 1993 waste flow was 212 tons/day for a 7 day daily average. This would be 248 tons per operational day for a six day week. These costs do not include

transportation, collection, waste reduction, convenience centers or other costs for the waste management program for Bi-County.

Robertson County-- The construction cost of the present facility is unknown, but it was operated in 1991 for \$400,000. The County charges a variable tipping fee per ton as follows:

municipal solid waste	\$36.00/ton
construction materials	\$28.50/ton
private individuals	\$21.00/ton
compostable material	\$16.00/ton
special (Drossmet, Inc.)	\$15.00/ton
special (industrial waste)	\$100/ton

Cities and residents who utilize the convenience centers do not pay a disposal fee. The operator estimates about 70% of the waste received is charged a tipping fee. This results in an income of about \$.78 million per year from tipping fees. Residents in Sumner County pay for collection services, except for the Town of White House. The Town pays a fee for 40% of its waste stream which represents Sumner County.

A cost analysis was conducted based on the available information on the Robertson County Landfill. The results of this analysis are included in the calculations addendum, titled "Robertson County Costs for the Current Disposal Facility". All of the cost comparisons were run with assumptions regarding certain rates: 3% inflation; 7% amortization interest rate; 5% sinking fund interest rate; for Robertson County 1.21% growth rate. The costs analysis indicated the current costs of the facility for 1993 are:

operation and maintenance*:	\$ 545,957
phased construction costs:	\$ 82,328
closure/post closure care fund:	\$ 496,413
TOTAL:	\$1,124,698

*O&M costs include personnel with benefits, equipment with replacement, and daily operations and maintenance (fuel, utilities, maintenance, supplies, leachate treatment, groundwater monitoring, professional services, insurance, professional development, state maintenance fee, state surcharge tax and 10% contingencies).

The tipping fee needed to cover the costs associated with the Robertson County landfill are provided in the cost analysis for the life of the facility. For 1993/4 the cost should be \$35.38/ton for the entire waste stream. This is based on the current waste flow with a 1.21% growth rate. The 1993/4 waste flow was 87 tons/day for a 7 day daily average. This would be 102 tons per operational day for a six day week. These costs do not include transportation, collection, waste reduction, convenience centers, waste processing facility or other costs for the waste management program for Robertson County.

H. Public Information and Education Programs

Bi-County-- Mr. Pete Reed of the Bi-County Solid Waste Authority along with the new

recycling market coordinator, Mr. Ted Jackson, work with educational programs. Their programs include school and club interaction, as well as working with local businesses developing in recycling programs.

Montgomery County has a coordinator on the Environmental Advisory Committee, Mr Larry Carpenter. In coordination with Kroger, the County has developed a pamphlet entitled "Precycle and Recycle with Montgomery County and Kroger." There is a major newspaper and four radio stations in Montgomery County all open to airing or printing public service announcements concerning recycling. The Montgomery County School system has an environmental curriculum which includes recycling in grades K-8. There are four private schools in the county, none of which has implemented any form of recycling education.

Robertson County-- Robertson County presently employs a full-time recycling coordinator at the materials recovery facility, Buford Summers, the plant manager. Tours are conducted through the facility and a flyer was prepared giving an overview of it. A pilot "blue bag" program was implemented in certain areas of Springfield about two years ago. Mailings were sent out to the residents in a portion of Springfield. Unfortunately, the "blue bag" program met with very limited success and lasted only 2 to 3 months. There is one major newspaper and two radio stations within the county all open to airing or printing public service announcements. There are presently no recycling education curriculums in county schools.

The University of Tennessee Center for Industrial Services has worked with some industries to reduce their solid waste and increase their diversion.

K. Strengths and Weaknesses

Strengths of the existing program include:

- Convenience centers in place in Montgomery and Robertson Counties - well received by the population including positive statements regarding paying for the service; Stewart County has begun the process to implement convenience centers.
- Recycling participation is increasing, specific goals are set by Bi-County regarding the volumes of recycled material; 2 years ago only 20 to 30 tons per month were recycled at the convenience centers; the current goal is 200 tons per month.
- The transfer station in Montgomery County is popular.

- Bi-County already organized as a cooperative effort and has a long operating history.
- An educational program currently ready for schools to implement through the efforts of Bi-County.
- Existing efforts through Bi-County and Robertson County staff to reduce waste to the landfill; specific staff responsible for recycling programs.
- Some local merchants willing to assist in recycling/waste reduction efforts (Krogers, Walmart, industries working with UT CIS, etc.).
- Strong waste reduction efforts by industries particularly in Montgomery County including a noticeable drop in the amount of pallets, cardboard, packing material, material containers, etc. all due to in house recycling and waste reduction efforts.
- Robertson County has a solid waste consultant under contract to assist in their program.
- Robertson County has an existing materials recovery program operating at this time.
- Both disposal facilities have substantial capacity remaining, particularly if planned expansions considered.

Weaknesses of the existing system:

- Robertson County's Lundell system is not operating near capacity due to lack of staff and maintenance problems, some concern over contamination of materials.
- Existing disposal facilities do not yet comply with Subtitle "D" standards and need to be ungraded prior to October 1996.
- Heavy reliance on private collection service makes it difficult to implement different recycling options.
- Funding sources for future programs a concern.
- Existing Bi-County agreement extends to June 1994; current participants have option to pull out at that time
- Robertson County landfill and materials recovery facility are separate entities.

CHAPTER II: FORMS

A. 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
Stewart	6,500	9578	0.679
Montgomery	70,000	102,375	0.684
Robertson	31,600	42,001	0.752
Regional Total	108,100	153,954	0.702

Fort Campbell generates approximately 20,000 tons per year of waste; they have their own landfill on site which takes part (estimated 25%) of the waste generated. This would increase the per capita waste disposed to .73 for Montgomery County.

2. Origin of Regional Solid Waste in 1991

Table II-2

County	Residential	Institutional/ Commercial	Non-Hazardous Industrial	Special	Other
Stewart	6045	227	227	----	----
Montgomery	32,900	31,500	5600	----	----
Robertson	13,904	11,376	----	5372*	948**
Regional Total	52,849	43,103	5827	5372	948

* Industrial, non-hazardous waste

** Construction/Demolition

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

Table II-3

County/Facility	Yard Waste		Sewage Sludge		Construction Demolition		Tires		White Goods	
	Y/N	Qty	Y/N	Qty	Y/N	Qty	Y/N	Qty	Y/N	Qty
Stewart	Y	2	N	---	Y	450	Y	6	Y	14
Montgomery	Y	27	N	---	Y	2242	Y	270	Y	142
Robertson	N	---	N	---	Y	948	N	---	Y	150
SMR Total		29		---		3640		276		306

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

4. Description of the Waste Stream By Materials

Rather than rely upon the published national averages for a waste composition percentages, a waste characterization study was undertaken for the region. The study involved the actual categorization of waste at the two existing disposal facilities, the Bi-County balefill (receiving waste from Montgomery and Stewart Counties) and the Robertson County materials recovery facility and landfill. Waste was logged and categorized as it was delivered to the facilities during a total of four weeks time (two weeks per facility), spread over two seasons, the spring and fall.

The actual methodology used in the characterization study involved the identification of the origin of the waste, the weight and volume quantity of the waste and the classification of the waste into the respective categories. Samples of waste from selective trucks were taken and categorized and weighed. All of this information was then compiled and put into a percentage format. Once this was accomplished, adjustments were made in order to account for known discrepancies (such as yard waste at Bi-County which is disposed of at the pit burner) and then the information was weighted in order to arrive at regional results; the results of the Bi-County information representing 71% of the total regional waste and Robertson County representing the remaining 29% of the waste. These results are included in Table II-4.

The information from the study conducted in the spring at the Robertson County facilities was judged to be skewed and was not used. This was due to the fact that the week in which the study took place was Robertson County's "Spring Cleaning" week. During this week, all tip fees were waived and the county ran additional routes in order to pick-up large, bulky items.

The information from the fall study conducted at the Bi-County facility was used as a verification of the spring information.

STEWART, MONTGOMERY AND ROBERTSON COUNTIES

MSW Characterization Analysis Comparison

Material	National Average	Fall Robertson Raw Data	Bi-County Raw Data	SMR Weighted Average
Paper	40.0	28.3	37.1	34.5
Glass	7.0	11.1	7.3	8.4
*Ferrous Metals	6.5	8.9	5.2	6.3
Aluminum	1.4	1.7	0.7	1.0
Non-Ferrous Metals	0.6	1.5	2.2	2.0
Plastics	8.0	10.5	6.3	7.5
Rubber & Leather	2.5	4.6	3.9	4.1
Textiles	2.1	2.7	3.6	3.3
Wood	3.7	11.4	5.0	6.9
Food Waste	7.4	6.8	7.5	7.3
Yard Waste*	17.6	2.7	4.6	14.7
Misc. Inorganic Waste	1.5	6.9	8.1	1.2
Other	1.7	2.8	8.4	2.8
TOTAL MSW	100.0%	100.0%	100.0%	100.0%

* The yard waste is affected by seasonal fluctuations

Table II-4

Waste Category	National	Calculated %*, weighted & adjusted Regional results
Paper & paperboard	40.0	34.5
Glass	7.0	8.4
Ferrous Metals	6.5	6.3
Aluminum	1.4	1.0
Other Non-Ferrous Metals	0.6	2.0
Plastics	8.0	7.5
Rubber & Leather	2.5	4.1
Textiles	2.1	3.3
Wood	3.6	6.9
Food Waste	7.4	7.3
Yard Waste	17.6	14.7
Misc. Inorganic Waste	1.5	1.2
Other	1.7	2.8
TOTAL MUNICIPAL SOLID WASTE	100.0%	100.0%

*the national average is adjusted based on field observations of the waste disposed in the region's disposal facilities

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
Stewart	10,488	6500	3988	38%
Montgomery	109,500	70,000	39,500	36%
Robertson	45,990	31,600	14,390	31%
Regional Total	165,978	108,100	57,878	35%

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

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
none			N/A		

Planned:

County	Facility Location	Tons of Waste Processed/Yr	Composted Materials		
			Yard Waste	Sewage Sludge	Solid Waste
none			N/A		

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

Table II-7

Operating Facilities:

County	Facility Location	Design Capacity tons/year	Current Use tons/year	Anticipated Operating Life of Facility
BiCounty	BiCounty Landfill	Pit Burner	unknown	unknown
BiCounty	BiCounty Landfill	Crematorium	unknown	unknown

Planned Facilities:

County	Facility Location	Design Capacity tons/year	Current Use tons/year	Anticipated Operating Life of Facility
none			NA	

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)
Montgomery	Bi-County	Woodlawn	10 8 ¹ Total 18	250	900,000 800,000 ¹
Robertson	County	County Farm Road	3 12 ² Total 15	100	175,000 600,000 ²
Regional Total	2		13 20 ^{1,2} Total 33	350	1,075,000 1,600,000

¹ Vertical expansion under consideration by Bi-County

² Horizontal extension already permitted, yet to be constructed

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
Robertson	County	100	31,822	Fall 1996
Regional Total		100	31,822	

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

Table II-10

County	Proposed Expan.New	Location	When Will Capacity Be Ready	Proposed acres sought	Design Disposal Rate	Potential Expansion?
Robertson	Expansion	Landfill	Fall 1996	18	100	Yes
Bi-County	Vertical Expansion	Woodlawn	Summer 1994	15-20	250	Yes
Bi-County	Horizontal expansion	Under construc.	unknown	33-38	250	Yes
Regional				35	350	Yes

11. Total existing and planned capacity in the Region at the close of the next ten years.

TABLE II-11A

BI-COUNTY LANDFILL

YEAR	EXISTING TONS	PLANNED TONS	TOTAL TONS
FY 1993	897,679	0	897,679
FY 1994	818,827	800,000 ¹	1,618,827
FY 1995	738,569	800,000	1,538,569
FY 1996	656,882	800,000	1,456,882
FY 1997	573,739	800,000	1,373,739
FY 1998	489,114	800,000	1,289,114
FY 1999	402,980	800,000	1,202,980
FY 2000	315,325	800,000	1,115,325
FY 2001	226,247	800,000	1,026,247
FY 2002	135,596	800,000	935,596
FY 2003	43,343	800,000	843,000
FY 2004	0	749,105	749,105
FY 2005	0	653,105	653,539
FY 2006	0	556,272	556,272
FY 2007	0	457,274	457,274
FY 2008	0	356,514	356,514
FY 2009	0	253,960	253,960
FY 2010	0	147,723	147,723
FY 2011	0	41,486	41,486

¹ A vertical expansion is planned. It is expected that 3 to 4 additional lifts will be added over 2/3 of the permitted footprint which will have the composite liner permitted in 1994.

TABLE II-11B

ROBERTSON COUNTY LANDFILL

YEAR	EXISTING TONS	PLANNED TONS	TOTAL TONS
FY 1993	175,000	0	175,000
FY 1994	142,793	0	142,793
FY 1995	110,197	0	110,197
FY 1996	77,207	400,000 ²	477,207
FY 1997	0 (43,818) ³	366,611	366,611
FY 1998	0 (10,024)	332,817	332,817
FY 1999	0	298,615	298,615
FY 2000	0	264,004	264,004
FY 2001	0	229,056	429,056
FY 2002	0	193,689	193,689
FY 2003	0	157,897	157,897
FY 2004	0	121,672	121,672
FY 2005	0	85,009	85,009
FY 2006	0	47,902	47,902
FY 2007	0	10,346	10,346
FY 2008	0	-27,664	-27,664
FY 2009	0	-66,134	-66,134
FY 2010	0	-105,070	-105,070
FY 2011	0	-144,477	-144,477

² Permitted horizontal expansion proposed to be constructed once the existing fill area is no longer available

³ The existing landfill area can not continue operation past October 1996, so this capacity would be lost

TABLE II-11C

REGIONAL LANDFILL CAPACITY

YEAR	EXISTING TONS	PLANNED TONS	TOTAL TONS
FY 1993	1,072,679	0	1,072,679
FY 1994	961,620	800,000	1,761,620
FY 1995	848,766	800,000	1,648,766
FY 1996	734,089	1,200,000	1,934,089
FY 1997	573,739	1,166,611	1,740,350
FY 1998	489,114	1,132,817	1,621,931
FY 1999	402,980	1,098,615	1,501,595
FY 2000	315,325	1,064,004	1,379,329
FY 2001	226,247	1,029,056	1,255,303
FY 2002	135,596	993,689	1,129,285
FY 2003	43,343	957,897	1,001,240
FY 2004	0	870,777	870,777
FY 2005	0	738,114	738,114
FY 2006	0	604,174	604,174
FY 2007	0	467,620	467,620
FY 2008	0	328,850	328,850
FY 2009	0	287,826	187,826
FY 2010	0	42,653	42,653
FY 2011	0	-102,991	-102,991

*43,818 Tons lost air space with subtitle "D" implementation

CHAPTER III GROWTH TRENDS, WASTE PROJECTIONS AND PRELIMINARY SYSTEM STRUCTURE

A. County Profile Projections

Table III-1 summarizes calculations of annual per capita solid waste generation rates for each county in the Region. The County Profile in the District Needs Assessment was reviewed for each county in the region and the projections were extended for two additional years. This information is presented in Table III-2.

B. Reaggregated Data

The information from each county was reaggregated in Tables at the end of this chapter to show the regional information.

C. Preliminary System Design

The preliminary system design for the region consists of evaluating different options:

WASTE REDUCTION:

- drop off facilities, convenience centers
- materials recovery facility (increasing the effectiveness of the existing Lundell System)
- full scale municipal solid waste composting facility

COLLECTION AND TRANSPORTATION:

- existing system with convenience centers added in Stewart County
- existing system with convenience centers added in Stewart and a transfer station in Robertson County

DISPOSAL:

- existing system, BiCounty balefill and Robertson County landfill
- BiCounty handle region's municipal solid waste; Robertson County maintain and upgrade Lundell system for municipal waste with a baler to ship waste to

BiCounty; and Robertson County operate a Class III/IV landfill

- existing system with some out of county waste going to Robertson County landfill
- regional landfill for Stewart, Montgomery and Robertson Counties
- waste to energy facility at Fort Campbell
- BiCounty balefill accept Fort Campbell's municipal solid waste

PUBLIC INFORMATION AND EDUCATION:

- existing program, BiCounty and Robertson County acting independently
- regional approach with Stewart, Montgomery and Robertson Counties working together

PROBLEM WASTE:

- existing program, BiCounty and Robertson County acting independently
- regional approach with Stewart, Montgomery and Robertson Counties working together

D. Evaluation Criteria for the Region

The evaluation process will compare options which meet the minimum requirements of the solid waste management act, the goals of the region and provide economical management of the region's solid waste. The waste to energy option will be evaluated looking at potential steam customers and cost comparison to the most economical landfill options. The region's goals regarding public education, problem waste, recycling and reduction efforts will be used in addition to technical requirements to meet or exceed the 25% reduction goal and the minimum management of problem wastes.

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	Projected Total Waste Disposed in FY 1993**	Projected Population 1993	Annual Per Capita Generation Tons/Persons/Year
Bi-County Authority	75,070	115,974	0.6473
Robertson	30,835	43,023	0.7167
Total Region	105,905	158,997	0.6661

* Aggregate from Items 2, 3 and 4 in Chapter IV.A of the District Needs Assessment County Profiles

** Waste disposal projected from 1992 scales data. Scales data for Bi-County taken from time period before Waste Management, Inc. began hauling waste from county.

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)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Bi-County Authority	76,407	77,769	79,154	80,565	82,001	83,463	84,937	86,316	87,840	89,392
Robertson	31,208	31,585	31,967	32,354	32,746	33,141	33,538	33,864	34,270	34,682
Total Region	107,615	109,354	111,121	112,919	114,747	116,604	118,475	120,180	122,110	124,074

* Aggregate from Tables IV-1 in District Needs Assessment County Profiles, as extended. Adjusted as per 1992 scales data from both facilities.

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**

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Bi-County Authority	78,852	80,258	81,687	83,143	84,625	86,134	87,655	89,078	90,651	92,253
Robertson	32,207	32,596	32,990	33,389	33,794	34,202	34,611	34,948	35,367	35,792
Total Region	111,059	112,854	114,677	116,532	118,419	120,336	122,266	124,026	126,018	128,045

* Aggregate from Table IV-3 in District Needs Assessment County Profiles, as extended. Adjusted as per 1992 scales data from both facilities.

CHAPTER IV WASTE REDUCTION

A. Establish a Base Year Quantity

1.& 2. 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.

**Table IV-1a
1990 UT Study Synopsis**

County	1989 Population	1989 Total Waste Disposed (Tons)
Bi-County ¹	108,900	119,540
Robertson	43,850	29,858
Region Total	152,750	149,398

¹ Due to the combination of Montgomery and Stewart Counties into the Bi-County Solid Waste Authority. The numbers are easier to compare if these two counties are combined.

3. Regional Per Capita Waste Disposal Rate

**Table IV-1b
Calculation of Per Capita from UT Study**

County	1989 Population	1989 Total Waste Disposed (Tons)	Per Capita Waste Disposal
Bi-County	108,900	119,540	1.10
Robertson	43,850	29,858	0.68
Region Total	152,750	149,398	0.98

4. Adjustment to Base Year Data. None Requested

5. Alternate Base Year

No alternate base year is being requested for Montgomery and Stewart Counties. However, the Robertson County data from the 1990 UT Study listed above was considered to be grossly in error and therefore 1992 was requested as an alternate base year. Scale data is available from that year and a listing of the monthly waste disposal values is listed below:

**Table IV-2
1992 Alternate Base Year Waste Generation Data
for Robertson County**

Month	Waste Generation (Tons)
January	2,300.6
February	2,323.4
March	2,911.3
April	2,856.8
May	2,742.0
June	2,417.8
July	2,444.2
August	2,661.8
September	2,491.3
October	2,425.8
November	2,344.9
December	2,672.9
Total	30,592.8

**Table IV-3
Revised Per Capita Waste Generation for Robertson County**

County	1992 Population	1992 Total Waste Disposed (Tons)	Per Capita Waste Disposal
Robertson	42,509 ¹	30,592.8	0.720

¹ From Needs Assessment Table I-13

B. Target Waste Reduction Goals

1. Waste Reduction Goals

The following represents the waste generation in tons per capita per year which is required to meet the waste reduction goal (1989 waste generation per capita * 0.75 * Population = Yearly Waste Generation Goal).

**Table IV-4a
1995 Waste Generation Goals**

County (1)	Per Capita Generation (2)	Waste Generation Goal (%) (2) * 0.75 (3)	Estimated 1995 Population ¹ (4)	Waste Generation Goal (Tons) (3) * (4) (5)
Bi-County	1.100	0.825	120,142	99,117
Robertson	0.720	0.540	44,070	23,798
Total	0.7485	164,212	122,915	

¹From Chapter I, Table I-6

**Table IV-4b
1995 Waste Diversion Goals**

County	Total Waste Generation (Tons) ¹	Waste Generation Goal (Tons)	Waste Diversion Goal (Tons)
Bi-County	80,258	99,117	<18,859>
Robertson	32,596	23,798	8,798
Total	112,854	122,915	<10,061>

**Table IV-5
Composite Table of Annual Waste Generation Goals**

Year	Estimated Population ¹	Percent Waste Generation Goal	Tonnage Waste Generation Goal
1995	164,212	0.7485	122,915
1996	166,885	0.7485	124,913
1997	169,605	0.7485	126,949
1998	172,369	0.7485	129,018
1999	175,180	0.7485	131,122
2000	178,011	0.7485	133,241
2001	180,595	0.7485	135,175
2002	183,517	0.7485	137,362
2003	186,489	0.7485	139,587

¹ From Table I-6.

**Table IV-6
Annual Waste Diversion Goals**

Year	Estimated Waste Generation ¹	Waste Generation Goal ²	Waste Diversion Goal ³
1995	112,854	122,915	<10,061>
1996	114,677	124,913	<10,236>
1997	116,532	126,949	<10,417>
1998	118,419	129,018	<10,599>
1999	120,336	131,122	<10,786>
2000	122,266	133,241	<10,975>
2001	124,026	135,175	<11,149>
2002	126,018	137,362	<11,344>
2003	128,045	139,587	<11,542>

¹ From Table III-3.

² From Table IV-5

³ <Brackets> indicate diversion in excess of requirement.

C. Methodology for Meeting Reduction Goal

1. Goals and Objectives

Short Term Reduction Goals and Objectives: The short term goal of this study is to maintain the 25% reduction from the per capita waste generation rates as developed in the 1989 University of Tennessee Study "Solid Waste Planning for Tennessee" throughout the 10-year study period. Current efforts have achieved this goal. Reduction can be further increased with the implementation of Class III/IV landfills. The tipping fees for Class III/IV landfills are lower than the tipping fees for the Class I facilities, so there is an additional economic incentive to Class III/IV facilities.

In order to increase waste reduction further, the following capital installations can be constructed:

Class III/IV Demolition/Debris Landfills in Bi-County¹ and Robertson County.

¹ Bi-County Class III/IV Landfill already is in existence.

In order to support the waste reduction, the following collection systems will be in place by the target dates:

Drop-off Recycling Program at all Convenience Centers in the Region².

² Already in existence at several convenience centers throughout the region.

In order to encourage waste reduction, the following financial systems will be in place by the target dates:

Variable Rate System Allowing for Lower Tipping Fees for Yardwaste, Wood Debris, Cardboard, and Construction/Demolition Debris at the Class III/IV landfills

The goal of the above system is to divert as much as 17,000 tons in 1996. This diversion methodology exceeds definitions required to meet the 25% diversion goal for the three counties.

Long Term Reduction Goals and Objectives: It is estimated that, utilizing reasonable methodology and capital improvements, the region might continue to increase over the 25% minimum through source reduction.

Yard Waste Composting Facilities in Clarksville and Springfield
Maximize the Efficiency of the Robertson County MRF (see Chapters VI and VII)

These systems should be studied on an annual basis for viability. They should be considered as first alternates in the event that the 25% reduction requirement is increased by the state during the study period and/or pit burning is removed from the acceptable methods of meeting the reduction requirement.

Previous Waste Reduction Credit

No cause was found within the region to file for a previous waste reduction credit.

Quantities of Materials Diverted Per Year Based on Proposed Waste Reduction Efforts.

**Table IV-7
Estimated Diversion Per Year**

Year	Drop-Off Recycling ¹	Bi-County Class III/IV ²	Robertson Class III/IV ²	Total Est. Diversion
1995	1,268	13,845	1,630	16,743
1996	1,273	14,091	1,650	17,014
1997	1,278	14,342	1,669	17,289
1998	1,283	14,598	1,690	17,571
1999	1,288	14,858	1,710	17,856
2000	1,293	15,120	1,731	18,144
2001	1,298	15,366	1,747	18,411
2002	1,303	15,637	1,768	18,708
2003	1,309	15,914	1,790	19,013

¹ Diversion through the Robertson County MRF is not included here as the operation of that facility is at the discretion of Robertson County.

Regulatory Bans

The following items will be banned from acceptance at Class I landfills:

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)

*material currently banned

Economic Incentives and Disincentives

Variable rates are proposed such that the following items can be disposed of at the Class III/IV landfills at reduced rates:

Yard Waste

Wood Waste

Construction/Demolition Debris

Variable rates are proposed at the processing facilities to promote source separation of materials by industry on the following items:

Source Separated Cardboard

Source Separated Newsprint

Source Separated Scrap Metal

Source Separated White Goods

Source Separated Aluminum and Steel Cans

All other Source Separated Materials for which there is a market

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

Other Waste reduction Strategies

Source reduction and reuse methods are detailed in Chapter IX *Public Information and Education*.

Staffing Requirements Narrative

The Diversion/Education Manager will be the operations manager in charge of coordinating the paperwork associated with the recycling collection program. In addition, this person will coordinate future studies involved in adding facilities and programs to the system. A full-time administrative assistant will also be required with this position. Funding for these positions is provided for in Chapter VI.

Costs and Budgets Associated with Class III/IV Landfilling

This plan recommends the operation of two Class III/IV landfills within the region. One serving Bi-County and the other serving Robertson County. The Bi-County facility is existing and operation as a portion of the balefill disposal area. The BiCounty Balefill site has the potential for expansion into a new III/IV area. Robertson County presently has no permit for a Class III/IV facility but plans to apply for such a permit in the near future.

Bi-County Class III/IV:

From 11/29/93 to 12/4/93, Draper Aden Associates inspected the incoming loads into the Balefill, the Pit Burner, and the Construction Demolition Area of the Bi-County Sanitary Landfill. Bi-County presently has a variable rate schedule. From inspections of the incoming waste, the following table was constructed:

**Table IV-8
Description of Materials Disposed of at Bi-County Solid Waste Facility**

Disposal Method	Disposal Rate Charged (1993)	Description of Waste ¹
Pit Burn	\$30.00 per ton	Circuit Board Pallets, Oak Pallets, and Misc. Hardwood from Union Carbine. Misc. Brush, Leaves, Plywood, Dimensional Lumber, Tree Rounds, Pallets, Wooden Spools, Poles.
Construction/ Demolition Landfill	\$10.50 per ton	Doors, Lumber, Plywood, and Sheetrock from Sierra. Roofing Shingles from Mirabel. Misc. Roofing Shingles, Cinder Blocks, Wood Waste.
Class I	\$34.00 per ton (\$30.00 per ton pre-paid)	All waste not disposed of in the Pit Burner or the Construction/ Demolition Landfill

¹ Please note that this does not reflect all types of waste which are permitted to be accepted in these facilities.

Table IV-9
Bi-County Solid Waste Management
Listing of Tonnages Disposed of Through Various Methods
11/29/93 through 12/4/93

Date	Pit Burn	Construction/ Demolition	Class I	Total
11/29	10.20	26.83	395.97	433.00
11/30	5.19	19.40	278.25	302.84
12/1	4.49	5.88	141.31	151.68
12/2	9.64	5.28	131.36	146.28
12/3	30.21	19.28	150.57	200.06
12/4	6.30	0.00	238.99	245.29
Total	66.03	76.67	1,336.45	1,479.15
Percentages	4.46	5.19	90.35	100.00

In addition to the above information which was determined from the 2nd week of the Draper Aden waste stream characterization on the site, the Bi-County Solid Waste Authority provided a years worth of data with the following breakdowns:

**Table IV-10
Breakdown of Materials Handled by Bi-County Solid Waste Facility
1992-1993**

Month	Pit Burn	C/D Lf	Recycled	Class I	Total
11/92	187.97	1,175.71	56.76	5,412.56	6,833.00
12/92	83.76	605.64	97.84	3,845.38	4,632.62
1/93	86.33	530.67	102.87	3,053.35	3,773.22
2/93	70.39	300.26	89.43	3,050.30	3,510.38
3/93	177.72	1,072.21	144.84	4,594.79	5,989.56
4/93	217.52	371.06	140.14	5,325.64	6,054.36
5/93	212.82	863.49	110.88	5,295.81	6,483.00
6/93	265.33	974.73	103.06	4,579.04	5,922.16
7/93	231.58	5,161.56	105.20	4,445.10	9,943.44
8/93	54.90	1,168.99	118.60	5,456.97	6,799.46
9/93	199.82	846.81	143.88	5,127.93	6,318.44
10/93	193.07	667.89	182.56	4,535.92	5,579.44
Total	1,981.21	13,739.02	1,396.06	54,722.79	71,839.08
Percent	2.76	19.13	1.94	76.17	100.00

In the reviewing the above numbers, the peak month of the Construction/Demolition Landfill waste (7/93) is mathematically suspect. The mean value for that column is 1,144.92 with a standard deviation of 1,243.15. All of the numbers within the column fall within the range bounded by one standard deviation with the exception of the 7/93 value of 5,161.56. Therefore for planning purposes (Construction/Demolition Landfill only), the 7/93 value will be replaced with the mean value of 1,144.92 and thus yields the following table:

Table IV-11
Revised Table IV-10

Month	Pit Burn	C/D Landfill	Recycled	Class I	Total
11/92	187.97	1,175.71	56.76	5,412.56	6,833.00
12/92	83.76	605.64	97.84	3,845.38	4,632.62
1/93	86.33	530.67	102.87	3,053.35	3,773.22
2/93	70.39	300.26	89.43	3,050.30	3,510.38
3/93	177.72	1,072.21	144.84	4,594.79	5,989.56
4/93	217.52	371.06	140.14	5,325.64	6,054.36
5/93	212.82	863.49	110.88	5,295.81	6,483.00
6/93	265.33	974.73	103.06	4,579.04	5,922.16
7/93	231.58	1,144.92	105.20	4,445.10	5,926.80
8/93	54.90	1,168.99	118.60	5,456.97	6,799.46
9/93	199.82	846.81	143.88	5,127.93	6,318.44
10/93	193.07	667.89	182.56	4,535.92	5,579.44
Total	1,981.21	9,722.38	1,396.06	54,722.79	67,822.44
Percent	2.92	14.33	2.06	80.69	100.00

For the purposes of calculating available capacity of the existing Class III/IV area, it is assumed that all of the Class III/IV waste is disposed of in the demolition landfill area. This includes that waste which is presently being disposed of in the pit burner. The combined percentage of the two waste streams is $14.33 + 2.92 = 17.25$. The following table provides the annual estimates for Class III/IV waste:

**Table IV-12
Estimates for Bi-County Class III/IV Waste**

Year	Total Waste ¹	Percent Class III/ IV	Tonnage Class III/ IV
1995	80,258	17.25	13,845
1996	81,687	17.25	14,091
1997	83,143	17.25	14,342
1998	84,625	17.25	14,598
1999	86,134	17.25	14,858
2000	87,655	17.25	15,120
2001	89,078	17.25	15,366
2002	90,651	17.25	15,637
2003	92,253	17.25	15,914

¹ From Table III-3

In order to estimate the capacity needs, an estimate of 500 pounds per compacted cubic yard will be utilized for the Construction/Demolition Waste and 250 pounds per compacted cubic yard for the Pit Burner waste. This yields an average weight per cubic yard of 458 pounds. It is also assumed that six inches of cover soil will be placed over the waste every two weeks. It should be noted that the existing construction / demolition waste disposal area is estimated at between 10,000 and 20,000 cubic yards of airspace (See Chapter VIII-Page 1). If this estimation is correct, this facility will be full prior to 1995. It is not recommended that any further land area which is permissible as Class I be used for Class III/IV. After the existing Class III/IV area is full, it is recommended that a future facility be permitted and constructed outside of the Class I boundaries.

The following estimated cubic yardage needs for Class III/IV landfilling were calculated from the above estimates:

Table IV-13
Class III/IV Volume Needed for Bi-County

Year	Tonnage	Cubic Yards of Waste	Cubic Yards of Cover (Not Final Cover)	Total Cubic Yards Capacity Needed
1995	13,845	60,458.52	7,255.02	67,713.54
1996	14,091	61,532.75	7,383.93	68,916.68
1997	14,342	62,628.82	7,515.46	70,144.28
1998	14,598	63,746.72	7,649.61	71,396.33
1999	14,858	64,882.10	7,785.85	72,667.95
2000	15,120	66,026.20	7,923.14	73,949.34
2001	15,366	67,100.44	8,052.05	75,152.49
2002	15,637	68,283.84	8,194.06	76,477.90
2003	15,914	69,493.45	8,339.21	77,832.66
Total				654,251.17

Estimate Annual Costs For Facilities:

Bi-County

Table IV-14a
Capital Costs of Operating the Bi-County Demolition Landfill

Assume 1993 cost of heavy equipment at \$125,000

Assume Replacement Cost of Same Equipment in 1998 at \$160,000 (5% Inflation)

Item	Capital Cost	Annualized Cost
Land	200,000 ¹	25,901
Full-Time Equipment 1994-1998	25,000 ²	5,774
Full-Time Equipment 1999-2004	32,000 ²	7,391

¹ 30 Acres @ \$5,000 per acre + \$50,000 for engineering.

² Equipment and costs shared with balefill. Class III/IV landfill paying for 10% of two pieces of equipment.

Table IV-14b
Estimated Operations and Maintenance Costs (1993)

Item	Unit Cost	Quantity ¹	Total
Supervisor (Part-Time)	35,000	1	35,000
Operator/Attendant	25,000	2	50,000
Maintenance	20,000	2	40,000
Fuel	20,000	1	20,000
Groundwater Monitoring	7,000	1	7,000
Engineering	2,000	1	2,000
Total			154,000

¹ Costs shared with balefill

Table IV-14c
Estimated Annual Costs Bi-County Demolition Landfill
Assumed 5% Inflation

Year	Annualized Capital	O & M	Total
1995	31,675	169,785	201,460.00
1996	31,675	178,274.25	209,949.25
1997	31,675	187,187.96	218,862.96
1998	31,675	196,547.36	228,222.36
1999	33,292	206,374.73	239,666.73
2000	33,292	216,693.47	249,985.47
2001	33,292	227,528.14	260,820.14
2002	33,292	238,904.55	272,196.55
2003	33,292	250,849.78	284,141.78

Table IV-15
Bi-County Solid Waste Management
Estimated Cost Per Ton for Class III/IV Landfill

Year	Est. Annual Cost	Estimated Tonnage	Estimated Cost/Ton
1995	201,460	13,845	14.55
1996	209,949	14,091	14.90
1997	218,863	14,342	15.26
1998	228,222	14,598	15.63
1999	239,667	14,858	16.13
2000	249,985	15,120	16.53
2001	260,820	15,366	16.97
2002	272,197	15,637	17.41
2003	284,142	15,914	17.85

Since the tipping fee is less than the Class I landfill operation it is recommended BiCounty pursue a Class III/IV operation from an economical perspective as well as a waste reduction program.

Robertson County Class III/IV

In 1993, Draper Aden Associates performed a waste stream characterization for the Robertson County Sanitary Landfill which yielded the following results:

Table IV-16
Robertson County Waste Stream Characterization

Category	Percentage
Paper	28.3
Glass	11.1
Ferrous	8.9
Aluminum	1.7
Non-Ferrous	1.5
Plastics	10.5
Rubber	4.6
Textiles	2.7
Wood ¹	11.4
Food Waste	6.8
Yard Waste ¹	2.7
Misc. Inorganics ¹	6.9
Other	2.8

¹ Potential waste for Class III/IV Facility.

From *Waste Plan Default Data Report*, Tellus Institute, Inc., 1989. The wood waste portion of the waste stream can be broken down further into stumps and general woodwaste. Assuming that 50% of the general wood waste is treated in some way as to make it ineligible for demolition landfilling yields the following table:

Table IV-17
Percent of Waste Stream Eligible for Demolition Landfilling

Waste Subcategory	Total Wood Waste % of Total Waste Stream	% Subcat. of Wood Waste	% Subcat. of Total Waste Stream
Wood Waste Ineligible For Demolition Landfill	11.4	45.7	5.2
Wood Waste Eligible for Demolition Landfill	11.4	45.7	5.2
Stumps	11.4	8.6	1.0
Total Wood Waste Eligible for Demolition Landfill			6.2

It is assumed that about 50% of the miscellaneous inorganic waste is comprised of construction debris. The above table and this assumption yields the following estimates for the total amount of waste which is eligible for disposal in a Class III/IV landfill.

Table IV-18
Robertson County Solid Waste Management
Total Tonnage Eligible for Class III/IV Disposal

Category	Percent of Total Waste Stream Eligible for Class II/IV Disposal
Wood Waste	6.2
Yard Waste	2.7
Miscellaneous Inorganics	3.4
Total	12.3

From case studies of other voluntary participation programs (usually concerning recycling) a capture/participation rate of 40% is a fairly conservative assumption given variable tipping fee rates for these materials. This yields the following percentage diverted to a Class III/IV landfill:

Percentage Eligible Class III/IV Landfill Disposal	Capture/Participation Rate (%)	Total Percentage Diverted
12.3	40	5.0

Applying this percentage diverted figure to the Class I waste generated in 1991 (31,600 tons, given in Chapter II) gives a total tonnage of construction/demolition waste of 1,580 tons. As can be seen in Chapter II, this is somewhat in excess of the 948 tons reported for that year. Therefore estimates of total waste to be diverted into Class III/IV landfills can be projected as follows:

Table IV-19
Robertson County Solid Waste Management
Estimated Diversion into Class III/IV Facility

Year	Total Waste ¹	Percent Diverted to Class III/IV	Tonnage Diverted to Class III/IV
1995	32,596	5	1,630
1996	32,990	5	1,650
1997	33,389	5	1,669
1998	33,794	5	1,690
1999	34,202	5	1,710
2000	34,611	5	1,731
2001	34,948	5	1,747
2002	35,367	5	1,768
2003	35,792	5	1,790

The following estimated cubic yardage needs for Class III/IV landfilling were calculated from the above estimates:

Table IV-20
Class III/IV Volume Needed for Bi-County

Year	Tonnage	Cubic Yards of Waste	Cubic Yards of Cover (Not Final Cover)	Total Cubic Yards Capacity Needed
1995	1,630	7,117.90	854.15	7,972.05
1996	1,650	7,205.24	864.63	8,069.87
1997	1,669	7,288.21	874.59	8,162.80
1998	1,690	7,379.91	885.59	8,265.50
1999	1,710	7,467.25	896.07	8,363.32
2000	1,731	7,558.95	907.07	8,466.02
2001	1,747	7,628.82	915.46	8,544.28
2002	1,768	7,720.52	926.46	8,646.98
2003	1,790	7,816.59	937.99	8,754.58
Total				75,245.40

Estimate Annual Costs For Facilities:

Robertson County

Table IV-21

Capital Costs of Operating the Robertson County Demolition Landfill

Assume 1993 cost of heavy equipment at \$125,000

Assume Replacement Cost of Same Equipment in 1998 at \$160,000 (5% Inflation)

Item	Capital Cost	Annualized Cost
Land	0 ¹	0
Full-Time Equipment 1994-1998	25,000 ²	5,774
Full-Time Equipment 1999-2004	32,000 ²	7,391

¹ Facility located on land already owned by county.

² Equipment and costs shared with County Highway Department. Class III/IV landfill paying for 10% of two pieces of equipment.

Table IV-22

Estimated Operations and Maintenance Costs (1993)

Item	Unit Cost	Quantity ¹	Total
Supervisor (Part-Time)	35,000	0	0
Operator/ Attendant	25,000	1	25,000
Maintenance	20,000	.2	4,000
Fuel	20,000	.2	4,000
Groundwater Monitoring	7,000	1	7,000
Engineering	2,000	1	2,000
Total			42,000

¹ Costs shared with county highway department.

Table IV-23
Estimated Annual Costs Robertson County Demolition Landfill
Assumed 5% Inflation

Year	Annualized Capital	O & M	Total
1995	5,774	46,305	52,079.00
1996	5,774	48,620.25	54,394.25
1997	5,774	51,051.26	56,825.26
1998	5,774	53,603.82	59,377.82
1999	7,391	56,284.01	63,675.01
2000	7,391	59,098.21	66,489.21
2001	7,391	62,053.12	69,444.12
2002	7,391	65,155.78	72,546.78
2003	7,391	68,413.57	75,804.57

Table IV-24
Robertson County Solid Waste Management
Estimated Cost Per Ton for Class III/IV Landfill

Year	Estimated Annual Cost	Estimated Tonnage	Estimated Cost Per Ton
1995	52,079	1,630	31.95
1996	54,394	1,650	32.97
1997	56,825	1,669	34.05
1998	59,378	1,690	35.13
1999	63,675	1,710	37.24
2000	66,489	1,731	38.41
2001	69,444	1,747	39.75
2002	72,547	1,768	41.03
2003	75,805	1,790	42.35

Since this tipping fee is less than the Class I landfill operation it is recommended Robertson County pursue a Class III/IV operation from an economical perspective as well as a waste education program.

2. Quantitative Allocation of the 1995 Waste Reduction Target

A large percentage of the diversion performed in The SMR Region is due to industrial source reduction. The following is an estimate of the diversion per year through all sources included in this industrial segment:

**Table IV-25
Total Estimated Waste Reduction by Year**

Year	Industrial Source Reduction ¹	Drop-Off Recycling	Demolition Landfill	Robertson MRF ²	Total
1994	48,000	1,000	6,000	1,260	56,260
1995	48,480	1,268	15,475	1,260	66,483
1996	48,964	1,273	15,741	1,260	67,238
1997	49,454	1,278	16,011	1,260	68,003
1998	49,948	1,283	16,288	1,260	68,779
1999	50,448	1,288	16,568	1,260	69,564
2000	50,952	1,293	16,851	1,260	70,356
2001	51,462	1,298	17,113	1,260	71,133
2002	51,977	1,303	17,405	1,260	71,945
2003	52,496	1,309	17,704	1,260	72,769

¹ This number is extrapolated from estimates of existing source reduction. These estimates were derived through the subtracting of the 1990 UT numbers from the 1993 actual generation rates.

² This number included for information. Operation of this facility is at the discretion of Robertson County.

**Table IV-26
Allocation of 1995 Waste Reduction by Economic Sector**

Sector	Tonnage
Commercial/Industrial	63,955
Residential	2,528
Total	66,483

3. Strategy Used to Meet Target Amounts

a. 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.

b. Quantities of Materials Diverted Per Year

See Table IV-6

c. 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)

*currently banned due to existing regulations

d. Economic Incentives and Disincentives

Variable rates are proposed such that the following items can be disposed of at the Class III/IV Solid Waste Facilities at reduced rates:

Wood Waste
Construction/Demolition Debris

In the long-term, variable rates should be studied for the following items based upon the marketability:

White Goods
Scrap Metal

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

e. Other Waste reduction Strategies

Source reduction and reuse methods are detailed in Chapter IX *Public Information and Education*.

D. Calculations Concerning Demolition Landfilling

See Table IV-1 through IV-5.

E. 10-Year Implementation Schedule

December 1995	All Planned Programs Associated With Diversion Operating at 100%.
January 1, 1996	25% Diversion Goal Met.
December 1996	Evaluate Potential Blue Bag Program.

F. Allocation of Responsibility

SMR Region

The SMR Region as a separate entity will have a percentage of the current Director of the BiCounty Director's time allocated to the waste reduction program. The Recycling/Education Director will provide general coordination of the program with support from anchor staff people in each of the counties. In addition, this Director will assist with education programs and continuing education and the administration of the problem waste programs.

Bi-County Authority

1. Construct/operate recycling drop-off at new convenience centers in Stewart County.
2. Continue to operate existing convenience centers and recycling drop-off facilities.
3. Construct 2 new centers in Stewart County.
4. Continue to operate Class III/IV disposal facility, expand as needed.
5. Continue to collect and market recyclables
6. Operation of Pit Burner is optional at the Authority's discretion
7. Provide funding through a minor surcharge at the disposal facility for the implementation of the program as well as provide anchor staff person to coordinate with the Director.

Stewart County

The County has the option to construct and operate additional convenience centers.

Montgomery County

The requirements on Montgomery County are minimal. They are to fund all necessary improvements not within the scope of the Authority.

Robertson County

1. Continue to operate convenience centers
2. Establish and operate drop-off recycling at all convenience centers
3. Construct and operate a Class III/IV disposal facility
4. Continue to collect and market recyclables
5. Operation of the Lundell MRF is optional at the county's discretion
6. Provide funding through a minor surcharge at the disposal facility for the implementation of the program as well as provide anchor staff person to coordinate with the Director.

G. Data Collection System Narrative. As stated above, the Recycling/Education Director is responsible for all data collection and report preparation. All recyclable materials will be run across the scales at the landfill or balefill 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 Division of Solid Waste Assistance.



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 system to all residents within the county. An adequate collection system is defined as convenience centers or house to house pick up. Requirements for the minimum number of convenience centers are one per 12,000 population or one per 180 square miles (excluding government owned land) of the service area.

The following table indicates the number of convenience centers required by each county:

County	Area Sq. Mile	Centers Required	2003 Population ²	Centers Required	Minimum Required	Existing
Stewart	454 ¹	3	10,818	1	1	1 ³
Montgomery	539	3	124,281	10	3	8
Robertson	476	3	48,390	4	3	6

¹ Area includes Land Between The Lakes Park and Fort Campbell military base.

² Population figures are for total county population and include cities with house to house pick-up.

³ Under construction. To be complete in Spring 1994.

The following is a list of existing collection facilities within the region:

Stewart County

Stewart County currently has 24 green box sites with a total of seventy-nine 6 cubic yard containers. Stewart County is constructing one convenience center located on State Highway 79 at the intersection with Highway 120 which will be complete in January 1994. The following is a list of the current collection facilities.

1. Industrial Park - Cumberland City	2	8 cubic yard boxes
2. Elk Creek	9	6 cubic yard boxes
3. Cross Creek	6	6 cubic yard boxes
4. Timber Top	5	6 cubic yard boxes
5. Hwy. 18, Old Barn	5	6 cubic yard boxes
6. Leatherwood Road	3	6 cubic yard boxes
7. Taylor Chapel	6	6 cubic yard boxes
8. Cruthers Store	3	6 cubic yard boxes
9. Courthouse	1	6 cubic yard box
10. Dover High School	1	6 cubic yard box
11. Dover Elem. School	1	6 cubic yard box
12. Headquarters	6	6 cubic yard boxes
13. Dover Ready Mix	1	6 cubic yard box
14. Joiner Hollow	2	6 cubic yard boxes
15. Milford Bait Shop	1	6 cubic yard box
16. Bumpus Mill One Stop	1	6 cubic yard box
17. Tobacco Port Road	5	6 cubic yard boxes
18. Big Rock	3	6 cubic yard boxes
19. Cub Creek	3	6 cubic yard boxes
20. Hwy 120/79	5	6 cubic yard boxes
21. Indian Mound	4	6 cubic yard boxes
22. Rod Top	3	6 cubic yard boxes
23. Rivers Bend	3	6 cubic yard boxes
24. No. Stewart Elem. School	2	6 cubic yard boxes

Montgomery County

Bi-County Authority currently operates 8 convenience centers within Montgomery County. The convenience centers are fenced and staffed full time during operating hours. They are equipped with an operations building, two-way radios, sanitary facilities, and compacted stone base over the site. The operation hours are: 7:00 a.m. to 6:00 p.m., Sunday, Monday, Wednesday, Friday, and Saturday for all facilities with the transfer station center open on Tuesday and Thursday as well. The following is a list of locations and existing equipment:

1. St. Bethlehem (Hwy. 79 N.)
1 - Compactor
1 - 42 C.Y. Closed Container
2. Southside Road (Hwy. 48)
1 - 42 C.Y. Closed Container W/Doors
3. Round Pond (Hwy. 48/13)
1 - Compactor
1 - 42 C.Y. Closed Container
4. Landfill (Hwy. 76 W.)
2 - 42 C.Y. Open Containers
5. Fredonia (Hwy. 12)
1 - Compactor
1 - 42 C.Y. Closed Container
6. Transfer Station (Hwy. Drive - Clarksville)
3 - 75 C.Y. Trailers
7. Palmyra (Buck Smith Rd. & Canann Road)
1 - 42 C.Y. Closed Container W/Doors
8. Sango (Hwy. 41-A)
1 - Compactor
1 - 42 C.Y. Closed Container

Robertson County

Robertson County currently operates 6 convenience centers within the County. All centers are fenced and staffed full time. The hours of operation are Sunday, Monday, Thursday, and Friday 1:00 - 6:00 p.m. and Saturday 8:00 a.m. - 6:00 p.m. All of the centers have a compactor with a 42 C.Y. container. The following is a list of locations:

1. Cedar Hill
2. Cross Plains
3. Greenbriar Road
4. Orlanda
5. 431 North
6. 49 Market

B. Regional Collection Needs

As indicated in Table V-1, all three counties meet the requirements for the minimum number of convenience centers. All of the convenience centers will need to be upgraded to meet the current standards for convenience centers (Chapter 1200-1-7). The following list gives the main criteria for a convenience center:

- Restricted access by fencing and ability to secure access points (locking gates)
- Hours of operation posted
- Must be staffed with trained personnel full time during operating hours
- On site equipment to notify authorities in an emergency (telephone/two-way radio)
- Shelter for personnel during inclement weather and to store records and supplies.
- Sanitary facilities shall be provided
- Service water should be provided if required for maintenance
- Surfaces used for access, operation shall be paved (includes compacted stone)
- Storm water run-on should be diverted around facility with ditches or pipes
- Site shall be graded to prevent ponding of water and all storm water runoff shall be diverted to an area that can control release of solids from the property
- Process water from compactors shall be collected and properly disposed (in a sanitary sewer system or a septic system or tank)

The following list summarizes the recommendations for each county for collection and transportation.

Stewart County

- Utilize 1 existing convenience center
- Add 2 new convenience centers
- Utilize Bi-County Solid Waste Authority for transportation ¹

Montgomery County

- Utilize 1 existing transfer station/convenience center
- Utilize 7 existing convenience centers
- Utilize 2 existing roll off trucks
- Utilize Bi-County Solid Waste Authority for transportation ¹

Robertson County

- Utilize 6 existing convenience centers
- Utilize 1 existing roll off truck

¹ Bi-County SWMS currently operates 2 roll-off trucks

As indicated above, the recommendations for Stewart County are to add two convenience centers. Locations should be on major roadways and near more densely populated areas. The recommended locations for new centers are as follows:

- Cumberland City/Carlisle Area
- Highway 79 West of Dover

Montgomery and Robertson Counties have an adequate number of convenience centers currently in place.

Montgomery County's only incorporated city is the city of Clarksville which has approximately 75,000 people. Clarksville is currently served by several private haulers and the city does not provide house to house pickup. An evaluation for the city of Clarksville to provide house to house pickup indicates that 13 new rear loading trucks along with 40 new personnel would be required. This initial investment would be substantial and would probably force some of the private haulers out of business. This current system works well and recommendations are to leave collection within the city of Clarksville as is.

Within Robertson County there are three cities that provide house to house pickup. They are Springfield, Greenbriar and White House. Recommendations are to leave the current collection within Robertson County and the cities as is.

In Stewart County the City of Dover contracts with Waste Management for collection services. The City charges \$9.46 to 513 households for curbside collection. Continuation of this service is at the discretion of the City.

C. Timetable And Milestones For Construction Of New Convenience Centers

Stewart Co.

Apply for convenience center grants	March 1994
Funding for convenience centers	April 1994
Design/permitting of convenience centers	May 1994
Bidding/negotiation for convenience centers	July 1994
Construction of convenience centers	Feb - August 1994
Begin operations	September 1994

D. Summarize Total Ten Year Staffing Needs

Normal hours of operation for a convenience center vary depending upon number of residents served and the times of day required to adequately serve the population. Typically a center will be open 5 or 6 days and 55 to 77 hours per week. A study done by UT-CTAS, with convenience centers open 7:00 a.m. to 7:00 p.m. seven days per week, the days of the week are listed from most visits to fewest visits are as follows: Saturday, Sunday, Friday, Monday, Tuesday, Thursday, Wednesday. Saturday clearly had the most visits, with Sunday slightly ahead of Friday which was almost tied with Monday. Tuesday, Thursday and Wednesday had almost the same number of visits.

With centers open 40 or more hours per week, counties have the option of hiring one full time employee per center or two part-time employees. Most counties with convenience centers currently favor two part-time employees per center because they can coordinate schedules to guarantee the centers will be open the hours as posted. Many times, retired persons who live nearby want these jobs to supplement their income. Also, with part-time employees, the counties save money on fringe benefits.

A cost saving measure is to have convenience centers vary their operating days within a county. In that manner, one full-time employee can man two centers or one part-time employee can man a given center.

Staffing needs by county:

<u>County</u>	<u>No. of Centers</u>	<u>Staff Needed*</u>
Stewart	3	3
Montgomery	8	8
Robertson	6	6

*Note these requirements based upon full-time employees. To operate facilities with part-time employees, multiply this number by 2.

E. Ten Year Budget - Collection and Transportation

Cost for convenience centers and transportation from "Solid Waste: Transportation And Other Cost" by Lewis D. Bumpus with the University of Tennessee County Technical Assistance Service, 1993.

Conditions

1. Convenience center cost includes construction, equipment, labor, operation and maintenance. Equipment and construction cost amortized over 5 years @ 5% interest.
2. Transportation cost includes trucks (5 years @ 5%), labor, fuel, operation and maintenance.
3. Assume all disposal at existing facilities for transportation cost.
4. Costs are for 1993 waste loads.

Stewart County - 6,500 tons per year

Recommendations: Utilize 1 existing convenience center (40 hrs./wk.)

Construct 2 new convenience centers (operating 40 hours/wk.)

Annual Cost Per Ton

Convenience Centers 2 @ 13,809	=	27,618
Labor and Materials 3 @ 17,810	=	<u>53,450</u>
Subtotal		81,068/5,423 tons
	=	\$14.95/ton
Loading		+ 1.23/ton
Transportation 20 miles @ .45/mi		+ <u>9.00/ton</u>
		\$25.18/ton
		\$26.00/ton (use)

Annual cost 6,500 (26) = \$169,000

Montgomery County - 20,000 tons per year

Recommendations: Use 4 existing centers with compactors

Upgrade 4 centers to add compactors (operate 40 hours/wk.)

Annual Cost Per Ton

Convenience Centers Upgrade 4 @ 1,917	=	7,668 (note, this has been completed)
Labor and Materials 8 @ 17,810	=	<u>142,480</u>
Subtotal		142,480/16,626 tons
	=	\$ 8.57/ton
Loading		+ 1.23/ton
Transportation 20 miles @ .45/mi		+ <u>8.57/ton</u>
		\$18.80/ton
		\$19.00/ton (use)

Annual cost 20,000 (19) = \$380,000

Robertson County - 4,900 tons per year

Recommendations: Use 6 existing centers with compactors

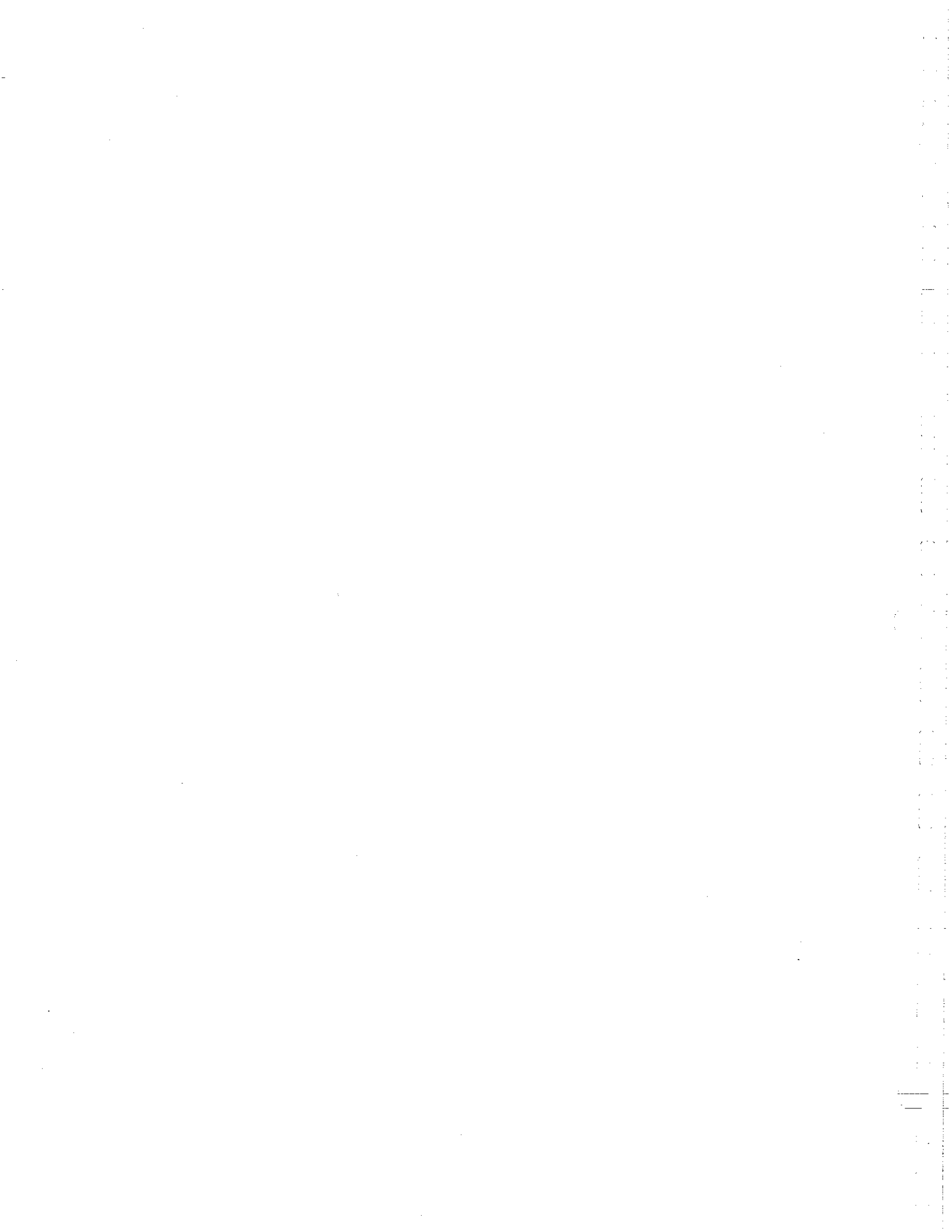
Annual Cost Per Ton

Labor and Materials 6 @ 17,810	=	106,860/4,872 tons
	=	\$21.93/ton
Loading		+ 1.23/ton
Transportation 20 miles @ .45/mi		+ <u>9.00/ton</u>
		\$32.16/ton
		\$32.00/ton (use)

Annual cost 4,900 tons (32) = \$156,800

**10 YEAR BUDGET REQUIREMENTS
(3% INFLATION PER YEAR)**

Year	Stewart	Montgomery	Robertson
1993	169,000	380,000	156,800
1994	174,070	391,400	161,504
1995	179,292	403,142	166,349
1996	184,671	415,236	171,339
1997	190,211	427,693	176,480
1998	195,917	440,524	181,774
1999	201,795	453,740	187,227
2000	207,849	467,352	192,844
2001	214,084	481,373	198,629
2002	220,507	495,814	204,588
2003	227,122	510,688	210,726



CHAPTER VI RECYCLING

Needs Definition Narrative

In terms of determining the need for recycling in the SMR Solid Waste Planning Region, it is necessary to differentiate between long-term needs and short term needs. In the short term, the need for recycling is as a component of an integrated waste management plan which meets the 25% reduction requirements by 1996 is not necessary as the 25% reduction has been met through industrial and existing means. Given that the regulatory need for recycling and waste reduction is not a driving force in this region, the short-term and long-term goals blend together.

The ultimate goal of any recycling and/or waste reduction program must be to minimize to the degree possible the need for Class I landfill space. The determination of the feasibility of this goal is not a purpose of this plan and, in real terms, has no bearing on the setting of the long-term goal.

The short-term tonnage goals will be set based upon reasonable accomplishments of the recommended programs. Long-term goals will not be established in terms of tonnages but in terms of recommended programs.

Following is the listing of the diversion through public recycling cataloged by the Needs Assessment in 1991:

**Table VI-1
1991 Montgomery County Recycling Programs**

Name	Type	Public, Private, or Industrial	Tonnage Diverted in 1991
Montgomery Co.	Drop-Off	Public	533
Lui Heimanson	Buy-Back	Private	Not Given
Krogers (portion of the Montgomery County Program)	Drop-Off	Private	See Montgomery County Program
Jones Recycling	Buy-Back	Private	Not Given
Recycling America	Buy-Back	Private	100
Waste Mgmt.	Drop-Off	Private	Not Given
Battery Connection	Buy-Back	Private	250
Allied Signal	Process Fluids	Industrial	Not Given
Arcata Graphics	Paperboard	Industrial	Not Given
Clarksville Prod.	Scrap Metal	Industrial	Not Given
Conwood Co.	Metals	Industrial	Not Given
Cougar Packaging	Paperboard	Industrial	Not Given
Orgain Bldg. Sup.	Wood	Industrial	Not Given
New Era, Inc.	Aluminum Cans	Industrial	Not Given
Acme Boot	Process Materials	Industrial	Not Given
Jay Garment Co.	Aluminum Cans	Industrial	Not Given
Jersey Miniere Zinc	Metals	Industrial	35,000
JFB	Metals/Office Paper	Industrial	Not Given
Jostens Printing	Process Materials	Industrial	Not Given

Table VI-1 (cont.)

Name	Type	Public, Private, or Industrial	Tonnage Diverted in 1991
Kena Industries	Cartons	Industrial	Not Given
International Label	Aluminum	Industrial	Not Given
McLeads Industrial Cleaners	Aluminum Cans	Industrial	Not Given
The Leaf Chronicle	Paper	Industrial	Not Given
Clarksville Foundry and Machine Works	Metals	Industrial	Not Given
North American Oxide	Scrap Iron	Industrial	Not Given
North American Tool & Die	Metals	Industrial	Not Given
Poser Business Forms	Paper	Industrial	Not Given
Providence Cabinet Shop	Wood	Industrial	Not Given
Red River	Aluminum	Industrial	Not Given
Smithfield Industries	Metals	Industrial	Not Given
Tennessee Iron Works	Metals	Industrial	Not Given
Whitson Lumber Co.	Wood	Industrial	Not Given
UCAR Carbon Products	Misc Items	Industrial	16,221
Tile Cera	Inerts	Industrial	Not Given
Vulcan Corporation	Rubber, Cardboard	Industrial	Not Given

**Table VI-2
1991 Robertson County Recycling Programs**

Name	Type	Public, Private, or Industrial	Tonnage Diverted in 1991
Robertson County Recycling	Mixed Waste Processing Facility	Public	1,706
Springfield Recycling	Buy-Back	Private	Not Given
Kroger	Drop-Off	Private	20
Wal-Mart	Drop-Off	Private	Not Given

**Table VI-3
1991 Stewart County Recycling Programs**

No recycling programs were given for Stewart County in 1991.
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Regional Goals and Objectives

As can be seen from the previous tables, the tremendous industrial involvement (primarily in Montgomery County) in recycling and waste reduction accounts for the large waste reduction level already in place for the region.

The following goals and objectives are given for the purpose of establishing an effective recycling program:

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

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

Objective b: Provide a system for residents who are served by private haulers. (The private haulers of Robertson County are presently served by the mixed waste processing facility. Montgomery and Stewart Counties will be addressed in the long-term goals.)

Objective c: Provide a system for residents within the urban areas of the county. (The urban residents of Robertson County are served through the mixed waste processing facility. Presently there are no public collection systems within Montgomery or Stewart Counties and therefore they are served via the drop-off recycling at the convenience centers.)

Goal 2: Make Recycling Available to Business Customers

Objective a: Adapt the collection and processing system to allow business participation. (Presently only residential loads are being directed into the mixed waste processing facility in Robertson County. Variable rates (i.e. \$0 tipping fee for source-separated cardboard in Bi-County) are the primary means for bringing the business community into the recycling program.

Goal 3: Make Recycling Available for Industrial Customers

(Note: Montgomery County is presently operating a program which meets many of the objectives listed below.)

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 for the above industries.

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

Expansion of Recycling Collection to Unserved Areas

Short-Term Planning:

As stated in the Regional Goals and Objectives section above, Robertson County is presently completely served for recycling collection based upon the mixed waste processing facility. The industries in Montgomery County are already participating based upon variable rates and an aggressive education program by the Authority. The users of the convenience centers in Montgomery and Stewart Counties will be served by drop-off collection centers located at these facilities.

Long-Term Planning:

From the above, it can be seen that the primary unserved area within the county is comprised of the residences and businesses served by private haulers. Due to the volatility of the recycling market and the potential impacts of the 1996 Tennessee deadline on those

markets, it is not recommended to invest capital or effort into serving this area before 1996. In 1996, when there is more information available, it is recommended that a study be done on the potential effectiveness of utilizing the existing tipping floor and constructing additional under roof materials storage for the purposes of operating a "blue bag" collection program.

The "Blue Bag" program requires a tipping floor and a materials recovery facility (MRF). Specially colored plastic bags are made available to all of the citizens in the region. There are a number of means of distribution. Alternative methods of distribution which have been successful in other areas include:

1. Distributing the bags through the existing waste collection system by making them available at the convenience centers and at the landfill as well as having the public and private haulers distribute them on their routes.
2. Have local grocery and department stores purchase the same colored bags to use in bagging at the check-out counter. These bags then become the recycling bags. This system is presently in use in Chattanooga, Tennessee.
3. Sell or distribute the bags through local grocery stores or designate a specific bag that is available in local stores.

Robertson County has previously tried a "blue-bag" collection system. The results of that test effort were not sufficiently positive for Robertson County to further pursue that form of collection. The studies performed on the potential for such a program in the region should evaluate the advances in technology that might make the system more feasible than the one attempted at that time.

Description of Planned Programs and Location of Proposed Facilities

Drop-off Collections

Drop-Off Collection Overview:

Drop-off collections will be provided at all proposed convenience centers in which there is sufficient space for adequate access. These will consist of compartmentalized roll-off containers and roll-off trucks. The collection of these materials is to be regionalized and the recyclables will be hauled to market or to the Robertson County Materials Recovery Facility. The drop-off recycling collection program will consist of two 4-bin 40 CY roll-off containers at each convenience center. Additional land area may be required as this program is implemented.

Drop-Off Collection Estimated Materials Recovery

1. Determine numbers of households served by convenience centers per county:

Table VI-4a
Households Served by Door-to-Door Pick-up in Montgomery County

Hauler	Type	Households
Poindexter	Private	247
Outlaw	Private	800
Cook	Private	400
Austin	Private	350
Hatter	Private	259
Barker	Private	150
Williams	Private	50
Shelton	Private	52
Porter	Private	275
Bound	Private	325
Dewberry	Private	300
Mixon	Private	375
Lee	Private	84
Baynhamn	Private	75
Waste Management	Private	15,900
Dependable	Private	Unknown
Best Disposal	Private	Unknown
USA Sanitation	Private	Unknown
Van Dyke	Private	Unknown
Fishers Trash Service	Private	Unknown
	TOTAL	19,867

**Table VI-4b
Households Served by Door-to-Door Pick-up in Robertson County**

Hauler	Type	Households
City of Springfield	Public	4,500
City of White House	Public	1,211
City of Greenbriar	Public	976
Waste Control	Private	500
Cook	Private	70
Jones	Private	125
Denson	Private	350
Stewart	Private	30
	TOTAL	7,762

**Table VI-4c
Households Served by Door-to-Door Pick-up in Stewart County**

Hauler	Type	Households
Waste Management, Inc.	Contract with Dover	513
	TOTAL	513

**Table VI-4d
Total Households Served by Door-to-Door Collection in Region**

County	Households Served Door-to-Door
Montgomery	19,867
Robertson	7,762
Stewart	513
TOTAL	28,142

**Table VI-5
Households Served by Convenience Centers**

County	Total Households ¹	Households Served Door-to-Door	Households Served by Convenience Centers
Montgomery	37,300	19,867	17,433
Robertson	15,000	7,762	7,238
Stewart	4,420	513	3,907
Regional Total	56,720	28,142	28,578

¹ From Needs Assessments Chapter V.

The maximum potential waste recovery can be calculated by a methodology derived from information contained in *Guidelines for Decision Makers, Solid Waste Management*, published in November, 1991 by the University of Tennessee County Technical Advisory Service. 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:

**Table VI-6
Maximum Recyclables Available to the Drop-Off System**

County	Recyclable Materials Available (TPY)
Montgomery	3,225
Robertson	1,339
Stewart	723
Region Total	5,287

From case studies performed by the California Solid Waste Management Board of 5 recycling programs conducted within that state, a 60% participation rate and a 40% capture rate was generated. The participation rate is defined as the total number of households which participate in some form through the year and the capture rate represents the average level of participation of those that participate. Therefore the diversion rate is $60\% \times 40\% = 24\%$. This is the number multiplied by the total amount of materials available to determine the tonnage diverted. These studies are recorded in The Solid Waste Handbook, A Practical Guide, William D. Robinson, P.E., John Wiley and Sons, 1986.

**Table VI-7
Estimated Materials Recovery Through Drop-Off Recycling Collection
All estimated Based On 1991 Populations**

County	Total Tonnage Available for Diversion	Estimated Participation/ Capture Rate (%)	Total Tonnage Estimated to Be Diverted.
Montgomery	3,225	24	774
Robertson	1,339	24	321
Stewart	723	24	173
Regional Total	5,287		1,268

As a comparison of the above numbers to the actual recycling programs within the region, the Bi-County Authority is presently operating a drop-off collection system at its convenience centers similar to the one proposed for the region. Each convenience center collects scrap metal, plastic, newsprint, cardboard, aluminum, and glass. In addition to this variable rates bring in substantial amounts of cardboard and other recyclable materials

directly to the baling facility. In 1991, a total of 531 tons of these materials were recovered for resale. In the first half of 1993, 482 tons (964 tons on a yearly basis) of these materials were recovered for resale. Please note that 691 tons of recyclables were collected by Bi-County during this period. The total amounts of recyclable materials collected for this period are given by Bi-County as 691 tons. The 691 ton figure, however, includes batteries, used oil and cores. Given that the batteries and used oil are specifically covered in Chapter 10. Therefore, the 774 tons figure appears to be sufficiently accurate for planning purposes.

Drop-Off Collection Locations:

As stated earlier, drop-off collection stations will be located throughout the region at convenience center locations. These sites are shown on the proposed solid waste system map included within this report. The following is a listing of the number of sites per county:

**Table VI-8
Drop-Off Collection Centers By County**

County	Number of Locations	Households Served Per Location
Montgomery	8	2,179
Robertson	6	1,206
Stewart ¹	3	1,302
Regional	17	1,681

¹ Stewart County is required under Chapter V to construct and operate 1 convenience center. It is recommended that 2 additional facilities be constructed at the discretion of the county to better serve the public. At present, the county is considering the possibility of a total of 7 centers.

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. Although it is understood that the system in Montgomery and Stewart Counties will continue to operate with front end loaders for some years, it is recommended that this type of collection be phased out in favor of the roll-off collection due to cost efficiencies between the systems. In order to calculate costs for the system, it is assumed that all materials will be hauled to the nearest processing facility (the

Baler in Montgomery County or the MRF in Robertson County) and then processed or baled before shipment to Nashville for sale. It is understood that the reality of the situation requires several different areas for marketing. The numbers generated through this system should give reasonably accurate overall cost estimates for the system.

Table VI-9a
Average Haul Distances from Convenience Centers to Nearest Processing Facility
Montgomery County

Convenience Center Site	One-Way Mileage to Baler
St. Bethlehem	20
Southside Road	20
Round Pond	16
Landfill	0
Fredonia	20
Transfer Station	13
Palmyra	24
Sango	18
TOTAL	131
AVERAGE	16.38

Table VI-9b
Average Haul Distances from Convenience Centers to Nearest Processing Facility
Robertson County

Convenience Center Site	One-Way Mileage to MRF
Cedar Hill	12
Cross Plains	16
Greenbriar Road	4
Orlinda	16
431 Market	7
49 Market	4
TOTAL	59
AVERAGE	9.83

Table VI-9c
Average Haul Distances from Convenience Centers to Nearest Processing Facility
Stewart County

Convenience Center Site	One-Way Mileage to Baler
Wyatt's Chapel	13
Taylor Chapel Road	24
Carlisle	29
TOTAL	66
AVERAGE	22

Table VI-9d
Estimated Average Hauling Distances to Nearest Processing Facility By County
(All distances given in one-way mileage)

County	Nearest Processing Facility	Average Haul Distance (One-Way)
Montgomery	Baler	16
Robertson	MRF	10
Stewart	Baler	22
Regional Average		15

Transportation costs per county are therefore derived through the number of "pulls" per year per county. 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:

Table VI-10
Number of "Pulls" per County Per Year

County	Tonnage Hauled	Number of Pulls
Montgomery	774	227
Robertson	321	95
Stewart	173	51
Region Total	1,268	373

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.

**Table VI-11
Collection/Transportation Costs for Hauling to Processing Facilities**

County	Number of Pulls/Year	Miles/Pull	Total Miles	Transportation Cost(\$)
Montgomery	227	16	3,632	6,538
Robertson	95	10	950	1,710
Stewart	51	22	1,122	2,020
Region Total	373		5,704	10,268

The capital costs associated with operating the recycling drop-off program consist primarily of the costs of the individual bins. The costs of constructing and operating the convenience centers was included in Chapter V. The costs in the table below assume a 5 year life of the drop-off bins and 5% inflation. The costs associated with the purchase of the bins is based upon the low bidder for the Cheatham County recycling system. That bid was \$3,856 per container and was made on May 22, 1992. 1994 costs based upon this were assumed at \$4,360 per bin.

**Table VI-12
1994 Capital Costs for Drop-Off Collection**

County	Number of Bins Required ¹	Total Capital Cost(\$)	Total Annualized Cost(\$/Year)
Montgomery	16	69,760	16,113
Robertson	12	52,320	12,085
Stewart	6	26,160	6,042
Region Total	34	148,240	34,240

¹ Montgomery County and Robertson County already have bins in-place. The above costs are calculated as though total replacement is needed at the present time. The actual costs will depend upon the timetable for the replacement of the existing units.

Revenues and Transportation of Processed Materials

In order to estimate revenues from the sale of recycled materials, it was necessary to plot trends in the recycling markets and extrapolate the trends out throughout the study period. For this purpose, the *Recycling Times* monthly average recyclable prices for the southeast was plotted for a three year period from 1990 through 1993. A brief synopsis of these values is listed in the following table:

Table VI-13
Southeastern Recyclable Prices 1990-1993
 (All prices in \$/Ton)

Date	Clear Glass	Green Glass	Brown Glass	Alum	Newsprint	Card-board
1/90	25.80	25.00	25.40	---	20.30	37.00
7/90	23.40	22.50	22.50	1,022.00	13.00	29.00
1/91	10.60	7.90	5.90	920.00	19.40	45.40
7/91	6.70	4.20	1.70	816.00	22.50	35.50
1/92	6.40	4.50	0.00	802.00	17.20	33.20
7/92	5.30	2.80	2.80	800.00	14.30	30.90
1/93	10.00	5.00	5.00	610.00	17.50	37.50
7/93	10.00	5.00	5.00	700.00	17.50	40.00

A two-step process was used to estimate the revenues to be derived from the sale of recyclables in 1996 and thereafter. The first step was to utilize a rough straight line extrapolation of the above numbers to generate the best guess of the market values of the materials at that time. Please take note that the "rough" straight line extrapolations were in some cases difficult and notes are listed below the table in explanation of the derivation of some numbers. The second step was to divide the numbers given from the first step in half in order to model a glut on the market localized around Tennessee due to all of the counties attempting to meet the reduction goal. The following table shows a synopsis of this method:

Table VI-14
Calculation of 1996 Market Values of Recyclables
 (All Prices in \$/Ton)

Commodity	Market Extrapolation (\$/Ton)	Glut Model Multiplier	Value Assumed
Clear Glass	9.10 ¹	.5	4.55
Green Glass	0.00 ²	.5	0.00
Brown Glass	3.65 ³	.5	0.00
Aluminum	370.00	.5	185.00
Newsprint	14.70	.5	7.35
Steel	10.00	.5	7.50
Plastics	0.00	.5	0.00
Cardboard	35.00 ⁴	.5	17.50

¹ Market for clear glass has remained relatively stable since 1991. Therefore the 1990 figures were disregarded in the calculation of this figure.

² Disregarding the 1990 figures as above, the extrapolation gave a figure of \$0.65/ton. Based upon existing markets for green glass, this number was made \$0.00.

³ Disregarding the 1990 figures as above, the extrapolation gave a figure of \$3.65/ton. Based upon existing markets for brown glass, this number was made \$0.00.

⁴ The cardboard market has remained very stable and should continue to do so.

The following table shows a comparison of the revenues from the above table compared with the revenues actually received by Bi-County in recent sales of recyclables (1993).

Table VI-15
Revenues Received at Bi-County for Sale of Recyclables in 1993
Compared to Estimates Used for 1996

Commodity	Nov, 1993 Bi-County Price	Estimated 1996 Price
Clear Glass	30.00	4.55
Brown Glass	15.00	0.00
Green Glass	5.00	0.00
Aluminum	420.00	185.00
Newsprint	23.60	7.35
Steel	15.00	7.50
Plastic	0.00	0.00
Cardboard	28.00	17.5

Table VI-16a
Breakdown of Paper and Paperboard Category
 Category: Paper and Paperboard
 Subcategories: Newspaper, White Paper, Mixed Paper, Cardboard

Subcategory	Category % of Total Waste Stream	Subcategory % of Category ¹	Subcategory % of Total Waste Stream
Newspaper	34.5	17.7	6.11
White Paper	34.5	10.1	3.48
Mixed Paper	34.5	46.4	16.01
Cardboard	34.5	25.8	8.90
Total		100.0	34.50

¹ From Franklin Associates Study.

Table VI-16b
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	8.4	48.2	4.05
Green Glass	8.4	25.9	2.18
Brown Glass	8.4	16.7	1.40
Miscellaneous	8.4	9.2	0.77
Totals		100.0	8.40

² From Tellus Institute Study.

In 1993, Draper Aden Associates performed a waste stream characterization for the SMR Region which yielded the following results (See Table II-4):

Category	Percentage
Paper/Paperboard	34.5
Glass	8.4
Ferrous	6.3
Aluminum	1.0
Non-Ferrous	2.0
Plastics	7.5
Rubber	4.1
Textiles	3.3
Wood ¹	6.9
Food Waste	7.3
Yard Waste ¹	14.7
Misc. Inorganics ¹	1.2
Other	2.8

In order to break the waste stream characterization numbers 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 *Waste Plan Default Data Report*, prepared by the Tellus Institute, Inc., 1988, 1989. The following tables give the breakdowns for waste categories in question:

Table VI-16c
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	6.3	27.2	1.71
Major Appliances	6.3	30.4	1.92
Miscellaneous	6.3	42.4	2.67
Totals		100.0	6.30

² From Tellus Institute Study.

Table VI-16d
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	1.0	62.6	0.63
Scrap Aluminum	1.0	37.4	0.37
Totals		100.0	1.00

² From Tellus Institute Study.

Table VI-16e
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	7.5	54.9	4.12
Other Plastics	7.5	45.1	3.38
Totals		100.0	7.50

² From Tellus Institute Study.

Table VI-17
Estimated Tonnages of Recyclables
Montgomery County

Commodity	Percent of Total Waste Stream	Percent of Total Recyclables	Total Tons of Specific Recyclables
Clear Glass	4.05	13.06	101.08
Green Glass	2.18	7.03	54.41
Brown Glass	1.40	4.51	34.91
Aluminum	0.63	2.03	15.71
Newsprint	6.11	19.70	152.48
Steel	3.63	11.70	90.56
Plastic	4.12	13.28	102.79
Cardboard	8.90	28.69	222.06
Totals	31.02	100.00	774

Table VI-18
Estimated Tonnages of Recyclables
Robertson County

Commodity	Percent of Total Waste Stream	Percent of Total Recyclables	Total Tons of Specific Recyclables
Clear Glass	4.05	13.06	41.92
Green Glass	2.18	7.03	22.57
Brown Glass	1.40	4.51	14.48
Aluminum	0.63	2.03	6.52
Newsprint	6.11	19.70	63.24
Steel	3.63	11.70	37.56
Plastic	4.12	13.28	42.63
Cardboard	8.90	28.69	92.08
Totals	31.02	100.00	321

Table VI-19
Estimated Tonnages of Recyclables
Stewart County

Commodity	Percent of Total Waste Stream	Percent of Total Recyclables	Total Tons of Specific Recyclables
Clear Glass	4.05	13.06	22.59
Green Glass	2.18	7.03	12.16
Brown Glass	1.40	4.51	7.80
Aluminum	0.63	2.03	3.51
Newsprint	6.11	19.70	34.08
Steel	3.63	11.70	20.24
Plastic	4.12	13.28	22.98
Cardboard	8.90	28.69	49.64
Totals	31.02	100.00	173

Table VI-20
Revenues from Sale of Recyclable Materials
Montgomery County

Commodity	Tonnage/Year	Value (\$/Ton)	Revenue/Year
Clear Glass	101	4.55	459.55
Green Glass	54	0.00	0.00
Brown Glass	35	0.00	0.00
Aluminum	16	185.00	2,960.00
Newsprint	152	7.35	1,117.20
Steel	91	7.50	682.50
Plastic	103	0.00	0.00
Cardboard	222	17.50	3,885.00
County Total	774.00		9,104.25

Table VI-21
Revenues from Sale of Recyclable Materials
Robertson County

Commodity	Tonnage/Year	Value (\$/Ton)	Revenue/Year
Clear Glass	42	4.55	191.10
Green Glass	23	0.00	0.00
Brown Glass	14	0.00	0.00
Aluminum	7	185.00	1,295.00
Newsprint	63	7.35	463.05
Steel	38	7.50	285.00
Plastic	42	0.00	0.00
Cardboard	92	17.50	1,610.00
County Total	321		3,844.15

Table VI-22
Revenues from Sale of Recyclable Materials
Stewart County

Commodity	Tonnage/Year	Value (\$/Ton)	Revenue/Year
Clear Glass	23	4.55	104.65
Green Glass	12	0.00	0.00
Brown Glass	8	0.00	0.00
Aluminum	4	185.00	740.00
Newsprint	34	7.35	249.90
Steel	20	7.50	150.00
Plastic	23	0.00	0.00
Cardboard	50	17.50	875.00
County Total	174		2,119.55

An additional cost which will have to be handled by the Baler facility will be the hauling of the processed materials to market. It is assumed that the Nashville area will provide sufficient market for the quantities of recyclables being generated. For the purposes of determining these costs, the UT CTAS study on solid waste transportation costs was again used. It was assumed that compacted materials were placed on a tractor-trailer for hauling to Nashville and that the average one-way distance to market from the MRF was 30 miles.

**Table VI-23
Total Cost of Transportation of Materials to Market
Market Assumed to be Nashville**

County	Tonnage	Cost Per Ton Per One-Way Mile	One-Way Mileage	Annual Cost
Montgomery	774	0.31	48	11,517
Robertson	321	0.31	24	2,388
Stewart	173	0.31	48	2,574
Regional Total	1,268.00			16,479

**Table VI-24
Total Net Cost of Drop-Off Recycling (1993\$)**

County	Capital Costs	Collection Costs	Transport Costs	Less Revenues	Net Costs
Montgom.	16,113	6,538	11,517	-9,104	25,064.00
Robertson	12,085	1,710	2,388	-3,844	12,339.00
Stewart	6,042	2,020	2,574	-2,120	8,516.00
Region Total	34,240	10,268	16,479	-15,068	45,919

**Table VI-25
Net Cost Per Ton for Drop-Off Collection (1994\$)**

County	Net Annual Cost(\$)	Annual Tonnage	Cost Per Ton (\$)
Montgomery	25,064	774	32.38
Robertson	12,339	321	38.44
Stewart	8,516	173	49.23
Region Total	45,919	1,268	36.21

For years following 1996, it is assumed that 1996 will be the bottom year and that the market value of recyclables will begin to rise with inflation after that time. The following tables assume 5% inflation per year:

**Table VI-26
Budget and Tonnage Extrapolation through 2003
Montgomery County**

Year	Cost (\$/Year) ¹	Revenue (\$/Year) ¹	Net Cost (\$/Year)	Tonnage Per Year ²	Cost Per Ton
1995	34,168	9,104	25,064.00	774	32.38
1996	35,193.04	9,377.12	25,815.92	777.10	33.22
1997	36,248.83	9,658.43	26,590.40	780.21	34.08
1998	37,336.29	9,948.18	27,388.11	783.33	34.96
1999	38,456.38	10,246.63	28,209.75	786.46	35.87
2000	39,610.07	10,554.03	29,056.04	789.61	36.80
2001	40,798.37	10,870.65	29,927.72	792.77	37.75
2002	42,022.32	11,196.77	30,825.55	795.94	38.73
2003	43,282.99	11,532.67	31,750.32	799.12	39.73

¹ Costs extrapolated from costs shown in Tables VI-14 and VI-15 at 3% inflation.

² Assumed that drop-off collection will increase with solid waste increase due to population (see Table III-2)

Table VI-27
Budget and Tonnage Extrapolation through 2003
Robertson County

Year	Cost (\$/Year) ¹	Revenue (\$/Year) ¹	Net Cost (\$/Year)	Tonnage Per Year ²	Cost Per Ton
1995	16,183	3,844	12,339.00	321	38.44
1996	16,668.49	3,959.32	12,709.17	322.96	39.35
1997	17,168.54	4,078.10	13,090.44	324.93	40.29
1998	17,683.60	4,200.44	13,483.16	326.91	41.24
1999	18,214.11	4,326.45	13,887.66	328.90	42.22
2000	18,760.53	4,456.24	14,304.29	330.91	43.23
2001	19,323.35	4,589.93	14,733.42	332.93	44.25
2002	19,903.05	4,727.63	15,175.42	334.96	45.31
2003	20,500.14	4,869.46	15,630.68	337.00	46.38

¹ Costs extrapolated from costs shown in Tables VI-14 and VI-15 at 3% inflation.

² Assumed that drop-off collection will increase with solid waste increase due to population (see Table III-2)

Table VI-28
Budget and Tonnage Extrapolation through 2003
Stewart County

Year	Cost (\$/Year) ¹	Revenue (\$/Year) ¹	Net Cost (\$/Year)	Tonnage Per Year ²	Cost Per Ton ³
1995	10,636	2,120	8,516.00	173	49.23
1996	10,955.08	2,183.60	8,771.48	179.26	48.93
1997	11,283.73	2,249.11	9,034.62	185.75	48.64
1998	11,622.24	2,316.58	9,305.66	192.47	48.35
1999	11,970.91	2,386.08	9,584.83	199.44	48.06
2000	12,330.04	2,457.66	9,872.38	206.66	47.77
2001	12,699.94	2,531.39	10,168.55	214.14	47.49
2002	13,080.94	2,607.33	10,473.61	221.89	47.20
2003	13,473.37	2,685.55	10,787.82	229.92	46.92

¹ Costs extrapolated from costs shown in Tables VI-14 and VI-15 at 3% inflation.

² Assumed that drop-off collection will increase with solid waste increase due to population (see Table III-2)

³ Cost per ton for Stewart County is assumed to be substantially higher than that for Montgomery County due to the aging factor in dealing with paper. Paper loses a great deal of its marketability when it is three months old. Given the large number of drop-off centers per population in Stewart County, it is felt that this will be the deciding factor rather than fullness for the pulling of the bins. Therefore, transportation costs will be incurred for bins which are not full which will drive up the cost per ton.

Cooperative Marketing Plan

All recyclable materials will be processed and marketed through the centralized materials recovery facility. Marketing will be coordinated by the Bi-County and Robertson County waste reduction staff. Therefore, cooperative marketing is built in to the system as presented.

Interaction with the Tennessee Office of Cooperative Marketing

The Bi-County and Robertson County waste reduction staff will continue to be responsible for coordinating with the Tennessee Office of Cooperative Marketing (TOCM). The following information will continue to 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 Recycling/Education program. 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 Recycling/Education program. The goals and objectives associated with it are detailed in Chapter IX *Public Information and Education*.

10-Year Staffing Plan

Administration: Recycling will continue to be administered by personnel of Bi-County and Robertson County. These staff positions are already in place. No changes to the existing (1993) personnel system are required under the plan. The Director of the Recycling/Educational program will have general oversight of the recycling programs. Implementation will remain under the responsibility of the BiCounty Authority and Robertson County.

10-Year Budgets

The Administrative Staffing Budget for the program is covered under the budget outlined in the waste reduction section. The budget for the operation of the program is discussed earlier in this section. The recycling program will be funded by the Bi-County Authority and Robertson County individually through a surcharge on the tipping fees at the disposal facilities. The recycling program for Bi-County includes primarily the drop-off program at the convenience centers. The recycling program for Robertson County includes the drop-off at the convenience centers as well as the Mixed Waste Processing Facility already in existence.

Table VI-30a
Estimated Tipping Fee Surcharge for Operation of BiCounty's Recycling

Year	BiCounty Operation Cost	Total Tonnage	Cost Per Ton
1994	\$ 33,580	78,852	0.43
1995	33,580.00	80,255	0.42
1996	34,587.40	81,678	0.42
1997	35,625.02	83,143	0.43
1998	36,693.77	84,625	0.43
1999	37,794.58	86,134	0.44
2000	38,928.42	87,655	0.44
2001	40,096.27	89,078	0.45
2002	41,299.16	90,651	0.46
2003	42,538.13	92,253	0.46

Table VI-30b
Estimated Tipping Fee Surcharge for Operation of Robertson County's Recycling

Year	BiCounty Operation Cost	Total Tonnage	Cost Per Ton
1994	\$ 12,339	32,207	0.38
1995	12,339.00	32,780.28	0.38
1996	12,709.17	32,990	0.39
1997	13,090.45	33,389	0.39
1998	13,483.16	33,794	0.40
1999	13,887.65	34,202	0.41
2000	14,304.28	34,611	0.41
2001	14,733.41	34,948	0.42
2002	15,175.41	35,367	0.43
2003	15,630.67	35,792	0.44

Diversion Through Lundell MRF

The primary discussion on the Robertson County MRF is located in Chapter VII. However, a synopsis is provided here of diversion and budgeting information.

In terms of calculating the diversion from the MRF, there are three options to explore. The first being to shut down the MRF entirely, the second being to maintain the present levels of service, and the third being to maximize the potential level of service of the facility. Option 1 will give a diversion rate of 0% and therefore is not included within the following tables. As the capacity of this system is static based upon staffing and other factors, the tonnage diverted will not vary based upon option. However, as the total tonnage generated in the county increases, the percent diversion will gradually fall. The following table shows the estimated diversion through options 2 and 3 and the corresponding percentages:

Table VI-31
Comparison of Percent Diversions for the Robertson County MRF
Option 2: Present Service and Option 3: Maximize Facility

Year	Total Waste Generated	Option 2 Tonnage ¹	Option 2 Percent Diversion of Waste Generated	Option 3 Tonnage ²	Option 3 Percent Diversion of Waste Generated
1994	32,207	1,260	3.91	5,150	15.99
1995	32,596	1,260	3.87	5,150	15.80
1996	32,990	1,260	3.82	5,150	15.61
1997	33,389	1,260	3.77	5,150	15.42
1998	33,794	1,260	3.73	5,150	15.24
1999	34,202	1,260	3.68	5,150	15.06
2000	34,611	1,260	3.64	5,150	14.88
2001	34,948	1,260	3.61	5,150	14.74
2002	35,367	1,260	3.56	5,150	14.56
2003	35,792	1,260	3.52	5,150	14.39

¹ Includes marketed recyclables and pellets sold.

² This method assumes that no new market for pellets is found but that all of the recyclables are marketed. In the event that a market is found for all pellets which are generated, the total tonnage diverted would be 17,600 tons per year.

Table VI-32
Budget Costs Associated with Robertson County MRF Options
3% Inflation Assumed
Option 2: Present Service and Option 3: Maximize Facility

Year	Option 2 ^{1,2}	Option 3 ₂
1994	377,438	454,438
1995	388,761.14	468,071.14
1996	400,423.97	482,113.27
1997	412,436.69	496,576.67
1998	424,809.79	511,473.97
1999	437,554.08	526,818.19
2000	450,680.70	542,622.74
2001	464,201.12	558,901.42
2002	478,127.15	575,668.46
2003	492,470.96	592,938.51

¹ Extrapolated from present budget. Includes sale of recyclables does not include avoided costs of landfilling.

² Estimated. Includes sale of recyclables. Does not include avoided costs of landfilling.

Recommendations Concerning the Lundell MRF

The operation of the Lundell MRF is not required to meet the 25% reduction requirement at the regional level. Therefore this plan does not require the continued operation of the Lundell MRF. The continued operation of the facility should remain at the discretion of Robertson County and should be evaluated each year during the budgetary process.

Data Collection Plan

The Bi-County and Robertson County waste reduction staffs are 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.

CHAPTER VII

COMPOSTING, SOLID WASTE PROCESSING, WASTE-TO-ENERGY AND INCINERATION CAPACITY

The Tables, Figures, Charts referenced are included in the "Supporting Information and Calculations" document

A. GENERAL

COMPOST. At this time, the Region does not have any compost operations in existence. Compost of municipal solid waste and/or yard waste was evaluated as part of the planning process.

PROCESSING. The Region already has two major waste processing/disposal facilities. The first is the Materials Recovery Facility in Robertson County and the second is the Bi-County (Stewart and Montgomery) baling/landfill facility. A description of the existing systems are detailed in Chapter II. An evaluation of the Robertson county materials processing facility is included below.

WASTE TO ENERGY. The possibility of a waste-to-energy facility was investigated for this region in the preparation of this plan. This task was undertaken primarily because of the existence of a U.S. Army Post within the region, Fort Campbell. There are several military and government installations across the United States in which waste-to-energy facilities are meeting all, or a portion of the energy needs. The primary goals and objectives of implementing a waste-to-energy facility for this region include two main items. First, close to a 90% reduction in volume of waste through combustion with associated savings in available landfill space. Secondly, a waste-to-energy facility offers an additional revenue source from the sale of energy. This revenue can offset the disposal cost of the waste. If viable, a waste-to-energy project may offer a community an alternative which is, in the long run cost competitive with other disposal options.

B. COMPOST

MSW Composting--

During the study portion of the planning process, MSW composting was costed out as an option for the region. Utilizing the Bedminster process and a facility similar to but larger than that in Sevier County, Tennessee, the cost per ton for the waste processed was over \$50. In addition to this, about 35% of the waste processed by the system would have to be landfilled at additional cost. The total cost for the system including both the composting facility and the landfilling of the residuals was between \$70 and \$80. The SMR Planning Board rejected this option for further study early in the plan development.

Yard Waste Composting--

In a detailed study conducted by Gary L. Lide, P.E. in 1989, it was determined that for a yard waste composting program to be successful, it required an urban area with a population of at least 10,000. This population is necessary to provide a home-grown market for the materials as well as to provide the materials necessary. In revisiting that study on several occasions since that time, the 10,000 minimum population figure still appears to be a reasonable rule-of-thumb.

Clarksville and Springfield are the only municipalities within the SMR region which meet this basic criteria. Equipment for processing of yard waste ranges in cost between \$100,000 and \$500,000. These capital costs will cause a cost per ton (cost per ton diverted) to range between about \$30-35 per ton for Clarksville and about \$45-50 per ton for Springfield. The difference between these costs and the costs associated with Class III/IV landfilling do not justify the inclusion of yard waste composting as a mandatory part of this plan. The construction of such facilities should be at the discretion of the municipalities listed and should be reviewed by the region on an annual basis.

C. PROCESSING - Robertson County Materials Recovery Facility

The effectiveness towards reducing the waste stream and the economics of the existing Robertson County materials processing facility were generally reviewed. Substantial records regarding processing history and quantities processed, pelletized and recycled, was not available. The information contained in this section is based on a review of the budget, visit to the facility and discussions with the plant management staff.

1) **Issues.** The following calculations were based on information from the operator. It appears the operation does not have specific records which would make these estimates more reliable. Specifically, quantities of pellets generated, landfilled, sold, or burned; quantities of recycled material, income from the sale of them; the exact flow through the system; etc. Since the quantities and associated revenues of recyclable material were not known these revenues were not included in the cost evaluation. With high market values on recyclable material the material recovery facility would be more economically viable.

The operator has indicated the system has high maintenance problems, with substantial down time associated with the process. This was not taken into account in this evaluation, primarily due to the lack of precise numbers related to the amount of time the facility is operational.

The County currently has control of the waste due to flow control associated with the pelletizer and the potential for incineration of the material.

2) **Effectiveness.** At this time, the plant management indicates the processing/production rate is 1.9 tphr, with a 40 hour week this equates to 3,952 tpy. Assuming that 18% of this

quantity is actually recycled, 710 tpy of waste is recycled as a result of this process. This equates to only 2% of the total waste stream. Assuming 65% of the processed waste eventually becomes pellets, it appears the process generates 2,570 tpy pellets or 8% of the total waste stream. Of this quantity, it is estimated that only 550 tpy is marketed at this time or about 2%. This amount can count towards a diversion goal. The current diversion accomplished by the system is about 4%.

The plant management indicates the Lundell rated capacity of 10 tphr is for a full staff which would include the addition of 6 pickers to the existing operational staff of 11. Given 10 tphr, with a single shift, four ten hour days, fifty weeks per year, approximately 20,000 tpy of waste could be processed. This assumes routine maintenance would be conducted on Friday, Saturday, or Sunday, and two weeks for down time, holidays, etc for the year. This is 60% - 65% of the current waste flow for Robertson County (using 32,600 tpy which is the average waste generation for the next three years). This is close to the optimal rate for the County's waste due to the fact that it is logical to expect the Lundell system to process 60% - 65% of the waste due to certain wastes being unsuitable for this system (yard waste, wood waste, bulky items, etc. according to the waste stream analysis account for approximately 35% of the waste stream). The addition of staff to the system is assumed to result in an increase in diversion to about 4,600 tpy of recyclable material, 23% of the material processed (15% for the total waste stream). The system would generate about 13,000 tpy of pellets. If the pellets could be marketed the diversion would increase to 54% for the entire waste stream.

3) Cost. An important component of the cost evaluation for a materials recovery facility is the resources saved by diverting waste from a disposal facility. The actual cost associated with landfilling to Robertson County at this time, until 1996 (including O & M, closure and post closure costs) is \$36/ton. Currently, the cost savings associated with waste diverted from the landfill are 710 tons recycled material plus 550 tons pellets sold with a tipping fee of \$36/ton equals \$45,360/yr.

PELLETS. Given the current process and assuming 65% by weight of the processed waste becomes pellets, approximately 2,570 tpy of pellets are produced. The plant management estimates \$46,500 will be spent for fiscal year 1993/4 on the pelletizing process in maintenance costs. There is 228.5 HP associated with the pelletizing process. Considering annual operating time of 2080 hours and electricity costs of \$.055/kwh estimated operational costs run \$19,500 annually. The market for the pellets has not been consistent, with pellet sales producing a revenue for last year of \$5,500. This revenue was for the portion of the pellets sold. The plant manager did not know how much of the pellets were sold versus how much needed to be landfilled due to lack of market. Using an estimate of \$10 per ton for the pellets we can guess that 550 tons were sold, leaving 2,020 tons landfilled. The cost estimate for the operation of the pelletizer is \$46,500 + \$19,500 - \$5,500 - diverted costs from the landfill of \$19,800 = \$40,700. With the 2,570 tons per year of pellets generated this results in a cost of about \$16/ton of pellets or \$10/ton of waste processed.

If a consistent market could utilize the pellets at the \$10/ton, the operation cost for the pelletizer would be $\$46,500 + \$19,500 - \$25,700 - \text{diverted landfill cost } \$92,520 = \$-52,220$. This indicates that the pelletizer would be diverting costs for the County, even if the pellets were given away, as long as they were not landfilled.

PROCESSING PLANT. The operating budget of the processing plant for fiscal year 1993/4 is projected at \$377,438, the savings in diverted landfill costs is currently about \$45,360, and the pellets generated about \$5,500 in revenue last year. To divert 710 tons to recyclables and 550 tons to marketable pellets the cost is $(\$377,438 - \$45,360 - \$5,500)/(710 + 550) = \$259/\text{ton}$ (\$10/ton of total waste). Note, with a market for the pellets, 2,570 tons per year of pellets and 710 tons per year of recyclables diverted landfill costs would be \$118,080/yr. This equates to a cost per ton for the 2,570 pellets and the 710 tons of recyclables of $(\$377,438 - \$118,080 - \$25,700)/(2570 + 710) = \$71/\text{ton}$ (\$7/ton total waste). This gives the processing plant a total diversion of about 10%.

The cost of increasing the process to design flow was evaluated. With an increase in staff by 6 pickers the budget would increase by \$77,000/yr (total budget \$454,438). With an assumed increase in the diversion rate to 15% of the overall waste results in 4,650 tpy waste recycled, this plus assuming the same rate of pellets sold (550 tpy) would result in a diversion of 5,200 tpy. A savings from diverted landfill costs would be \$187,200. The cost would be $\$454,438/\text{yr} - \$187,200 - \$5,500 = \$261,738$, or \$50/ton of diverted waste (\$8/ton total waste). This provides for a total diversion of close to 16%. Note, if all of the pellets were marketed the diverted landfill cost would increase substantially. With the design flow rate (20,000 tpy) the amount of pellets generated would be 65% of the waste or 13,000 tpy of pellets. If a market could be found for the pellets the diverted landfill costs would be \$468,000. If a market could be found for the pellets, even with zero revenue from the pellets, the cost of the system would be covered by the diverted costs of landfilling. $(\$454,438 - \$468,000 - \$0 = -\$13,562)$

D. WASTE TO ENERGY

1) Energy Market. A survey of the available energy market within the region was conducted. This involved the contact of several industries and manufacturing facilities to determine interest and energy needs/requirements. These energy needs include the use of steam, chilled water or hot water. The production of electricity for sale to TVA (the region's utility) was not addressed due to TVA's low production costs. A summary of the companies contacted is included in Table VII-1. The results of this survey show that presently, there is not a viable energy customer among the industries and manufacturing facilities. However, due to their significant steam usage, Fort Campbell does represent a potentially viable energy customer.

During the survey process, two site visits were conducted to Fort Campbell. The first visit

was conducted in order to explain the 10-Year planning process being undertaken by Stewart, Montgomery and Robertson Counties and to establish interest on the part of Fort Campbell to be potentially involved in a waste-to-energy project involving the region. Representing Fort Campbell at this meeting was Wally Crow, PE and Dewayne Smith. Mr. Crow and Mr. Smith stated that Fort Campbell would be interested in pursuing the concept as long as there are benefits to the Post. Once this interest was established, a second site visit was conducted in order to obtain the needed information on the Post's energy requirements.

Fort Campbell has a total of five (5) boiler plants on the post. Based on the quantity of MSW being disposed of within the region, preliminary calculations were done and it was determined that only two of these plants are large enough to be considered in the evaluation of a waste-to-energy project. These two plants include Buildings #7008 and #3902. Records were obtained from the Post concerning the fuel and steam usage/production quantities.

From the data obtained during the site visit to Fort Campbell, it was determined that there was erroneous information concerning the steam production quantities. This was determined by comparing the energy in the steam which was produced (BTU) and comparing it with the energy in the fuel (BTU) which was consumed. From this comparison, the records obtained from Fort Campbell indicate that more energy was produced than was consumed. These findings were shared with Fort Campbell, and it was stated that it was quite likely that the metering equipment was at fault.

Based on these discussions with Fort Campbell, it was assumed that the fuel quantity data is accurate because the fuel companies use this information for billing purposes. Estimates were then applied concerning the overall system efficiencies in order to establish more correct steam production quantities. Using efficiency information from the International District Heating and Cooling Association on similar steam plants an overall system efficiency of 70% was applied. Based on this information, Table VII-2 was developed. The results from this table show that in 1992 Building #7008 produced 67,924,000 pounds of steam and Building #3902 produced 103,072,000 pounds. Both buildings (plants) produce the steam at 150 PSIG/saturated conditions and the primary fuel used is natural gas.

After establishing the steam load, the next step is to determine a fair market value for the steam which is to be sold. To do this, a steam production cost evaluation was completed in order to determine Fort Campbell's present production costs. Once the production costs were determined, a 10% discount was applied in order to give the Post an incentive to purchase steam from a waste-to-energy facility and a credit was applied for the purchase/lease of a 5 acre site on the Post for the construction of the facility. This production cost evaluation is included in this plan in the appendix. The resulting steam sale price to Fort Campbell used in this evaluation based on 1993 production costs is \$10.95 per 1000 pounds of steam.

2) Plant Sizing. Before an optimum waste-to-energy facility size can be established, an analysis to determine the quantity and composition/characterization of the MSW must be performed. Chapter II of this plan establishes the characterization of the waste for this region and Chapter III establishes the quantity of waste generated. The next step is to establish the characterization and heating value or BTU value of the waste. This is summarized in Table VII-3. The results from this analysis establishes the higher heating or BTU value of the waste at 4,825 btu/lb.

In order for a waste-to-energy project to be successful, the facility must be sized to the available market, which in this case is the steam usage by Fort Campbell. A load duration curve is often used as a tool to help determine the "optimum" sizing based on the energy market. A load duration curve represents graphically the total annual amount of energy (steam) which is to be supplied and the maximum and minimum flows of steam. Once this curve is established, one can graphically "pinpoint" the optimum size for a facility to meet the steam needs. Ideally, a waste-to-energy facility would be sized to meet the peak steam requirement so that the plant which is being supplied can act completely in a "standby" status. Three (3) alternates were evaluated for this plan: A) Supply steam to meet the needs of Building #7008 only B) Supply steam to meet needs of Building #3902 only and C) Supply steam to meet the needs of both Buildings #7008 and #3902. Figures VII-1 through VII-3 represent load duration curves for these alternates respectively.

Figure VII-1 is the steam load duration curve for Building #7008. It shows that the peak steam flow requirement is 45,000 lbs/hr. The area beneath the curve represents the total amount of steam required, which in this case is 67,924,000 pounds. In order to supply this 45,000 lb/hr peak and based on the higher heating value of the MSW, a waste-to-energy facility would have to combust approximately 16,250 lb/hr of MSW. This establishes a facility size of 195 tons per day of MSW, or approximately 60,249 tons/year (allowing for plant downtime). Also from this figure, it can be seen that a large amount of steam is produced which is not being sold. Ideally, every pound of steam produced at the waste-to-energy plant would be sold. Having a large amount of steam produced which is not sold have detrimental economic effects on a waste-to-energy facility. The figure also shows a small portion of steam which Fort Campbell will have to continue to supply. This is due to the fact that the waste-to-energy facility will typically be off-line for about 15% of a given year (85% availability). This down time occurs due to required boiler inspections and maintenance. Normally, however, the waste-to-energy facility would never be completely shut down. Because the facility would have two boilers, outages can be pre-arranged and staged in order to have minimal impact on steam being delivered to Fort Campbell. (The conceptual design of the facility is discussed further in Section G.) The impact of these outages results in steam sales being less than the 67,924,000 pounds which Building #7008 would require. The estimated actual sales would be 59,124,000 pounds.

Figure VII-2 is the steam load duration curve for Building #3902. It shows that the peak steam flow requirement is 60,000 lbs/hr. The area beneath the curve represents the total

amount of steam required, which in this case is 103,072,000 pounds. In order to supply this 60,000 lb/hr peak and based on the higher heating value of the MSW, a waste-to-energy facility would have to combust approximately 21,667 lb/hr of MSW. This establishes a facility size of 260 tons per day of MSW, or approximately 80,331 tons/year (allowing for plant downtime). Once again, as the load duration curve shows, there is a large amount of steam produced which is not sold and due to the waste-to-energy facility's 85% availability, the estimated steam sold would be 90,272,000 pounds.

Figure VII-3 is the combined steam load duration curve for Buildings #7008 and #3902. It shows that the peak steam flow requirement for this case is 105,000 lbs/hr. The area beneath the curve represents the total amount of steam required, which is 170,996,000 pounds. In order to supply this peak and based on the higher heating value of the MSW, a waste-to-energy facility would have to combust approximately 37,800 lb/hr of MSW. This establishes a facility size of 454 tons per day of MSW, or 140,729 tons/year (allowing for plant downtime). Since the region does not generate this amount of MSW, a scenario to meet all of the steam requirements for both buildings was not evaluated. However, a scenario in which most of the steam needs of Building #7008 is met (enabling Fort Campbell to operate this building on a standby basis) along with meeting a portion of Building #3902's requirements is possible. Under this scenario, a larger portion of the steam produced is sold compared to the other two alternates. Based on this, a plant size of 216 tons per day was established. From the load duration curve and allowing for the 85% availability, the total amount of steam sold under this alternate would be 149,396,000 pounds.

3) Waste to Energy Plant Criteria and Technology. The waste-to-energy technology chosen for this evaluation is a "mass-burn" type. This technology is designed to combust the MSW in an "as-received" state. This technology provides the region with the flexibility of being able to combust processed or non-processed MSW. Due to the size of the waste-to-energy facilities evaluated in this plan, the type of technology evaluated is of a modular design. Presently, this type of technology is the only viable choice in this size range. Utility grade combustor/boilers typically are not offered in this size and if they are, the pricing is prohibitive.

Since Fort Campbell requires a high level of reliability for the supply of steam, the plant will consist of two (2) separate combustor/boilers, each accounting for 50% of the total ton per day capacity. Figures VII-4 through VII-6 are schematic mass and energy balances developed based on the respective combustion rates. These figures were developed in order to determine the steam production capabilities of the waste-to-energy facilities and is a basis for O & M and sales information included in the tables and proformas in this chapter.

It is proposed that the waste-to-energy facility would be located on Fort Campbell property. This enables the efficient transportation/delivery of steam to the army post. Careful consideration was given to the plant location in order to minimize impact on Fort Campbell.

For purposes of this plan a site has been selected which is on 25th street, beside Building #6087 (on the Tennessee property of the army post). This site provides fairly good access to steam line tie-in locations, while accessibility for trucks coming to the facility is good without putting any undue stress on existing Fort Campbell traffic conditions. The foremost consideration in selection of a final facility location would be to minimize impact on Fort Campbell operations.

4) **Cost.** Once again, three different waste-to-energy alternates are evaluated for this plan:

Supply steam to meet the needs of Building #7008

Supply steam to meet needs of Building #3902

Supply steam to meet the needs of both Buildings #7008 and #3902.

The capital costs associated with the modular type of technology generally run in the \$100,000 per installed ton of capacity. This figure was used in determining the capital cost of the waste-to-energy facility, this figure does not include the capital cost of the steam and condensate distribution lines. Additional capital was added to this figure to account for the distribution lines. All of this pricing assumes that the project were developed based on a standard design/bid/construct approach. This method offers the most economical pricing for the facility to the region. Other procurement approaches include "turn-key" and "full service". These methods offer advantages with regard to guarantees, but at a higher capital cost.

Table VII-4 presents a summary of the operating costs associated with the three alternates. This table is supported by Exhibits A through I, which give a more detailed breakdown of the summary's itemized costs. These costs were developed based on the plant being operated and managed by the local governments through an Authority. Once again, other methods of plant operation can be investigated (such as operation by private or "full service" vendors) and there are advantages to them, however generally, costs are much higher with these approaches.

Recent legislation requires operators of waste-to-energy facilities to be certified by passing an operations examination. This law is presently in effect and several review courses are offered by organizations such as the American Society of Mechanical Engineers.

5) **Residuals/Excess Waste.** All available waste disposal technologies require some type of landfill facility and waste-to-energy is no exception. Even if the total MSW generated within the region were to be combusted, there would have to be a landfill for the ash residue. Landfill facilities would also have to be provided for materials which can not be combusted in waste-to-energy facility such as construction and demolition debris. The

quantity of ash resulting from combustion will be in the range of 10% of the original volume of the waste and 15-1/2% of the original weight.

Unfortunately, as demonstrated by the load duration curves, the steam requirements of Fort Campbell offer a limited revenue stream from steam sales. As depicted on the load duration curves, as the size of the waste-to-energy facility increases, steam sales will NOT reflect a proportionate increase. Therefore, combustion of additional MSW at the waste-to-energy facility will have detrimental effects on the resulting tip fee. To put this another way, the financial components of a waste-to-energy facility can be summarized with the following equation:

$$\text{Tip Fee} = \text{Energy Sales} - \text{Debt Service} - \text{Operations and Maintenance}$$

Of these components, the debt service and all of the O&M costs except staffing, will vary linearly with a corresponding change in plant size. Because the energy sales component either remains constant or does not increase proportionately as additional waste is combusted (thus increasing the size of the facility), the corresponding tipping fee will increase also. If Fort Campbell's base load steam requirements increased, then a larger facility could be justified and a lower tipping fee would result. This is a typical problem facing waste-to-energy facilities which supply steam for heating purposes. Because the steam is used for heating, the load is seasonal. If a larger portion of the load were to be used for a year round process, the resulting load duration curve would be more rectangular in shape.

Any plant size increases or expansion possibilities would have to be addressed and justified as the circumstances arise.

The costs associated with landfilling the excess waste and the ash were evaluated. Costs for the waste to energy option utilizing the entire three county waste stream were conducted as well as the cost of utilizing the waste of Bi-County alone. The tipping fee for the entire region's waste (164 tpd with a 2.66% growth rate) was \$21.52 to \$27.54/ton. The tipping fee for Bi-County's waste (73 tpd with a 4.1% growth rate) was \$30.37 to \$31.94/ton. The spread sheets are included at the end of this chapter. The costs are based on the assumption that the Bi-County landfill would be the disposal facility, with design modifications to allow for the disposal of ash along with the overflow waste.

6) Summary/Projections. Proformas VII-A, VII-B and VII-C provide financial projections for a period of 20 years for the three alternates addressed by this plan. The resulting disposal or tipping fees per ton of MSW is also shown. The proformas shown do not account for the ash disposal costs or any additional transportation costs.

From the proformas, the most economical waste-to-energy alternate appears to be Alternate C) Supply Steam to both Buildings #7008 and #3902. This conclusion along with the waste-to-energy option as a whole would be subject to the final energy sales negotiations with Fort

Campbell, resulting in pricing equal to that used in this evaluation.

7) Permitting. There are two major phases of permitting requirements for a waste-to-energy facility. The first involves a permit to construct such a facility (construction permit), and the second involves a permit to operate once the facility has been completed (operating permit). These permits involve compliance with existing state and federal regulations concerning facility operations and effluent emissions. The facility owner would be required to obtain a permit prior to construction which demonstrates that the plant will not exceed any of the regulatory limits once it is put into operation. Once this permit is obtained, the facility can be constructed.

The second permit is obtained after the plant is substantially completed and the facility starts combusting waste. Testing will be performed during this period in order to establish that the plant is operating within the limits designated by the construction permit.

8) Implementation and Schedule. The foremost requirement of the waste-to-energy option would be to negotiate with Fort Campbell with regard to their continued interest in such a project. This involves the use of Fort Campbell property for the construction of such a facility along with negotiations on a sale price for the steam.

A multi-county undertaking such as a waste-to-energy facility would also require the formation of a body which is made up of representatives from each of the local governments (such as an Authority). This would be required for purposes of bonding and financing of such a facility to ensure faith and credit along with control of the waste (fuel) stream. This would also require a long term contract (20 years) with Fort Campbell for the purchase of the steam. All of this would be a requirement of this option if the facility is going to be owned and/or operated by the counties. If a turn-key or full service approach is pursued, the turn-key or full service vendor would have to reach agreements with the entities involved.

The financial information in Section M of this chapter assumes a waste-to-energy facility being on-line starting in 1997. In order for that schedule to be met, construction would have to commence approximately mid to late year 1995. This allows a period of 1-1/2 to 2 years prior to ground breaking for negotiations, permitting and for a large part of the design process to take place. While it is difficult to assign time periods to negotiations and permitting, if these items are pursued early in 1994, they should be completed by early 1995.

9) Conclusions and Recommendations. In viewing the results of the proformas, it appears that waste-to-energy is a viable option for the region. Results show that for the portion of the waste being disposed of at a waste-to-energy facility serving both Buildings #7008 and #3902, tipping fees fall in the \$40 to \$50 per ton range (not including ash disposal). Although this figure is not as financially attractive as existing disposal options within the region, it does offer unique advantages:

- Revenue from the sale of energy - stabilizes waste disposal costs
- Minimizes the amount of waste going to a landfill
- Ash produced is a stable, low risk residue which minimizes environmental impact
- Ash residue disposal is less labor/capital intensive (less cover and compaction required)

Also, based on the fact that the accuracy of some of the data furnished by Fort Campbell is questionable, this option could be pursued with an in-depth feasibility study in the future. Through such a study, more concise information could be gathered regarding Fort Campbell's steam production numbers and costs along with more accurate load information. In viewing Figures VII-1 through VII-3, it is apparent that the production capacity of the waste-to-energy alternates is vastly under utilized.

It is evident that waste-to-energy can offer Fort Campbell substantial savings in their production costs and at the same time offer the region an alternate to landfill disposal.

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CHAPTER VIII DISPOSAL CAPACITY

The Tables, Figures, Charts referenced are included in the "Supporting Information and Calculations" document

BACKGROUND. The SMR Solid Waste Management Region has two municipal solid waste disposal facilities: the Robertson County Landfill which has a materials recovery system on site and the Bi-County balefill. The city of Springfield also has a brush disposal area used for the City's brush waste only, not open to the public.

CLASS IV CAPACITY.

The Bi-County landfill has a small area delegated to Class IV, demolition and construction waste as part of the footprint for the landfill. A corner of the balefill, about 2 acres is used as a Class IV. The air space is difficult to estimate since a topographic survey has not been conducted to determine the current elevations, but a rough estimate would be less than 10,000 to 20,000 cubic yards of air space remain.

CLASS I CAPACITY.

Bi-County; 3212 Dover Road, Woodlawn

Contact: Mark Neblett, Superintendent Landfill Operations

The site is on an approximately 82 acre tract of land. The current area provided with a clay liner and leachate collection system is about 11 to 12 acres. Approximately 53 acres are permitted for placement of sanitary refuse bales with the remainder available for borrow. Bi-County is in the process of upgrading the remaining permitted area to meet Subtitle "D" requirements. The permit modification for upgrading to Subtitle "D" standards will also include design modifications to increase the capacity of the composite lined area. Bi-County will be evaluating a vertical expansion as well as the cut depths.

The original air space available for waste in the currently permitted area was approximately 2,000,000 cubic yards. Given the past and future expected waste flow for the facility, an estimated capacity is 10 years remaining air space. This is based on an estimated density of the bales at 1269 #/yd³; 10% air space under the final cover being allowed for working cover; six day work week; and a waste flow between 250 and 300 tons per day. The waste flow is for Bi-County waste, which includes waste generated in Stewart and Montgomery County, but not waste from Fort Campbell. Since the landfill began operations in 1989, the landfill as currently designed should last until the year 2003. If the proposed redesign is approved this will increase the life even more (probably by another 8 to 9 years).

Robertson County; 2916 West County Farm Road, Springfield.
Contact: J. R. Mantlow, Landfill Supervisor

The Robertson County landfill has an operating area which does not have a containment system in place. The current plans indicate the current fill operation has approximately 586,000 yd³ (175,000 tons of waste) of air space remaining as of September 1993. Given the expected waste flow for the facility, an estimated capacity of 4 years air space remains. This is based on an estimated density of the in place waste of 800 #/yd³; 20% air space under the final cover being allowed for working cover; six day work week; and a waste flow of approximately 120 tons per day (7 day work week). The waste flow is for Robertson County waste only. This would provide enough capacity at the existing facility to actually last until the year 1998. However this area can only operate until 1996 due to Subtitle "D" restrictions on uncontained facilities. Volume estimates for the air space utilized between 1991 and 1993 indicate over 200,000 yd³ of air space was utilized. Given this volume used and the waste flow of 62,506 tons for that two years the estimated in place density turns out to confirm the 800 #/yd³.

The County has an adjacent parcel of property which has been designed and permitted for a horizontal expansion. This expansion has an estimated capacity of 1,075,000 yd³. Given in place density of 950 #/yd³, waste to cover ratio of 4 to 1 and a six day working week this results in approximately 400,000 tons of capacity. This will provide sufficient capacity to last approximately 12 additional years. This puts the anticipated life of the site to the year 2008.

IMPLEMENTATION SCHEDULE.

Bi-County is preparing the design modifications to upgrade the next cell to meet Subtitle "D". The current cell is expected to be operational until next fall. With the design modification pending, the permitting process will take until early spring which allows the summer and fall for construction for the next cell. Once the design modifications are permitted, the Bi-County landfill can update construction on subsequent cells to meet Subtitle "D". The facility will last in excess of the ten year planning period.

It is possible the current Bi-County landfill could be horizontally expanded at some time in the future with a full evaluation of the suitability of adjacent Fort Campbell property.

Robertson County landfill intends to operate until 1996 in the current area. If the County proceeds with the horizontal expansion in compliance with Subtitle "D", the county will need to follow the steps outlined below. The schedule is general, certain tasks are difficult to predict, in particular regulatory review time frames. Since the design is approved and permitted, the schedule starts with preparation for bids.

ROBERTSON COUNTY HORIZONTAL EXPANSION AS A CLASS I LANDFILL

<u>Date</u>	<u>Task</u>	<u>Cost Estimate</u>
December 1995	County authorizes Consultant to prepare bid documents for construction	\$10,000-\$25,000
March 1996	County bids construction of first cell sufficient for 2-3 years of waste	\$5,000-\$10,000
April 1996	County awards/signs construction contracts	
May 1996	Contractor begins construction of contained landfill cell (estimate 3 acres)	\$400,000-\$600,000
September 1996	County begins operations in new contained cell	

CAPACITY CONTROL. SMR has sufficient Class I capacity in excess of the 10 year planning period, based on the quantity of solid waste requiring disposal adjusted for population and economic growth as shown in Table III-3 (approximately 111,000 tons for 1994, about 355 tons per day; 128,000 tons for 2003, about 410 tons per day). The Region can control the waste flow going to the landfill since the facilities are owned and operated by the counties. The Region will have in excess of one million tons of available capacity at the end of the ten year planning period. The Region has the option of coordinating with neighboring counties during the ten year planning period to accept out of Region waste as needed to offset the high cost of operating Subtitle "D" landfills.

In the event the waste flow dramatically increases during the ten year planning period, the Region will proceed with the process for obtaining additional disposal capacity. If the Region pursues development of a new disposal facility it will be with sufficient time to avoid a loss of service to the community at the local level. The Region will annually reevaluate the capacity remaining at the landfills. At the point that five years capacity remains, the Region will begin the reevaluation process for long term disposal options.

LONG TERM DISPOSAL (IN EXCESS OF TEN YEARS).

At the point that the Region begins the reevaluation process, the process will begin through communication with neighboring counties/regions regarding a regional approach to solid waste disposal. Once the Region establishes the size and members of a cooperative

group, they can proceed through the site selection process. The site will 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, disposal area configuration and potential fill depth

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.

SMR REGIONAL DISPOSAL OPTIONS

A variety of final disposal options were evaluated for the Region from an economical perspective. Life cycle cost analyses were conducted for the different disposal options. The cost analyses were conducted with computer spread sheets. The final cost per ton value includes the site development, operations, closure and post closure. The waste flow when presented in tons per day (tpd) represents a 365 day/year. One scenario, the existing Robertson County landfill, was evaluated using basic engineering economic formulas to double check the output, the results verify the accuracy of the model used. The specific costs referenced below are for 1997 unless otherwise noted. The yearly costs associated with each option are provided in the individual cost analyses as well as the cost summary charts. In parenthesis is the specific spread sheets for each cost analysis. The supporting calculations are included in the addendum document "Supporting Information and Calculations for the SMR Solid Waste Management Plan".

LANDFILL OPTIONS - cost analysis

- 1) Continue existing operations, 2 landfills.
Cost analyses were run for the existing systems in general using current expenses, staff, etc. for Bi-County and for Robertson County. For Robertson County cost were run for the existing uncontained facility to operate until 1996 (RCLFCUR.QTR) and another cost analysis was run for the currently permitted horizontal expansion expected to operate from 1997 to 2008 (RCLFEXP.QTR). For Bi-County a cost analysis was run for the existing facility with the expected vertical expansion to last until 2012 (BICCURT.QTR).
- 2) Continue existing operations; increase waste flow to Robertson County landfill. Cost analyses were run for increasing the waste going to the Robertson County Landfill. An increase of 20 tpd was used since neighboring Cheatham County is looking for disposal options and that is close to what they would be hauling. In fact, the current landfill could accept up to 40 tpd additional waste and still not attain the full capacity prior to the regulatory closure date of October 1996. Cost were run for the current situation (RCLFCURCH.QTR) and for the horizontal expansion for 1997 through 2006 (RCLFCHM.QTR).
- 3) One regional landfill, located at Bi-County.
Cost analyses were run for operating Bi-County including the vertical expansion to last until 2008 (BICREG11YR.QTR).
- 4) One regional landfill, located at the waste generation centroid.
Cost analyses were run for developing a regional landfill at the centroid of the waste generation (on the east side of Clarksville) which would last from 1997 to 2016 (CENTROIDLF.QTR).

ROBERTSON COUNTY -

The current fill area will close by October 1996 since it does not have a liner and associated leachate collection system. The current fill capacity is estimated at 175,000 tons. At the anticipated Robertson County waste flow this will leave 44,600 tons of unavailable capacity in 1996. The costs associated with the current landfill are for 1994: \$35.38/ton.

Although the existing landfill has relatively low development and operational costs, the regulations allow less than three more years of operation. Of long term concern is potential environmental impact due to the lack of containment system in the existing landfill. Due to the unknown impact of this issue it was not taken into account in this cost evaluation.

The remaining three years of capacity for the landfill will need to provide revenue for the expensive closure and post closure care for the entire landfill (closure/post closure over \$15/ton). This means that even though the cost per ton tipping fee to regionalize immediately appears lower, it is more cost effective for Robertson County to utilize the existing landfill's capacity, since it will be providing for the cost of closure and post closure which is a cost the County is responsible for whether the landfill continues to operate or not. The most economical disposal option for Robertson County would be to remain operating in the existing facility until 1996. This economic incentive could be even greater with some additional out of county waste, not to exceed 40 tpd.

Robertson County has a permitted horizontal expansion with about 400,000 tons of capacity which can last till 2008 at the anticipated Robertson County disposal rates. The costs associated with the horizontal expansion to be constructed in 1996 are higher than the cost of transporting the waste to a regional landfill (Bi-County \$31.45/ton or the centroid landfill (\$28.04/ton), though lower than the waste to energy option (\$49.22/ton). The 1997 cost, for Robertson County waste only: \$38.08/ton. If the waste flow to the landfill increased the tipping fee would decrease, eventually approaching the cost of a regional facility.

BI-COUNTY -

The current fill area will last until 2003 with the estimated 900,000 tons of remaining capacity. Bi-County intends to construct the next cell in compliance with Subtitle "D" so they are not affected by the October 1996 deadline. Bi-County is in the process of permitting a vertical expansion which will increase the capacity (800,000 tons was used for this evaluation). This will extend the current life to the year 2012. The costs associated with the current operation are for 1997: \$22.40/ton.

This provides the second lowest cost option for Bi-County. Accepting additional waste at the Bi-County landfill, such as from Robertson County, would lower the tipping fee further (\$20.90/ton). The cost for Bi-County would be higher if the waste was hauled to the regional landfill located at the centroid of the region's waste (\$24.86/ton), or hauled to a waste to energy facility (\$40.64/ton).

This equates to a two existing landfill disposal system cost for 1997 of:

$$\begin{aligned} &(\$38.08/\text{ton}) (33,389 \text{ tons}) = \$1,271,453 \text{ for Robertson County} \\ &(\$22.40/\text{ton}) (83,143 \text{ tons}) = \underline{\$1,862,403} \text{ for Bi-County} \end{aligned}$$

$$\$3,133,856 / 116,532 \text{ tons} = \$26.89/\text{ton}$$

REGIONAL LANDFILL

Bi-County Regional Landfill. The cost of a regional landfill system handling the entire region's waste stream was compared to the option of maintaining two disposal facilities. One option was locating the regional landfill at the existing Bi-County landfill, expanded as needed to accommodate the waste of the region. Bi-County is expected to generate 83,134 tons in 1997 and Robertson County 33,389 tons. If the entire region's waste goes to this system, the Bi-County Landfill will reach capacity around the year 2008. The disposal cost would be for 1997: \$20.90/ton.

TRANSPORTATION. The additional transportation costs to move Robertson County's waste to the Bi-County landfill were estimated with an approximate distance between the two current landfills of about 40 miles. The waste is assumed to be hauled on tractor trailers. The reference "Solid Waste: Transportation and Other Costs" by UT County Technical Assistance representative Lewis Bumpus was used to estimate costs. The tractor trailer travel costs are presented as \$.246323/ton/mile. This is using a \$7/hour pay rate for the driver. Travel costs for 1997: 40 miles (\$.246) = \$9.85/ton.

Additionally, some improvements at the existing materials recovery facility in Robertson County would be needed to facilitate the transfer of waste. This would include upgrading the building, expanding the loading area, providing a loading dock for transfer of the waste and adding a baler. The capital cost would be about \$500,000. This equates to about \$25,000 per year, adding to the system cost by \$.70/ton for 1997. Robertson County cost would be $\$9.85 + \$0.70 + \$20.90 = \31.45 .

This equates to a regional Bi-County landfill disposal system cost for 1997 of:

landfilling of 116,532 tpy at \$20.90/ton (\$2,435,519)
transfer cost of 33,389 tpy at $\$9.85 + \$0.70 = \$10.55$ /ton (\$352,254)
TOTAL: $\$2,787,773/116,532$ tpy = $\$23.92$ /ton

Centroid of Waste New Regional Landfill Location. Costs of developing a new landfill site were evaluated using 1997 as the start up year. This would represent the location in the region with the least transportation costs. The centroid is located on the east side of Clarksville as shown on the regional map. The costs for 1997 of \$21.18/ton.

This cost is compared to the disposal of the Region's waste at Bi-County landfill. The centroid of the region's waste is approximately 15 miles east of Bi-County landfill. The savings in cost of siting a landfill at the centroid would be determined using the UT reference. For tractor trailers to transport the waste from Bi-County to the centroid would be $(\$0.246323/\text{mile}/\text{ton})(15 \text{ miles}) = \$3.69/\text{ton}$. For tractor trailers to transport from

Robertson to the centroid would be $(\$246323/\text{mile}/\text{ton})(25 \text{ miles}) = \$6.16/\text{ton}$. For Robertson County the cost of upgrading the processing facility would still equate to about $\$.70/\text{ton}$ for 1997.

This equates to a regional centroid landfill disposal system cost for 1997 of:

landfilling of 116,532 tpy at $\$21.18/\text{ton}$ ($\$2,468,148$)
Robertson County - transfer cost 33,389 tpy: $\$6.16 + \$0.70 = \$6.86/\text{ton}$ (229,049)
Bi-County - transfer cost 83,143 tpy: $\$3.69$ ($\$306,798$)

TOTAL: $\$3,003,995/116,532 \text{ tons} = \$25.78/\text{ton}$

WASTE TO ENERGY OPTIONS

- 5) The waste to energy option explored resulted in the conclusion that the optimum waste flow for the waste to energy facility with the lowest cost per ton for the plant would be about 250 tons per day. Cost analyses were conducted for the supporting landfill (assumed to be the Bi-County landfill) to take the overflow from Bi-County's waste along with the ash (ASHLFBIC.QTR). Another set of cost analyses were conducted for the Bi-County landfill to accept the waste overflow if the regional waste went to the waste to energy option along with the ash, one analysis was for the years 1997 to 2012 (when the existing Bi-County landfill would reach capacity - (ASHLFSMR.QTR) and the second for 2012 to 2026 (ASHLFEXTR.QTR).

The cost of the waste to energy facility system handling the entire region's waste stream as well as strictly Bi-County's waste were evaluated. Cost comparisons utilized the existing Bi-County Landfill redesigned and permitted for disposal of the ash and the overflow of waste from the waste to energy plant. The Pro Forma VII-C shows the volumes of waste which will be incinerated and landfilled for the 20 year planning period of 1997 through 2016. The incinerator's optimal combustion is for 66,952 tpy, which could be provided for by the Bi-County waste stream alone. This results in Robertson County's waste going to the overflow landfill. However, with Robertson County's waste the cost of the associated landfill is reduced substantially which results in a lower disposal fee for the regional waste than for the Bi-County waste only. The resultant disposal cost estimate for the region's waste is $\$38.67/\text{ton}$ and for Bi-County's waste stream alone of $\$47.45/\text{ton}$.

REGIONAL WASTE TO ENERGY. With an evaluation of the waste to energy facility receiving the entire regions's waste, the additional transportation costs to move Robertson County's waste to the Bi-County landfill were estimated. The approximate distance used between the two current landfills was about 40 miles. The waste is assumed to be hauled

on tractor trailers, with the same calculations as above, the additional transportation cost for 1997 of 40 miles (\$.246) = \$9.85/ton

Additionally, the same improvements at the existing materials recovery facility in Robertson County would be needed to facilitate the transfer of waste, adding to the system cost by about \$0.70/ton/year.

This equates to a regional waste to energy disposal system cost for 1997 of:

disposal (\$38.67)(116,532) = \$4,506,292
transfer cost (\$10.55)(33,389) = \$1,376,636
transfer cost (\$1.96)(83,143) = \$162,960

TOTAL: \$5,021,506/116,532 tpy = \$43.09/ton

BI-COUNTY WASTE TO ENERGY. The incinerator's optimal combustion rate remains 66,952 tpy at its projected start up date in 1997. This results in an incineration cost to BiCounty of \$46.84/ton in 1997. Cost comparisons utilized the existing Bi-County Landfill for disposal of the ash and the overflow of waste from the waste to energy plant. With only Bi-County's waste using the landfill and incinerator the landfill is expected to last until the year 2026, at a cost of \$30.79/ton in 1997.

This equates to the Bi-County's waste to energy disposal system cost for 1997 of:

incineration of 66,952 tpy at \$46.84/ton (\$3,136,032)
landfilling of 26,569 tpy at \$30.79/ton (\$818,060)

TOTAL: \$3,954,092/83,143 tpy = \$47.56/ton

With the incinerator handling only Bi-County's waste, Robertson County's waste would then be managed at the horizontal expansion of the Robertson County Landfill at a cost for 1997 of \$37.87/ton.

This equates to the Bi-County W-E and Robertson County Landfill option disposal system cost for 1997 of:

$(33,389(\$37.87) + 83,143 (\$47.56))/116,532 = \$44.78/\text{ton}$

SUMMARY 1997 DISPOSAL SYSTEM COST

OPTION	REGIONAL	BI-COUNTY	ROBERTSON
Existing System, 2 Landfills	\$26.89/ton	\$22.40/ton	\$38.08/ton
Regional Bi-County Landfill	\$23.92/ton	\$20.90/ton	\$31.45/ton
Regional Centroid Landfill	\$25.78/ton	\$24.87/ton	\$28.04/ton
Regional Waste-Energy	\$43.09/ton	\$40.63/ton	\$49.22/ton
Bi-County W-E w/Robertson County Landfill	\$44.78/ton	\$49.42/ton	\$37.87/ton

DISPOSAL COST ESTIMATE

The most cost effective option for the Region until 1996 is to continue operations as the current system, with one adjustment. Robertson County is to continue operations at the existing facility, but they should attempt to increase their waste flow slightly, not to exceed 40 tpd. Bi-County landfill is to continue accepting waste from Stewart and Montgomery counties. In the event Bi-County increases their waste flow, this increase would tend to bring the facility tipping fee down.

The most economical option for the region subsequent to 1996, given the anticipated waste flows, is for the region to operate one disposal facility at the existing Bi-County landfill. However, three disposal option scenarios offered **Regional** costs in the mid \$20/ton range. These options include the regional disposal facility at BiCounty, or centrally located and to continue with current operations. The Regional Solid Waste Board has indicated the region will continue with the operation of two existing disposal facilities. The cost figures below are based on this option. Half way through the planning period and again at the end of the plan, the costs of regionalization with a centrally located facility can be revisited.

Regional Disposal Cost for 1993/4:

Bi-County: \$21.34/ton for 77,473 tons/year = \$1,653,273

Robertson County: \$35.38/ton for 31,822 tons/year = \$1,125,860

Region Disposal Cost: \$2,779,134

Regional Disposal Cost for 1997:

Bi-County: \$22.40/ton for 83,143 tons/year = \$1,862,400

Robertson County: \$38.08/ton for 33,389 tons/year = \$1,271,453

Region Disposal Cost: (\$23.92) (116,5342) = \$3,133,853

* if Robertson County could locate another source of waste, it would result in a noticeable decrease in their tipping fee; this is particularly noticeable in the next three years, where the waste flow could increase by about 40 tpd through 1996 and not impact the life of the landfill.

CHAPTER IX PUBLIC INFORMATION AND EDUCATION

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.

Regional Needs for Education

The Environmental Advisory Committee of Montgomery County is an organization within the region which focuses on education concerning solid waste related topics.

Authority and government sponsored education programs have been offered by both Bi-County and Robertson County.

The regional needs include the expansion of the educational system to include more of an emphasis on rural participants (particularly in Stewart County). In addition, the present program of presentations to school children should be upgraded to an actual curriculum which would be made available to the school systems.

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 Nurseries and Landscapers for Compost Market

Target Groups and Audiences, Amount and Kind of Information, Specific Methods

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: 5th Grade students throughout the region.

Amount and Kind of Information and Specific Methods to be Utilized: Presented in the appendix is a five unit study with 28 associated activities. Four seminars (one

per county) 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. The amount of effort which the individual teachers must exert to prepare to teach this program must be minimal.

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: 10th grade students throughout the region.

Amount and Kind of Information and Specific Methods to be Utilized: Presented in the appendix is a five unit study with 36 associated activities. Four seminars (one per county) 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 two pages of the evaluation form shown in the appendix 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 areas in the region which would have sufficient amounts of this environment are Clarksville, Springfield, Greenbriar, and White House. 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 either the Clarksville area or the Springfield 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

Target Groups and Audiences: 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 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 cancelled, 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, 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 in the four counties should be contacted in an effort to inform the church community of the available programs which might be used for fund raising 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 Nurseries and Landscapers for Compost Market

Target Groups and Audiences: Nurserymen and Landscapers

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 and landscapers would be recorded and maintained.

Staffing and Budget Needs

Regional: In the three-county region, it is assumed that one full-time Director of solid waste operations will be required. In addition, specific anchor people for each county will handle individual county needs. The budget for this group is included under Chapter VI.

Funding Options and Allocation of Responsibility

This program is to be funded through direct surcharge on the disposal tipping fees as detailed in Chapter VI.

10-Year Implementation Schedule

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 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)
Ongoing	Educational Programs in Schools (Goal 1, Objective a)
October 1995	Area Office Education, Target Three Offices Per Month (Goal 1, Objective c)
February 1996	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)



Appendix I
Grade 5 School Curriculum



Appendix II
Grade 10 School Curriculum

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Appendix III
School Curriculum Evaluation Form



CHAPTER X. PROBLEM WASTES

Supporting information and references for this chapter is included in the addendum document, "Supporting Information and Calculations for the Stewart-Montgomery-Robertson Regional Solid Waste Plan".

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 by the contract with the State 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 his 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 schedules 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 (or Region) can request assistance with advertisement and educational programs from the state as well. Each county needs to provide the Section with 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 (532-0091)
Special Waste Section
Division of Solid Waste Assistance
14th floor, L & C Tower
401 Church Street
Nashville, Tennessee 37243-0455

In order to present an effective program a key ingredient is effective advertising and 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:

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 plans 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 detail for this issue.

SITE PREPARATION. Each county is responsible for providing the temporary site for the Collection Event. It is recommended the site be county owned. If the site is not county owned, the county needs to provide appropriate documentation of the specific agreement with the property owner (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. 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. It 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. An example form is provided at the end of this chapter (note, the State may provide 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. 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. The county representative will be responsible for coordinating county volunteers and for properly managing the solid waste on site.

COUNTY SPECIFIC ACTION. The first household hazardous waste collection day in the State program was Rutherford County on September 23, 1993. Over 400 cars visited the site to utilize the services offered. Overall the day was a success. The advertisement used by Rutherford County is included with this section. Bi-County conducted a household collection day in Clarksville in October 1993, as coordinated by Pete Reed. This event collected over 6000 pounds of household hazardous waste, with about 100 cars attending.

Robertson County, City of Springfield, and the Chamber of Commerce have worked with Laidlaw (located in Greenbrier) directly in setting up successful County Clean Up days. Robertson County can utilize the services of the State collection program while it is available. Robertson County has scheduled the State contractor for a collection event for June 4, 1994. Stewart County, working with Pete Reed, has scheduled a collection event for May 21, 1994.

The staffing requirements for each county will primarily involve the individual on site during the collection event. This individual will likely be from the public works or sanitation

department, preferably a supervisor or someone of equitable responsible nature. Pete Reed for Stewart and Montgomery and Buford Summers for Robertson would be logical choices for coordinators. It is recommended that these individuals be designated as the event organizers as well. The event organizer would coordinate choosing and preparing the site; setting the schedule with the State; developing and implementing the advertising campaign; working with the State Contractor to evaluate the site and assure the availability of all needed materials; coordinating volunteers; being on site at all times during the event; providing the final inspection and any follow up as needed.

In discussion with Pete Reed who coordinated the collection event in Clarksville, he estimated the County contribution was approximately 2 staff people for 3 days, with \$200 to \$300 in supplies and managing solid waste received. He stressed the involvement of volunteers to keep the costs to a minimal as well as to assist in public education. This results in about \$1,000 in County costs. This assumes the advertising is donated by local media.

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 or until the funding is exhausted (\$1,500,000). However, the contract is reevaluated annually. Given that, counties need 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.

Once the State program has been exhausted, the individual counties need to evaluate the options to continue the program with their own resources. The data accumulated from the State program can be used to estimate cost and assist in setting up regional programs. The Rutherford County collection event cost the State over \$20,000 while the Montgomery County program cost about \$10,000 due to less participation.

To take advantage of the economies of scale the SMR Solid Waste Regional Board can contact surrounding regions and counties to discuss options for continuing the services of a Contractor. Due to the high cost of individual programs (except in the case of Robertson County who is working directly with Laidlaw), it is unlikely the counties could finance household hazardous waste programs individually. Coordinating with other regions may allow for an economical option of continuing with the services of a private contractor. Preliminarily, the Region can establish collection programs, one collection day in each county once per year. Working with some adjacent regions, collection days will be set up periodically at alternating counties. Potential interaction with the Lewis, Hickman, Perry Region, Maury - Marshall Region, Sumner, Macon, Trousdale and Smith Region, as well as Cheatham, Dickson, Humphries and Houston Counties would provide a large enough

area to coordinate a rotating collection program with a private collection contractor, with each county conducting only one program per year.

The advertising campaign for the collection days would be disseminated to all participating counties. This allows participants access collection programs in other counties if they could not wait until their home county's scheduled day.

The progress made by the State funded collection events needs to be maintained with a continuing educational program. The information provided to the public regarding the dangers and alternatives of HHW needs to be ongoing. Information such as the attached is a listing of typical HHW with more environmentally friendly alternative products is particularly important in avoiding the generation of household hazardous waste.

The implementation of the long term household hazardous waste management program will be under the responsibilities of the Region's Recycling/Educational program, since the importance of proper education in this issue is paramount.

IMPLEMENTATION SCHEDULE. The region will take full advantage of the State funded collection program as shown with Bi-County conducting one of earliest collection program in the State. Robertson and Stewart Counties have scheduled their collection events for May and June.

In the fall of 1994, Montgomery County can contact the State to explore the possibility of having the Contractor return for a second day. If the state Contractor can schedule the frequency, the Region will conduct one collection day every four months, alternating counties. This would have each county responsible for a collection event only once or twice per year.

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 budget for HHW collection and management. The budget presented below provides rough estimates for expected program costs. the cost of Regional staff time is not included since it is budgeted in other chapters.

DATE	SCHEDULED TASK	ESTIMATED COSTS
1994-1996	state funded collection event in each county	\$1,000 - \$2,000/county
1996	Region investigate county events funded locally	\$500- \$1000 total region
1997-2003	Regional funded collection events in each county	\$15,000 - \$25,000/county

Date

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
SMR Solid Waste Region
_____ County

This letter serves to request scheduling of a household hazardous waste collection event in _____ 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 _____, The on site representative who will coordinate the county's responsibilities will be _____. 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: _____

Potential volunteers for this event may be contacted through 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,

County Executive

**HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM
SMR 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) _____

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 will go 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 (difficult to compact, tend to rise and interfere with cover integrity, leave voids in the waste after rising, etc)

- investigate alternative disposal options, such as recycling or reuse of the tire material subsequent to shredding

CURRENT SYSTEM. The existing tire management program is provided on a county basis (Stewart and Montgomery work together on this issue). Bi-County and Robertson County landfills have each established a tire storage area and works with the State shredding operation prior to disposing of the tires in landfills.

Robertson County installed a tire storage facility at the landfill site in June 1993. The landfill charges \$36 per ton for waste tires. This is the same tipping rate for commercial haulers of municipal solid waste. The shredder has visited the site twice since opening. Once the tires are shredded they are landfilled in the existing Robertson County landfill. The State records indicate that 25,779 tires were sold in Robertson County between October 1991 and June 1993 in Robertson County. Since the County uses landfill employees and the existing landfill for disposal, it is difficult to estimate the operational costs.

Bi-County Landfill has a tire storage area on site. The State tire shredder has visited the

Bi-County tire storage site twice. The State records show that to date 42,469 tires have been shredded at this site. The shredded tires are landfilled on site at the existing Bi-County Class I landfill. Since Bi-County uses landfill employees and the existing landfill for disposal, it is difficult to estimate the operational costs. The State records indicate that 99,655 tires were sold in Montgomery County between October 1991 and June 1993. The State records indicate 2,491 tires were sold in Stewart County in the same time period.

It is difficult to provide a quantitative estimate regarding the extent of illegal dumping problems in the Region. In general the counties agree that the extent of illegal tire dumping is an issue, more so in Robertson and Stewart County than Montgomery. Based on the number of tires sold compared to the number of tires shredded, the likelihood of problematic tire dumping is high. Most of the counties use the litter grant pick up program to address small illegal dumping problems. Implementation of each of the tire storage areas and effective advertising will reduce the illegal dumping problem.

IMPLEMENTATION. Each county in the region is currently meeting the minimum requirements for the regulations, in that they have developed tire storage areas and are shredding the tires prior to disposal. The Region's goals go beyond the minimum requirements of the regulations. The Region will move further by aggressively addressing the issue of illegal dumping problems and investigating the feasibility of alternative disposal options. The waste tire program is primarily a county operation, with general coordination provided on a regional basis. The Region will assign the general coordination responsibilities to the Recycling/Educational program.

To address the problem of illegal dumps the Recycling/Educational program will 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.

COSTS. The costs of the waste tire program are managed through the existing landfill budgets. The educational and administrative responsibilities will be handled by the Recycling/Educational program who's cost is accounted for in the waste reduction section.

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 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:

maintain and support private entities to 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 facilities at existing convenience centers to supplement the existing retail facilities

CURRENT SYSTEM. The Region has some public facilities at this time for the management of a used oil. Montgomery County has used oil facilities at each of their 8 convenience centers (this includes the transfer station and the landfill). A private hauler

services the Montgomery County facilities, paying the County to haul off the used oil. Stewart County will have used oil facilities at their convenience centers as they are developed. Robertson County does not have public service available at this time for the collection of used motor oil, but intends to provide this service at the landfill in 1994.

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. At this time, the region intends to have public service to address the issue of used motor oil in compliance with the solid waste regulations.

In addition to providing the public services, the Region can research the existence of private facilities which accept used oil. The Region and the individual counties 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 will be a listing of available private facilities in each county which will be 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.

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 as 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 valid 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 this issue. 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

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. The Regional educational coordinator 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 will be tied directly to the number of drop off stations. The cost of administration will 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.

COST. The used oil program in place for Montgomery County is managed under the landfill and convenience center budgets. The proposed system for Stewart County will be managed under the convenience center budget. Robertson County will have an expenditure of \$500 to \$1,500 in 1994 to provide for a drop off facility at the existing landfill. Operation of the program will be managed under the existing programs at the landfill or the material recovery facility. The administrative and educational aspects of this program will be covered by the Recycling/Educational program who's cost is covered in the waste reduction section.

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. Robertson County accepts batteries at the waste processing facility where they are temporarily stored until sold to a recycler. Bi-County convenience centers accept and store (on pallets with drip pans) batteries. Stewart County's convenience centers will offer this same service.

IMPLEMENTATION. The existing system complies with the State requirements for lead acid battery disposal. An important aspect of implementation is education. The counties will 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 Region will 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 will coordinate with gas stations, supply stores, existing disposal facilities to circulate this information.

COST. The waste battery program in place for Robertson County and Montgomery County is managed under the landfill and/or convenience center budgets. The proposed system for Stewart County will be managed under the convenience center budget. Operation of the program will be managed under the existing programs at the landfill or the material recovery facility. The administrative and educational aspects of this program will be covered by the Recycling/Educational program whose cost is covered in the waste reduction section.

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 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 are: Stewart County: \$20,211; Montgomery County: \$52,500; Robertson County: \$34,052.

The litter grant program is set up as a reimbursement for money spent of clean up or educational programs. This is an excellent opportunity to access funds for educational programs for the various solid waste issues addressed in this Plan. Educational/advertising programs for household hazardous waste, used oil, lead acid batteries, tires, and general recycling programs may be financed through this program. Note the TDOT emphasizes the money needs to be related to discouraging litter.

CHAPTER XI. IMPLEMENTATION: SCHEDULE, STAFFING AND FUNDING

In each of the preceding Chapters on the components of the Solid Waste Plan the implementation with schedule, staffing and funding is outlined. This chapter provides a summary of the different components of the solid waste management program for the Stewart, Montgomery, Robertson County Solid Waste Management Region.

The ten year plan calls for continuation of the existing solid waste management system in many ways. The collection, processing and disposal will continue as the current system, with BiCounty Authority responsible for Stewart and Montgomery Counties and Robertson County responsible for their own program. Administration and coordination of the waste reduction, recycling, education and problem waste programs will be implemented on a more regional approach. The director of the BiCounty Authority will have a portion of his time (10-15%) allocated to coordination of the regional waste reduction, recycling programs, education and problem waste issues. In Robertson County and BiCounty an anchor staff person will be identified to provide the support needed to the Director. This will be an estimated 10-15% of the anchor staff's time and resources. The actual cost of implementation of the recycling and problem waste programs will remain in the realm of the individual counties. Funding for the program will be largely dependent on tip fees at the disposal facilities. Certain aspects of the programs will remain the responsibility of the counties.

BACKGROUND INFORMATION. The SMR Planning Region is comprised of Stewart, Montgomery, and Robertson Counties in North Central Tennessee. The planning region is linear with the three member counties running east-west for a total length of about 80 miles with the average width running about 20 miles. Montgomery and Stewart Counties formed the Bi-County Solid Waste Management System Authority which pre-dated the Solid Waste Act of 1991. That authority presently operates a baling facility and balefill in Montgomery County. Robertson County has constructed and is operating a Lundell mixed waste processing system at their landfill. This facility is equipped to separate (either automatically or manually) several recyclable products from the waste stream and then create RDF (refuse derived fuel) pellets of the remainder of the throughput.

The estimated waste requiring disposal adjusted for population and economic growth is shown in Table III-3. For 1994 the regional waste flow is estimated at 111,059 tons: BiCounty at 78,852 tons/year and Robertson County at 32,207 tons/year.

SUMMARY OF REGIONAL NEEDS. At this time the Region has met their waste reduction requirement under the Solid Waste Management Act, 25% based on the 1989 figures. The Region currently has two operating landfills with proposed expansions which will provide disposal capacity past the ten year planning period. The existing collection system is in compliance with the Solid Waste Management Act except for Stewart County. Stewart County is in the process of upgrading their green box system to convenience centers. The first convenience center is scheduled to open spring of 1994. The Region needs to devote additional attention to the issue of problem wastes. Stewart and Robertson Counties plan to take advantage of the State funded household hazardous waste collection program with scheduled collection events for spring 1994. Some additional efforts towards used oil collection, battery collection and waste tires are needed in Stewart County. Robertson County intends to provide oil collection at their processing facility in 1994.

STATEMENT OF REGIONAL GOALS AND OBJECTIVES. The Regional goals include:

- 1) To provide the citizenry with a cost effective, yet environmentally sound disposal option for their solid waste;
- 2) To continue efforts to reduce the volume of material requiring final disposal;
- 3) To maximize the public education regarding the proper management of waste, proper disposal, impacts of improper management, and effective waste reduction;
- 4) To meet the requirements of the Solid Waste Management Act.

COMPONENTS OF THE SOLID WASTE MANAGEMENT SYSTEM.

WASTE REDUCTION. Drop off recycling facilities at the existing landfills, convenience centers - existing convenience centers for Montgomery and proposed for Robertson (Robertson has begun implementation of drop off recycling with 6 roll offs, 2 at existing convenience centers and the others at Kroger and Walmart) and Stewart (Stewart intends on completing the first convenience center this spring); the existing materials recovery facility in Robertson County is not mandated by this Plan, it will continue operations at the discretion of the County. In the event Robertson County continues operation of the Lundell material recovery facility the facility should be further evaluated in an attempt to increase the effectiveness and economy of the program. In particular strong efforts towards finding a market for the pellets need to be emphasized.

COLLECTION. Convenience centers: Stewart County has 24 existing collection sites which will be reduced to a minimum of 3 convenience centers; Montgomery County has 8 existing convenience centers; Robertson County has 6 convenience centers. No expansion of collection services is required for Robertson and Montgomery. The transference to the

convenience centers for Stewart County will be accompanied by strong educational efforts in an attempt to minimize problems with illegal dumps.

DISPOSAL. Robertson County has a Class I landfill which will complete operations in the fall of 1996. They have a permitted horizontal expansion with sufficient estimated capacity to extend past the ten year planning period. A Class III/IV landfill is recommended for development at, or adjacent to, the current landfill site. Bi-County operates a balefill which is in the process of a permit modification to upgrade the facility to meet Subtitle "D" standards and for a vertical expansion. The balefill offers sufficient capacity to extend past the ten year planning period. BiCounty currently operates a demolition area at their Class I landfill. It is recommended BiCounty develop additional Class III/IV capacity.

EDUCATION. BiCounty has an effective educational program in effect. They have worked with industries, commercial operations, schools, and civic organizations towards educating the public on solid waste issues. They have effectively provided source reduction from their industries. The Region is appointing the Director of BiCounty as the Director of the regional educational efforts. The Director will be supported by anchor staff in each county.

PROBLEM WASTES. Household hazardous waste collection events have been conducted or scheduled in each of the counties. The tire storage areas at existing disposal facilities meet state requirements. Stewart County will implement lead acid battery drop off at their convenience centers, Montgomery and Robertson have met the needs of this program. Stewart will implement used oil drop off at their convenience centers; Robertson County will implement a drop off at the materials recovery facility. Montgomery County has met the requirements for this program. The general administration and educational components of these programs will be coordinated through the Director of Education/Waste Reduction. The costs of implementation will be born by the individual counties.

STAFFING AND BUDGET.

WASTE REDUCTION, RECYCLING AND EDUCATION. Administration: The current staff at BiCounty and Robertson County will implement the waste reduction program. The current Director of the BiCounty Solid Waste Management System will act as the Director for the Regional efforts towards waste reduction and education. Existing staff at BiCounty and in Robertson County will include an anchor person to work with the Director. The staff will be responsible for coordinating and providing the paperwork for the county operated systems. Currently the BiCounty Director of Solid Waste System devotes part of his time to waste reduction. BiCounty also has a recycling market coordinator and an administrative support position. Robertson County is in the process of hiring a Director of Operations who will serve as a waste management program coordinator.

1994 Administrative Staffing Budget
Waste Reduction, Recycling, Education and Problem Waste Programs

	BiCounty	Robertson	Regional
Salary and Benefits	\$ 5,300	\$ 3,000	\$ 8,000
Overhead	500	200	500
Supplies	500	200	500
Office Equipment	500	200	500
Travel	200	100	1,000
Printing	1,000	400	500
Advertising	1,000	400	500
TOTAL	9,000.00	4,500.00	11,500.00

The total administration of the program results in a cost of \$25,000 in 1994, estimated to increase to \$50,000 in the year 2003. The estimated portion of the tip fees at the disposal facilities to pay for administration of the waste reduction program in 1994 based on the expected administration cost of \$25,000 with a waste flow of 111,059 is about \$.25/ton. For the year 2003 the cost would be approximately \$.40/ton based on a cost of \$50,000 and a waste flow of 128,045 tons.

The implementation of the recycling program for Bi-County includes primarily the drop-off program at the convenience centers. The funding for the recycling program is covered under the collection budget for BiCounty. The recycling program for Robertson County includes the drop-off at the convenience centers as well as the Mixed Waste Processing Facility already in existence. Robertson County funds the operation of the convenience centers as well as the materials recovery facility. As stated above the coordination and administrative budget will be funded with a portion of the tip fees at the disposal facilities.

COLLECTION. The collection programs will continue as the existing system, with BiCounty responsible for Stewart and Montgomery and Robertson County responsible for their collection programs. The 1994 budgets are:

Stewart County annual cost: 6,500 tpy (\$26/ton)(1.03) = \$174,070

Montgomery annual cost: 20,000 tpy (\$19/ton)(1.03) = \$391,400

Robertson annual cost: 4,900 tpy (\$32/ton)(1.03) = \$161,504

*1.03 provides for 3% inflation over the calculated 1993 costs

1994 Regional collection annual cost: \$726,974

DISPOSAL. The disposal programs will remain as is, with existing resources and staff. BiCounty will remain responsible for the operation of the balefill for Stewart and Montgomery Counties. BiCounty can at their discretion accept waste from outside the two counties. Robertson County will continue operations at their landfill for Robertson County waste. Robertson County can at their discretion accept waste from outside the County to reduce their tipping fees. The 1994 costs for operating the disposal facilities were estimated based on a tipping fee that would be charged to all waste accepted and would cover the development, operation and maintenance, and closure/post closure costs:

1994 Bi-County annual cost: 77,473 tpy (\$21.34/ton) = \$1,653,274
 Robertson annual cost: 31,822 tpy (\$35.38/ton) = \$1,125,862
1994 Regional disposal annual cost: \$2,779,134

1997 Bi-County annual cost: 83,143 tpy (\$22.40) = \$1,862,400
 Robertson annual cost: 33,389 (\$38.08/ton) = \$1,271,453
1997 Regional disposal annual cost: 116,532 tpy (\$26.89) = \$3,133,853

PROBLEM WASTE. The current staff at BiCounty and Robertson County will administer the problem waste program. The current Director of the BiCounty Solid Waste Management System will act as the Director for the Regional efforts towards problem waste management. Existing staff at BiCounty and in Robertson County will include an anchor person to work with the Director. The staff will be responsible for coordinating and providing the paperwork for the county operated systems. The Counties will be responsible for the implementation of the problem waste program. The household hazardous waste collection events will be county funded. The waste tire program is handled under the disposal facility operations. The used oil and battery drop off facilities are either handled under the convenience center or the disposal facility budgets.

This administration budget for this program will be funded through a portion of the disposal facility tip fees. The budget for the administration of the problem waste program is included in the budget for the waste reduction program shown above. The waste tire program will be funded through the disposal facility budgets. The used oil and battery collection programs will be funded with the collection budgets associated with the management of the convenience centers. The household hazardous waste collection events will be funded by the individual Counties.

Summary of problem waste implementation costs to be provided directly by the counties (the associated administrative and educational programs are covered under the waste reduction budget shown above):

1994: \$1,500 - \$3,500/County
 1995: \$1,000 - \$2,000/County
 1996: \$1,500 - \$3,000/County
 1997-2003: \$15,000 - \$25,000/County

SUMMARY OF SOLID WASTE MANAGEMENT SYSTEM COSTS

SYSTEM COMPONENT		1994 COSTS	2003 COSTS	COMMENTS
Waste Reduction	BiCounty	\$ 9,000	\$ 18,000	Regional Director funded by all 3 counties plus one anchor staff person in Robertson and BiCounty will allocate 10-15% of their time and resources to these programs
	Robertson Cty	4,500	9,000	
	Regional	11,500	23,000	
	Total	25,000	50,000	
Collection	BiCounty	\$ 565,470	737,810	BiCounty includes the construction of two new convenience centers in 1994
	Robertson Cty	161,504	210,726	
	Total	726,974	948,536	
Disposal	BiCounty	\$1,653,274	\$2,325,698	class III/IV disposal facility costs not broken out
	Robertson Cty	1,125,862	1,509,349	
	Total	2,779,134	3,385,047	
Education	BiCounty			administration costs covered under the waste reduction program outlined above
	Robertson Cty			
	Regional			
Problem Wastes	BiCounty	\$ 5,000	\$ 40,000	additional administration costs covered under the waste reduction program outlined above
	Robertson Cty	\$ 2,500	\$ 20,000	
	Total	\$ 7,500	\$ 60,000	
Recycling	BiCounty	\$ 33,500	\$ 42,550	
	Robertson Cty	12,000	15,600	
	Total	45,500	58,150	

The costs of the collection system and implementation of the problem waste program will be covered by BiCounty and Robertson County. The cost of disposal will be covered by the tip fees at the disposal facilities. Also implementation of the recycling programs will be covered by a portion of the tip fees at the disposal facilities (between \$.38 and \$.46/ton).

The costs of administering the waste reduction, education and problem waste programs will be funded by a portion of the tip fees at the disposal facilities (\$.25 to \$.40/ton). This will support a part time Director of Recycling/Education as well as anchor staff in each county part time.

GENERAL FUNDING. The funding for disposal, waste reduction, education and administration of the problem waste programs will be primarily from tip fees at the disposal facilities. Individual counties will cover short falls until the tip fees are established to cover all associated costs. Additionally, implementation of the household hazardous waste program, collection program and recycling efforts will be funded directly by the counties.

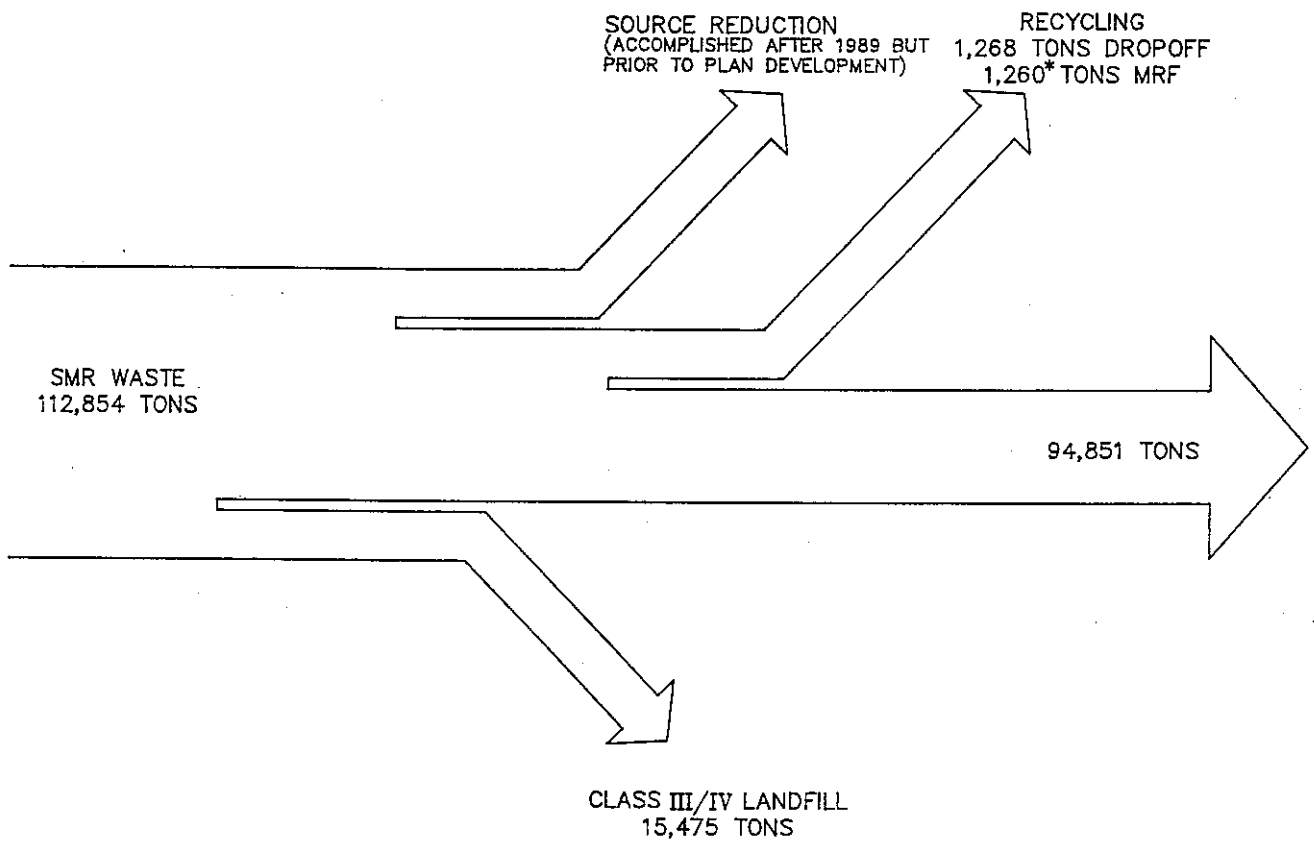
LONG TERM CONSIDERATIONS

The Region will reevaluate the long term disposal options half way through the planning process, at the 5 year point. The reevaluation will consider the following options:

- continuation of existing system, two disposal facilities serving the region
- regional landfill
- waste to energy facility
- municipal yard waste composting

The options will be considered based on changing economic and/or technical considerations. In the event a regional disposal option is implemented the case for regional processing of recyclable materials will be considered as well.

1995 WASTE FLOW CHART



*ROBERTSON COUNTY MRF NOT MANDATED BY THIS PLAN TO BE OPERATED AT THE COUNTY'S DISCRETION.

CHAPTER XII.
ALLOCATION OF RESPONSIBILITIES AMONG LOCAL GOVERNMENTS,
AND THE PRIVATE SECTOR.

The responsibilities for implementation of the solid waste plan follow closely existing responsibilities as set up with BiCounty and Robertson County. Each entity will remain responsible for the implementation of the collection, disposal, recycling and problem waste programs. The three counties will act regionally in the administration of the waste reduction, education and problem waste programs. A Director of Waste Reduction/Education will coordinate with key anchor staff in each county. The current Director of the BiCounty Authority will devote 10-15% of his time to coordinating regional efforts. This will be supporting from the tipping fees at the disposal facilities.

WASTE REDUCTION. The waste reduction program will be approached from a regional perspective. The Director of the BiCounty Solid waste Management System will coordinate with designated anchor people in the BiCounty Authority and Robertson County to manage the waste reduction program. The efforts will include working with local industries, commercial operations, as well as residents to accomplish waste reduction at the source.

COLLECTION. The collection program will continue with current operations. BiCounty is responsible for the collection of waste in Stewart and Montgomery counties while Robertson County is responsible for their waste.

DISPOSAL. BiCounty Authority will manage the operation of the BiCounty Balefill. This facility accepts waste from Stewart and Montgomery Counties. Robertson County is responsible for the operation of the Robertson County landfill.

EDUCATION. The educational program will be approached from a regional perspective. The Director of the BiCounty Solid waste Management System will coordinate with designated anchor people in the BiCounty Authority and Robertson County to manage the educational program. The efforts will include working with local industries, commercial operations, residents, local schools and civic groups to accomplish education on the critical solid waste management issues in the communities.

PROBLEM WASTES. A portion of the problem waste program will be handled regionally in the form of educational programs which stress proper management of potentially dangerous components of the municipal solid waste stream. The waste tire program is managed along with the two existing disposal facilities, BiCounty Balefill and Robertson County landfill. Used oil and lead acid batteries management programs are part of the collection and disposal systems under the responsibility of the BiCounty Authority and Robertson County. The litter grant program will be implemented as in the past by the individual counties.

PLAN ADOPTION. The plan should be formally adopted by resolution of the regional Administrative Board and signed by its Chairman. To demonstrate concurrence with the plan, each County Commission should ratify the plan, thereby acknowledging its future responsibility as a part of the region.

Three copies of the plan should be submitted to Division of Solid Waste Assistance no later than July 1, 1994. A copy of the adoption resolution and minutes of each County Commission's meeting ratifying the plan should be included with the submittal letter.

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."

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.

CHAPTER XIII FLOW CONTROL AND PERMIT APPLICATION REVIEW

I. New Facility Permit Application Review

A. Basis For Review

The review of any application for landfill approval with the SMR 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:

1. 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?
2. 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?
3. Is the location of the facility suitable for a landfill to serve the SMR Region? In other words, landfills which are located at the outer edges of the region (away from major SMR population centers) and designed to serve out-of-region waste will be considered to be not suitably located to serve the region.
4. Will the cost impacts for providing infrastructure (roads, water, etc.) for bringing out-of-region waste into the region exceed the cost savings provided by the additional landfill facility?

B. Application And Review Procedure

1. A copy of the Part I Solid Waste Disposal Facility Permit Application shall be submitted to the chairman of the SMR 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:
 - a. Estimated total volume of the facility in tons of waste.
 - b. Proposed daily tonnage of the facility.

- c. Proposed service area of the facility.
 - d. Map showing the location of the site suitable for advertisement.
 - e. Map showing current zoning of the site with a description of any special permits or re-zonings required and the status of same.
 - f. General site layout map showing proposed approximate landfill footprint, access roads, and solid waste management facilities proposed, etc.
 - g. Any preliminary site evaluation studies available (hydrogeologic, environmental, engineering, etc.).
 - h. An application fee will be established to cover the costs of the advertisement, public hearing, etc.
2. The Solid Waste Board Chairman will advertise the proposal in the local newspapers of the county in which the disposal facility is proposed as well as in the newspapers of any region which has a portion of their land mass within 5 miles of the proposed facility. This advertisement will include the following information:
- a. General description of the proposed facility.
 - b. Road address and location relative to incorporated or unincorporated municipalities.
 - c. Map showing the location of the site.
 - d. Date, time, and location of public hearing (must be at least 28 days after advertisement runs).
 - e. Dates of public comment period.
 - f. Address for mailing of public comments.
3. The Planning Board Chairman will send copies of the application to each member of the Planning Board, County Executives in the region, and the TN Division of Solid Waste Management.
4. The Planning Board will call a special meeting which will act as the public hearing.
5. 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 a representative of the Planning Board. The public comment period will follow with comments limited to 5 minutes per person. The hearings will be documented through a court recorder.

6. 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.
7. At the second special meeting the Planning Board will discuss the issue and then will vote to reject or not to reject the application.
8. The region may reject an application for a new solid waste disposal facility or incinerator, or expansion of an existing solid waste disposal facility or incinerator within the region only upon determining that the application is inconsistent with the solid waste management plan adopted by the region and approved by the state planning office. The region shall document in writing the specific grounds on which the application is inconsistent with the plan. The vote will be decided by simple majority. In the event of a tie vote, any abstentions will be re-polled for a vote. In the event that the vote remains tied, 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 rejected. The outcome will be provided to the Owner and the TN Division of Solid Waste Management.
9. If the Board does not reject the application, the applicant can proceed with the full permitting process of the State. The State review process will determine the technical acceptability of the proposal. The Board's decision is based on siting and need for the facility.
10. Rejection of the proposal will result in the decision that the proposal is not consistent with the SMR Solid Waste Management plan and therefore the facility cannot proceed through the State permitting process. Where a region rejects an application, the DSWM shall not issue the permit unless they find that the decision of the region is arbitrary and capricious and unsupported in the record developed before the region.

11. Appeal of final actions of the region, shall be taken by an aggrieved person within thirty (30) days to the Davidson County Chancery Court. The court shall exercise the same review as it would in a case arising under Tennessee Code Annotated, Title 4, Chapter 5. For the purposes of this section, an "aggrieved person" shall be limited to persons applying for permits, persons who own property or live within a three (3) mile radius of the facility or site that is proposed for permitting, or cities and counties in which the proposed facility is located.

II. Flow Control

Flow control is considered a viable option by the Stewart, Montgomery, Robertson Solid Waste Region. This plan leaves implementation of flow control as an option to the local government, the Bi-County Authority, the Solid Waste Region, or any future authority formed of the member counties or municipality.

The following report on flow control presents some general information on the topic. The report was prepared by Mr. John Williams, an environmental attorney in private practice, located in Nashville.

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.

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.

