

# **A SOLID WASTE MANAGEMENT PLAN FOR WALWORTH COUNTY, WISCONSIN**

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**A SOLID WASTE MANAGEMENT PLAN FOR WALWORTH COUNTY, WISCONSIN**

**Prepared by the**

**Southeastern Wisconsin Regional Planning Commission  
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**In Cooperation with the  
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W3929 County Trunk Highway NN  
Elkhorn, Wisconsin 53142**

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December 7, 1994

TO: Mr. Stanley R. Mikrut, Chairman  
Walworth County Solid Waste Management Board

In January 1992, the Walworth County Board requested that the Southeastern Wisconsin Regional Planning Commission assist the County in the reevaluation and revision, as necessary, of the County solid waste management plan completed in 1982. The reevaluation, which was done in cooperation with County staff and under the guidance of the Solid Waste Management Board, considered the changes affecting solid waste management which have occurred in the County since the preparation of the original plan in 1982. The revised plan was also prepared for a new design year of 2010.

The plan reevaluation effort emphasized those aspects of solid waste management which the County can significantly influence, including options for recycling; toxic and hazardous household waste collection and disposal; yard waste composting; and public education. Other aspects of solid waste management, including landfilling and incineration, were addressed in lesser detail since the interrelated roles of the private and public sector and the current State regulatory framework limit the ability of the County or other local units of government to effectively impact on these elements.

This report presents the findings of the plan reevaluation, and proposes a new solid waste management plan for Walworth County. The plan is based upon a careful evaluation of the existing solid waste management systems within the County, an analysis of the present and probable future needs for solid waste management, and an examination of the costs and other considerations attendant to alternative means of meeting those needs.

The selection of the recommended plan by the Solid Waste Management Board followed a public informational meeting and hearing held on a preliminary draft of the plan at the Courthouse Annex on July 27, 1994. A summary of the public comment received, and the revisions made to the plan in response to that comment, is included in this report.

The new County solid waste management plan recommended in this report provides a sound guide which can assist County and local officials in providing for solid waste management in the County, while protecting the public health of the residents and the environment of the County. The Regional Planning Commission staff stands ready to assist the County in any way possible in implementation of the recommended plan over time.

Sincerely,



Kurt W. Bauer  
Executive Director

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## Chapter I

### INTRODUCTION AND BACKGROUND

#### INTRODUCTION

The initial solid waste management plan<sup>1</sup> for Walworth County was completed in 1982 under a cooperative effort of the Walworth County Planning, Zoning, and Sanitary Department and the Regional Planning Commission. This update of that plan was prepared at the request of the County Solid Waste Management Board by the Regional Planning Commission staff in cooperation with the County Solid Waste Management Department.

Because the current interrelated roles of the private and public sector in solid waste management severely limit the ability of the County or other units of government to implement effectively certain elements of a solid waste management system, including elements relating to collection and transportation and to landfill disposal, this plan update has been limited in scope to the consideration of those aspects of solid waste management which the County can significantly influence or control. Such aspects include options for recycling, toxic and hazardous household waste collection and disposal, yard waste composting, and public education. Other solid waste management plan elements, including landfilling and incineration, are addressed in less detail.

With regard to landfill disposal, this plan update is limited to: documentation of the currently approved and proposed landfill capacities, quantitative comparison of those capacities to estimated solid waste disposal needs, estimates of costs for landfill disposal over the planning period and consideration of the relationship between capacities and costs to the other solid waste management components. Generalized locational data and criteria are provided. However, no specific landfill site analyses were conducted. With regard to the solid waste

incineration plan element, the plan update is limited to documenting the results of the previous studies prepared for the County and related subsequent activities, and to development of an estimate of the timing and conditions under which the County should consider reopening the issue of incineration. In addition, the plan update considers current State and Federal regulations relating to solid waste incineration facilities and the impact of those regulations on the initial plan recommendations.

The updated County plan addresses primarily solid wastes generated by residential and institutional land uses, where the materials generated by the institutional uses are similar in character to residential solid wastes. Commercial and industrial solid wastes are not considered since those waste streams are expected to be managed by the private sector. Hazardous and toxic wastes are not specifically considered in the plan update, except insofar as public centralized household hazardous and toxic waste collections are concerned. Yard waste composting and the separation and recovery of other recyclable materials are considered in the plan update.

#### RECENT HISTORY OF SOLID WASTE MANAGEMENT

Since the completion of the initial County solid waste management plan in 1982, certain significant changes have taken place affecting solid waste management in the County. Most significantly, the solid waste management systems within the County have shifted toward recycling of materials, as recommended in the initial plan. In addition, a new major landfill was sited in the County in conflict with the plan. Finally, new State regulations relating to landfill disposal, incineration facility requirements, and recycling have resulted in changes in the solid waste management activities within the County. These changes indicate a need to update the County solid waste management plan. The significant changes affecting, as well as the significant steps toward implementation of, the initial solid waste management plan that have taken place since 1982 are summarized below.

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<sup>1</sup>SEWRPC Community Assistance Planning Report No. 75, *A Solid Waste Management Plan for Walworth County, Wisconsin, 1982.*

The first significant step toward implementation of the initial solid waste management plan was the creation of the Solid Waste Management Board by the Walworth County Board on January 11, 1983. The Board has since taken several steps towards the implementation of the initial plan. The Board has held informational meetings and been actively involved in public education regarding recycling and composting. The Board has published a County recycling directory listing the locations of the recycling centers in the County. This directory has been periodically updated and distributed to County residents to increase the use of these centers. The Board in 1984 had created and funded a recycling trailer program whereby local recycling programs were provided with trailers, at no cost, to be used in local recycling programs. That program was an important step in initiating recycling operations within the County. However, because of the subsequent implementation of local recycling programs in many of the County municipalities, the trailer program was no longer needed and was abandoned in 1992. The Board has planned meetings with the area groups to further recycling and composting within the County. The Board has also given technical advice and assistance to municipalities in designing and implementing both recycling and yard waste composting programs.

Most municipalities within the County have expanded their existing recycling programs or begun new programs since the completion of the initial County solid waste management plan. The Williams Bay Recycling Center, which opened November 7, 1981, almost doubled the quantity of the recyclable material received and almost tripled the revenues from the sale of those materials in its second full year of operation and continues to grow in size every year. The Village of East Troy, which had a drop-off recycling program in 1982, has implemented a curbside collection recycling program. Interest in, and awareness of, recycling has continually increased from the early 1980s to the early 1990s. In 1992, there were recycling programs in all but two of the 27 municipalities within the County: the Towns of Bloomfield and Walworth.

The Solid Waste Management Board and the City of Elkhorn began discussions regarding the provision of a yard waste composting facility on the County institution grounds in the late 1980s, which led to the establishment of a composting

facility at the Lakeland Complex in late 1991. With the adoption of new State regulations relating to landfill disposal, incineration facility requirements, and recycling, including the 1989 Wisconsin Act 335 and its subsequent amendments as set forth in Wisconsin Act 39 and known as the State Recycling Law, composting became a major recycling issue. That law provides for a ban on yard waste disposal in landfills effective January 1, 1993. Many of the communities within the County have implemented composting and woodchipping-mulch programs.

In 1992 the County undertook a legal challenge to a State landfill siting law passed in 1983, which permitted the siting of a landfill or landfill expansion if found technically feasible by the Wisconsin Department of Natural Resources even if the local zoning was not consistent with such siting or expansion. The challenge was dismissed by the Court in 1993. The Solid Waste Management Board and the County also opposed the development of the Troy Area landfill, which was not provided for in the initial solid waste management plan recommendations. However, that landfill was permitted by the State to open despite the opposition of the County.

The 1982 County solid waste management plan documented 10 active landfills which were disposing of the solid wastes generated in Walworth County plus one private inactive landfill undergoing the expansion planning process. Of these 11 landfills, four were municipal landfills in the County, four were private landfills in the County, and three were private landfills outside the County. As of 1992, only three of the eleven landfills remained open and active. The other eight landfills have been closed.

The initial County solid waste management plan recommended that the unrecycled portion of the County solid waste stream be disposed of at the Greidanus landfill in Walworth County, which was subsequently renamed the Mallard Ridge Recycling and Disposal Facility; the HOD Disposal Service landfill in Illinois; and the Jongetgets and Valley Sanitation landfills in Jefferson County. The Jongetgets and HOD Disposal Service landfills have since been abandoned. Currently, municipal solid waste from Walworth County is disposed of primarily at the Mallard Ridge Facility and the Troy Area landfill in Walworth County, the Valley Sanita-



tion and Deer Track Park landfills in Jefferson County, and the Pheasant Run landfill in Kenosha County.

The 1982 plan also recommended that the Greidanus landfill be expanded, with a contingency recommendation that if this expansion did not occur, the County should consider development of a County-owned facility for use by County residents and operated under contract by a private operator. However, with the expansion of the Mallard Ridge landfill and the development of the Troy Area, Deer Track Park, and Pheasant Run landfills and with the subsequent expansion proposals of Mallard Ridge, Troy Area, and Valley Sanitation landfills, no need for the development of a County-owned facility currently exists.

In August 1986, ownership of the Greidanus landfill was transferred to Waste Management, Inc. As previously noted, the Greidanus landfill was renamed the Mallard Ridge Recycling and Disposal Facility landfill. The Mallard Ridge landfill is located on STH 11 west of Lawson School Road. The 15.5-acre Greidanus old-fill portion of the Mallard Ridge landfill is now full; however, there have been expansions of the landfill to provide an additional 2,460,000 cubic yards of capacity. This landfill has been accepting solid wastes from not only Walworth County, but also from Dane, Jefferson, and Rock Counties in Wisconsin and portions of Winnebago, Boone, and McHenry Counties in Illinois. In 1990 and 1991, 128,556 and 202,875 tons, respectively, were disposed of at the landfill. In October of 1990, Waste Management of Wisconsin (WMWI) submitted plans for an additional 80-acre expansion, but scaled these plans back to a 52-acre expansion to avoid adverse environmental impacts. State approval of this expansion is still pending.

The expanded WMWI facility is intended to serve the residential, commercial, and non-hazardous industrial waste disposal needs of portions of Walworth, Dane, Jefferson, and Rock Counties in Wisconsin and portions of Winnebago, Boone, and McHenry Counties in Illinois. An estimated 52 percent of the total daily waste load is from Illinois. The expansion is expected to extend the life of the landfill some seven years, with an additional capacity of 5,197,000 cubic yards and a projected annual waste load of 780,000 cubic yards of waste per year. As of May 1992, Waste Management of Wisconsin,

Inc., owned 620 acres of land in the vicinity of the Mallard Ridge landfill.

Another recommendation of the adopted plan was that a detailed evaluation of the means for disposal of the leachate from the Mallard Ridge landfill facility be undertaken. This recommendation has been implemented with the installation of a sanitary sewer force main which conveys the leachate from the Mallard Ridge landfill to the Walworth County Metropolitan Sewerage District treatment plant for treatment and disposal.

As already noted, the Troy Area landfill was developed contrary to the County plan, beginning operations in June of 1987. This landfill is located on STH 120 near IH 43, south of the Village of East Troy and is owned by Browning Ferris Industries. The service area of the landfill includes portions of Milwaukee, Waukesha, Jefferson, Racine, and Kenosha counties for the disposal of municipal, commercial, and industrial solid waste. This landfill is about 66 acres in size and has a total design capacity of about 3,828,000 cubic yards of waste, with an initial estimated service life of approximately 12 years, to 1999. As of 1993, however, the estimated remaining service life is only about two years at an estimated annual waste load of about 550,000 cubic yards per year. Leachate from the Troy Area landfill is conveyed by truck to the Village of East Troy sewage treatment plant for treatment and disposal.

In 1992 Browning Ferris Industries submitted plans for a 60-acre expansion. If approved, this would extend the site life of the landfill an estimated 12 years, with an additional waste capacity of about 6,300,000 cubic yards at a projected annual waste load of approximately 500,000 cubic yards per year. As of the end of 1991, Browning Ferris Industries owned 221 acres of land in the vicinity of the Troy Area landfill.

The Valley Sanitation Company has also begun an expansion process by requesting an initial site inspection from the Wisconsin Department of Natural Resources regarding expansion of the landfill. This initial site inspection was performed in September of 1992.

The initial County solid waste management plan recommended that the County undertake a study of the potential viability of developing a "waste-to-energy" incineration system located in the

County. The feasibility study was completed in July of 1985 by the Walworth County Solid Waste Management Board. The findings and recommendations of the feasibility study are set forth in a report entitled Walworth County Solid Waste Resource Recovery Preliminary Planning Study, July 1985, by R. W. Beck and Associates.

That study concluded that the proposed solid waste resource recovery facility was not economically viable at the time of the study. The conclusion was based primarily on a finding that the required tipping fees at the incinerator would be higher than the tipping fees at area sanitary landfills. It was concluded that if the existing or proposed landfills have sufficient capacity to receive area waste, it would be difficult to direct the flow of solid waste to the proposed incineration facility because haulers and generators of solid waste would tend to use the lowest cost disposal method available. It was noted, however, that the relatively high projected tipping fee was in part due to the small amount of solid waste to be processed by the incinerator facility; if more solid waste could be processed in a larger resource recovery plant the economies of scale would permit a lower and more competitive tipping fee. It was also noted that landfill tipping fees are likely to increase and that this, along with increasing energy costs at the County Complex, may be expected, in the future, to create a more favorable economic climate for development of a solid waste resource recovery facility.

#### OBJECTIVE OF PLAN UPDATE

The general objectives of the plan update effort are to review, reevaluate, and revise, as may be found necessary, the findings and recommendations of the 1982 County solid waste management plan. The updated plan is to have a design year 2010. The major elements of the plan update effort consist of:

1. An update of the inventory of the quantities and composition of the solid waste materials currently generated within Walworth County.
2. The preparation of new forecasts of the quantities and composition of the solid waste materials which may be expected to be generated in Walworth County by the year 2010.

3. An update of the inventory of current and planned solid waste management practices within or directly related to Walworth County.
4. A definitive description and evaluation of the alternative waste reduction and recycling programs which could be carried out on a Countywide basis, including estimates of the costs entailed.
5. An identification of the recommended institutional structure and phased implementation schedule for the most viable County waste reduction and recycling alternatives.
6. An inventory, analysis, and evaluation of alternatives regarding the disposal of yard wastes and a recommended composting, mulching, and woodchipping program for managing the yard waste materials generated within the County.
7. An inventory, analysis, evaluation of alternatives, and a recommended program for managing the household hazardous waste generated within the County.
8. An inventory, analysis, evaluation of alternatives, and a recommended program for managing the recyclable materials generated by the internal operations of County government.
9. An inventory, analysis, evaluation of the currently approved planned landfill capacity within the County and within a reasonable haul distance of the County and its communities, including estimates of the probable costs of landfilling over the planning period. Recommendations will be made regarding institutional approaches to the resolution of any potential landfill capacity problems which may be identified by the evaluation.
10. A review of the implementation status of the major recommendations contained in the initial County solid waste management plan, particularly as they relate to the timing and conditions under which the County should reopen the issue of solid waste incineration.

The updated plan is intended to identify those solid waste management functions which the local units of government within the County should perform and those which the County should perform. The focus of the updated plan is to be on developing and evaluating alternatives for Countywide solid waste management facilities in a manner compatible with the roles of the local units of government operating in the County.

## SCHEME OF PRESENTATION

The findings and recommendations of the Walworth County solid waste management plan update are documented in this report. Following this introductory chapter, Chapter II sets forth the findings of an inventory and analysis of the conditions affecting solid waste management in

Walworth County. Chapter III presents forecasts of anticipated change in the conditions affecting solid waste management in the County. Chapter IV contains a description and evaluation of solid waste management measures which can be considered for use in Walworth County. Chapters V, VI, and VII offer and evaluate alternative management plans for residential recycling, yard waste, and household toxic and hazardous wastes, respectively. Chapter VIII sets forth findings and recommendations concerning land-filling and incineration. Chapter IX presents information on potential alternative internal County government recycling and composting programs and sets forth the findings of, and recommendations regarding, these programs. Chapter X provides a summary of the major findings and recommendations of the updated solid waste management plan.

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## Chapter II

### INVENTORY AND ANALYSIS

#### INTRODUCTION

Certain elements of the man-made and natural features of Walworth County are important considerations in solid waste management planning. These include the population, household, and employment levels; land use patterns; public utility and transportation systems; topography, geology, and soils; surface water and groundwater resources; and the location and extent of environmentally significant areas. All these elements were described in the solid waste management plan<sup>1</sup> prepared by the County in 1982. The current plan update includes only those elements which have changed significantly since the 1982 plan preparation, including population, household, and employment levels; land use patterns; and selected transportation and public utility systems. In addition, an update of the existing solid waste sources, the quantity and composition of the solid wastes generated, the existing and planned solid waste management systems and activities and related constraints, are included in this chapter.

The first section of this chapter describes the demographic and economic base of the County in terms of existing conditions and the changes which have occurred since 1980, the date of the inventories in the 1982 plan. The second section describes the existing pattern of land use in the County and its relationship to the land use patterns set forth in the 1982 plan. The third section discusses the natural resource base in the County. The fourth section presents selected data on the existing utilities and updated data on selected transportation systems in the County. The fifth section describes the amounts and composition of the solid wastes generated in the County, with an emphasis on residential solid waste and recyclable materials. Also included in this section is a description of the current markets for recyclable solid wastes. The

sixth section describes the existing solid waste management systems and activities inside and outside the County. The final section describes the legal framework for solid waste management, including a description of current State legislation on recycling and other solid waste management activities.

The principal sources of the basic data required for the study were the Southeastern Wisconsin Regional Planning Commission and the Walworth County Solid Waste Management Department. Other sources of the basic inventory data include the Wisconsin Department of Natural Resources (DNR), the local units of government within the County, and private businesses dealing with solid waste, such as waste haulers and recycling centers.

The geographic area considered in the Walworth County solid waste management plan update is the same as that considered in the initial solid waste management plan. It includes all of Walworth County plus that portion of the City of Whitewater lying in Jefferson County, a study area encompassing 577 square miles.

#### POPULATION, HOUSEHOLD, AND ECONOMIC ACTIVITY

Since the ultimate purpose of any solid waste management planning effort is to develop an economical and environmentally sound solid waste management system to serve the residents of the planning area, an understanding of the size, characteristics, and spatial distribution of the resident population is basic to the planning effort. Resident population and household levels and associated commercial and industrial activity bear a direct relation to the demand for solid waste collection, transportation, handling, and disposal services. The size and characteristics of the resident population of an area, as well as the composition and quantities of solid waste generated, are greatly influenced by growth and change in economic activity.

The distribution of the resident population within the County by civil division for 1980 and 1990 is shown in Table 1. The County's 1982

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<sup>1</sup>SEWRPC Community Assistance Planning Report No. 75, A Solid Waste Management Plan for Walworth County, Wisconsin, September 1982.

Table 1

## POPULATION IN WALWORTH COUNTY BY MUNICIPALITY: 1980 AND 1990

Civil Division	Population		Change: 1980-1990	
	1980 Census	1990 Census	Number	Percent
<b>Cities</b>				
Burlington <sup>a</sup> . . . . .	0	4	4	- -
Delavan . . . . .	5,684	6,073	389	6.8
Elkhorn . . . . .	4,605	5,337	732	15.9
Lake Geneva . . . . .	5,612	5,979	367	6.5
Whitewater <sup>b</sup> . . . . .	9,098	10,170	1,072	11.8
Subtotal	24,994	27,563	2,564	10.3
<b>Villages</b>				
Darien . . . . .	1,152	1,158	6	0.5
East Troy . . . . .	2,385	2,664	279	11.7
Fontana-on-Geneva Lake . . . . .	1,764	1,635	-129	-7.3
Genoa City . . . . .	1,202	1,277	75	6.2
Sharon . . . . .	1,280	1,250	-30	-2.3
Walworth . . . . .	1,607	1,614	7	0.4
Williams Bay . . . . .	1,763	2,108	345	19.6
Subtotal	11,153	11,706	553	5.0
<b>Towns</b>				
Bloomfield . . . . .	3,277	3,723	446	13.6
Darien . . . . .	1,495	1,490	-5	-0.3
Delavan . . . . .	4,182	4,195	13	0.3
East Troy . . . . .	3,583	3,687	104	2.9
Geneva . . . . .	3,933	3,472	-461	-11.7
Lafayette . . . . .	1,024	1,276	252	24.6
LaGrange . . . . .	1,661	1,643	-18	-1.1
Linn . . . . .	2,064	2,062	-2	-0.1
Lyons . . . . .	2,659	2,579	-80	-3.0
Richmond . . . . .	1,649	1,405	-244	-14.8
Sharon . . . . .	945	1,016	71	7.5
Spring Prairie . . . . .	1,777	1,752	-25	-1.4
Sugar Creek . . . . .	2,599	2,661	62	2.4
Troy . . . . .	1,794	2,051	257	14.3
Walworth . . . . .	1,443	1,341	-102	-7.1
Whitewater . . . . .	1,270	1,378	108	8.5
Subtotal	35,360	35,731	376	1.1
<b>Total</b>	<b>71,507</b>	<b>75,000</b>	<b>3,493</b>	<b>4.9</b>

<sup>a</sup>The City of Burlington, Racine County, annexed territory from the Town of Spring Prairie in 1974. The total population of the City of Burlington was 8,385 in 1980, all of which resided in Racine County; the population in 1990 was 8,855, of which 8,851 resided in Racine County and four in Walworth County.

<sup>b</sup>Walworth County portion only. Total population of the City of Whitewater was 11,520 in 1980, of which 2,422 resided in Jefferson County; the total population was 12,636 in 1990, of which 2,466 resided in Jefferson County.

Source: U. S. Bureau of the Census and SEWRPC.

solid waste management plan included consideration of the 1980 resident population for the County of 71,500 and a planned year 2000 resident population level of 99,600.

As can be seen by review of Figure 1, the 1990 resident population level of 75,000 is somewhat less than had been projected under the previous planning effort. However, as discussed in the next paragraph, the 1990 numbers of households and jobs in the County are very close to, but slightly higher than, those projected in the 1982 report. Between 1980 and 1990 the population of the County increased by about 3,500 persons, or about 4.9 percent. During this time the largest increases in resident populations occurred in the four cities in the County, all of which experienced increases. As a group they increased by about 2,600 persons, a combined increase of about 10 percent. The City of Elkhorn experienced the largest increase, almost 16 percent. Most of the villages within the County have also experienced increases in resident population from 1980 to 1990. As a group, they increased by about 550 persons, a total increase of 5 percent, with the Village of Williams Bay experiencing the largest increase, almost 20 percent. The Villages of Fontana-on-Geneva Lake and Sharon experienced decreases of 7.7 and 2.3 percent, respectively. The towns within Walworth County as a group also experienced increases in resident population from 1980 to 1990, increasing by 376 persons, or about 1 percent. However, only 50 percent of the towns experienced an increase, while the other 50 percent experienced a decrease in resident population. The Town of Bloomfield experienced the largest increase, about 450 persons, or about 14 percent, while the Town of Geneva experienced the largest decrease, about 460 persons, or about 12 percent.

The distribution of the households associated with the resident population in the County by civil division for 1980 and 1990 is shown on Table 2. The 1982 County solid waste management plan included consideration of the 1980 county household level of 24,800 and of a planned year 2000 household level of 29,900. As can be seen by review of Figure 1, the 1990 household level of 27,900 is slightly higher than had been projected under the previous planning effort. As noted previously, the 1990 population level is somewhat lower than had been projected,

indicating that a smaller household size exists than had been estimated.

Seasonal population is another significant factor to be considered in any solid waste management planning effort for the County. Because of its highly attractive recreational resources, Walworth County experiences a significant seasonal and weekend increase in population. This pattern of population influx is associated chiefly with lake-oriented recreational activities and associated resort businesses. While the largest seasonal and weekend population influxes occur during the summer, visitors are increasingly seeking fall and winter recreational activities in the County as well. The 1980 Federal Census data indicate that approximately 23 percent of all of the housing units in the County were seasonal or occasional-use units. Similarly, 1990 Census data indicate that approximately 21 percent of the housing units in the County were seasonal or occasional-use units. In 1990, there were about 2,527 seasonal or occasional-use housing units in the cities and villages of Walworth County, including 427 in the City of Lake Geneva, 744 in the Village of Williams Bay, and 1,280 in the Village of Fontana-on-Geneva Lake. The majority, about 67 percent of the seasonal housing units in the County, 5,179 units, were located in the unincorporated towns. The distribution of these seasonal housing units by civil division for both 1980 and 1990 is shown in Table 3. These data do not reflect the recent large seasonal-home development project of Geneva National Golf Club Development in the Town of Geneva, which is expected to add about 1,900 seasonal housing units.

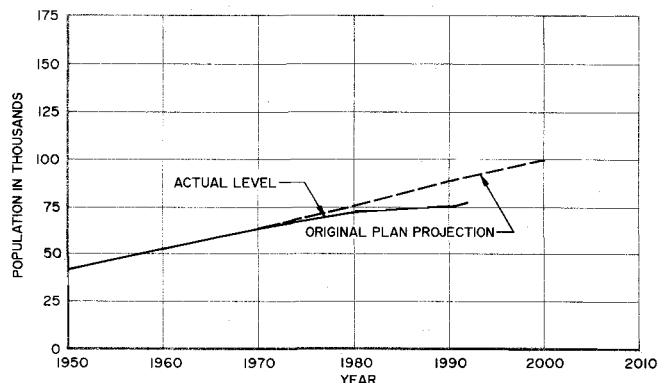
As already noted, the seasonal and weekend influxes of people are generally associated with such lake-oriented recreation areas as the Geneva Lake-Lake Como area, the Lauderdale Lakes area, the Whitewater Lake area, and the Delavan Lake area. Also popular are such State forest-oriented recreation areas as the Kettle Moraine State Forest recreation area and the major resorts in the County.

In 1990, a total of 37,100 jobs were available in the County, as shown in Table 4. This was about 6,000, or 19 percent, more jobs than were available in the County in 1980 and almost the same as the planned 1990 level forecast in the 1982 Solid Waste Management Plan. As of 1990, those

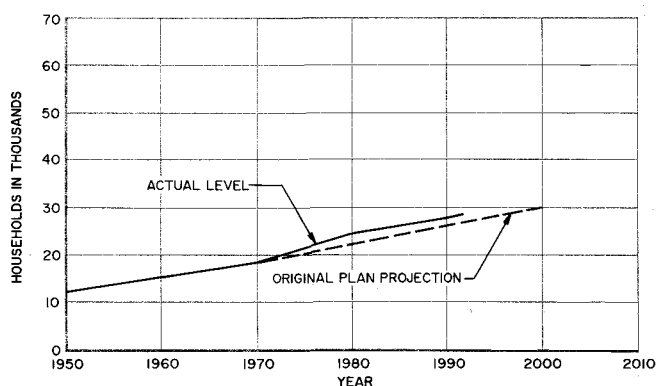
Figure 1

**ACTUAL POPULATION, HOUSEHOLD,  
AND EMPLOYMENT LEVELS COMPARED TO  
PLANNED LEVELS USED IN THE 1982 WALWORTH  
COUNTY SOLID WASTE MANAGEMENT PLAN**

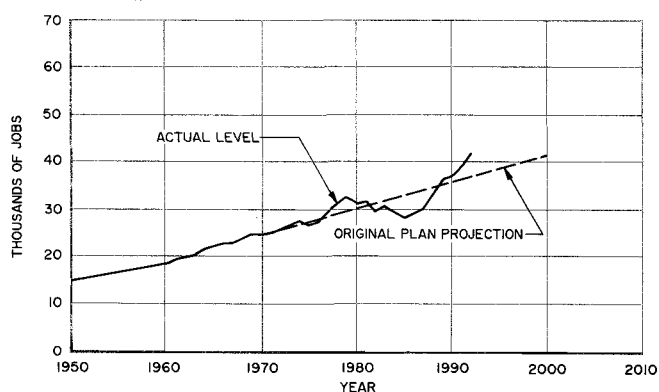
WALWORTH COUNTY POPULATION LEVELS: 1950-2000



WALWORTH COUNTY HOUSEHOLD LEVELS: 1950-2000



WALWORTH COUNTY EMPLOYMENT LEVELS: 1950-2000



NOTE: The levels shown for the year 1990 are actual and based on the 1990 census. All subsequent annual levels are based on the Wisconsin Department of Administration estimates.

Source: SEWRPC.

industries employing the largest percentage of the work force within Walworth County included manufacturing, with about 21 percent of the work force; retail trade, with about 18 percent; services, with about 16 percent; and government and education, with about 16 percent. Agriculture, although an important component of the economy of the County, employed only about 4 percent of the work force in 1990.

## CURRENT LAND USE AND ZONING

The type, intensity, and spatial distribution of the various land uses comprising the planning area are important determinants of the solid waste management of that area. The 1982 solid waste management plan included consideration of an existing 1975 and a planned year 2000 land use pattern. The amounts of land devoted to each of the various land uses in Walworth County in 1975 and in 1985 are set forth in Table 5. Map 1 shows the land use pattern of Walworth County in 1990, including the principal residential, commercial, industrial, transportation, governmental, institutional, and recreational land use classifications and the remaining rural land uses in the County. In 1990, urban land uses comprised about 61 square miles, or about 11 percent of the approximately 576-square-mile area of the County. The urban lands occupy about 3,900 acres, or about 11 percent more than was in urban uses in 1975. Residential land use was the predominant urban land use in 1990, constituting about 27 square miles, or 44 percent of the urban land uses and about 4.7 percent of area of the County as a whole.

Rural land uses still predominated in the County in 1990, encompassing a total of 515 square miles, or 89 percent of the County area. Agriculture was the predominant rural, and overall, land use within the County, encompassing approximately 386 square miles, or approximately 75 percent of the rural area and about 67 percent of the total area of the County.

Two County zoning ordinances were adopted by the Walworth County Board of Supervisors on August 13, 1974, a shoreland zoning ordinance and a comprehensive zoning ordinance. Both ordinances have jurisdiction only in the unincorporated areas of the County. The special-purpose shoreland zoning ordinance applies to lands within 1,000 feet of a lakeshore and to lands lying within 300 feet of navigable streams or



Table 2

**TOTAL HOUSEHOLD DATA FOR THE WALWORTH COUNTY  
STUDY AREA BY CIVIL DIVISION: 1980 AND 1990**

Civil Division	Total Households		Change: 1980-1990	
	1980	1990	Number	Percent
<b>Cities</b>				
Delavan .....	2,059	2,355	296	14.4
Elkhorn .....	1,814	2,100	286	15.8
Lake Geneva .....	2,380	2,599	219	9.2
Whitewater <sup>a</sup> .....	2,734	3,336	602	22.0
Subtotal	8,987	10,390	1,403	15.6
<b>Villages</b>				
Darien .....	372	390	18	4.8
East Troy .....	849	979	130	15.3
Fontana-on-Geneva Lake .....	657	652	-5	-0.8
Genoa City .....	418	455	37	8.9
Sharon .....	426	448	22	5.2
Walworth .....	640	658	18	2.8
Williams Bay .....	707	844	137	19.4
Subtotal	4,069	4,426	357	8.8
<b>Towns</b>				
Bloomfield .....	1,218	1,412	194	15.9
Darien .....	467	522	55	11.8
Delavan .....	1,494	1,614	120	8.0
East Troy .....	1,142	1,269	127	11.1
Geneva .....	1,185	1,213	28	2.4
Lafayette .....	343	436	93	27.1
LaGrange .....	586	606	20	3.4
Linn .....	739	817	78	10.6
Lyons .....	919	968	49	5.3
Richmond .....	559	526	-33	-5.9
Sharon .....	298	333	35	11.7
Spring Prairie .....	514	560	46	8.9
Sugar Creek .....	831	895	64	7.7
Troy .....	576	678	102	17.7
Walworth .....	427	457	30	7.0
Whitewater .....	435	497	62	14.3
Subtotal	11,733	12,803	1,070	9.1
<b>Total</b>	<b>24,789</b>	<b>27,619</b>	<b>2,830</b>	<b>11.4</b>

<sup>a</sup>Walworth County portion only. The total household count in the City of Whitewater was 3,030 in 1980, of which 296 were in Jefferson County; the total household count was 3,631 in 1990, of which 295 were in Jefferson County.

Source: U. S. Bureau of the Census and SEWRPC.

within the limits of the floodlands along the streams, whichever is greater. It contains special regulations to protect the shoreland areas. This ordinance became effective upon its adoption by the County Board, since State law does not provide for Town Board ratification of shoreland zoning ordinances. The comprehensive zoning

ordinance of the County applies to the unincorporated areas of the County lying outside the shoreland areas. This ordinance requires Town Board ratification in addition to County Board adoption to be effective in any given area of the County. To date, all 16 towns in Walworth County have adopted this ordinance.

Table 3

**SEASONAL HOUSING UNIT DATA FOR THE WALWORTH  
COUNTY STUDY AREA BY CIVIL DIVISION: 1980 AND 1990**

Civil Division	Seasonal, Recreational, and Occasional-Use Housing Units		Change: 1980-1990	
	1980	1990	Number	Percent
<b>Cities</b>				
Delavan . . . . .	12	12	0	0.0
Elkhorn . . . . .	5	12	7	140.0
Lake Geneva . . . . .	303	427	124	40.9
Whitewater . . . . .	12	21	9	75.0
Subtotal	332	472	140	42.2
<b>Villages</b>				
Darien . . . . .	3	2	-1	-33.3
East Troy . . . . .	5	2	-3	-60.0
Fontana-on-Geneva Lake . . . . .	869	1,280	411	47.3
Genoa City . . . . .	76	24	-52	-68.4
Sharon . . . . .	1	1	0	0.0
Walworth . . . . .	13	2	-11	-84.6
Williams Bay . . . . .	566	744	178	31.4
Subtotal	1,533	2,055	522	34.1
<b>Towns</b>				
Bloomfield . . . . .	628	604	-24	-3.8
Darien . . . . .	8	4	-4	-50.0
Delavan . . . . .	1,028	1,119	91	8.9
East Troy . . . . .	296	265	-31	-10.5
Geneva <sup>a</sup> . . . . .	897	544	-353	-39.4
Lafayette . . . . .	13	17	4	30.8
LaGrange . . . . .	1,145	781	-364	-31.8
Linn . . . . .	986	1,025	39	4.0
Lyons . . . . .	33	52	19	57.6
Richmond . . . . .	220	246	26	11.8
Sharon . . . . .	10	6	-4	-40.0
Spring Prairie . . . . .	57	38	-19	-33.3
Sugar Creek . . . . .	153	137	-16	-10.5
Troy . . . . .	111	79	-32	-28.8
Walworth . . . . .	44	44	0	0.0
Whitewater . . . . .	201	218	17	8.5
Subtotal	5,830	5,179	-651	-11.2
<b>Total</b>	<b>7,695</b>	<b>7,706</b>	<b>11</b>	<b>0.1</b>

<sup>a</sup>These data do not reflect the recent large seasonal residential development project of Geneva National Golf Club in the Town of Geneva, expected to add about 1,900 seasonal housing units.

Source: U. S. Bureau of the Census and SEWRPC.

These two zoning ordinances seek to regulate land use development and redevelopment, particularly the conversion of land from rural to urban uses, in the public interest. The ordinances seek to protect the rich natural resource base

of the County. To accomplish these goals, several districts and associated requirements are provided. Detailed maps, at a scale of 1 inch equals 400 feet, delineating the boundaries of the zoning districts, are on file at the County Plan-

Table 4

## INDUSTRIAL EMPLOYMENT BY PLACE OF WORK IN WALWORTH COUNTY: 1980 AND 1990

Major Employment Category	1980 Employment		1990 Employment	
	Number	Percent	Number	Percent
Agriculture .....	2,603	8.4	1,450	3.9
Construction .....	820	2.6	1,420	3.8
Manufacturing .....	6,742	21.7	7,700	20.8
Transportation, Communication, and Utilities .....	929	3.0	1,140	3.1
Wholesale Trade .....	978	3.1	1,130	3.0
Retail Trade .....	5,333	17.2	6,600	17.8
Finance, Insurance, and Real Estate .....	747	2.4	900	2.4
Services .....	4,878	15.7	5,763	15.6
Government and Education .....	5,416	17.4	5,747	15.5
Self-Employed, except Farm .....	2,494	8.0	5,100	13.7
Miscellaneous <sup>a</sup> .....	160	0.5	150	0.4
Total	31,100	100.0	37,100	100.0

<sup>a</sup>Includes agricultural services, forestry, commercial fishing, mining, and unclassified jobs.

Source: U. S. Bureau of Economic Analysis; Wisconsin Department of Industry, Labor and Human Relations; and SEWRPC.

Table 5

## DISTRIBUTION OF LAND USES IN WALWORTH COUNTY: 1975 AND 1990

Land Use Category	1975 Land Use		1990 Land Use		Change	
	Total Acres	Percent of Total	Total Acres	Percent of Total	Total Acres	Percent Change 1975-1985
Urban						
Residential <sup>a</sup> .....	14,773	4.0	17,379	4.7	2,606	17.6
Commercial .....	704	0.2	849	0.2	145	20.6
Industrial <sup>b</sup> .....	531	0.2	807	0.2	276	52.0
Transportation, Communication, and Utilities <sup>c</sup> .....	13,916	3.8	14,777	4.0	861	6.2
Governmental and Institutional .....	1,238	0.3	1,248	0.3	10	0.8
Recreational <sup>d</sup> .....	3,445	0.9	3,454	1.0	9	0.3
Unused Urban .....	742	0.2	707	0.2	-35	-4.7
Subtotal	35,359	9.6	39,221	10.6	3,862	10.9
Rural						
Agricultural .....	252,721	68.5	247,015	66.9	-5,706	-2.3
Surface Water .....	14,583	3.9	14,439	3.9	-144	-1.0
Wetlands .....	27,512	7.5	26,147	7.1	-1,365	-5.0
Woodlands .....	31,810	8.6	31,942	8.7	132	0.4
Unused Rural and Other Open Lands <sup>e</sup> .....	6,971	1.9	10,192	2.8	3,221	46.2
Subtotal	333,597	90.4	329,735	89.4	-3,862	-1.2
Total	368,956	100.0	368,956	100.0	0	0.0

<sup>a</sup>Includes residential areas under development.

<sup>b</sup>Includes wholesaling and storage.

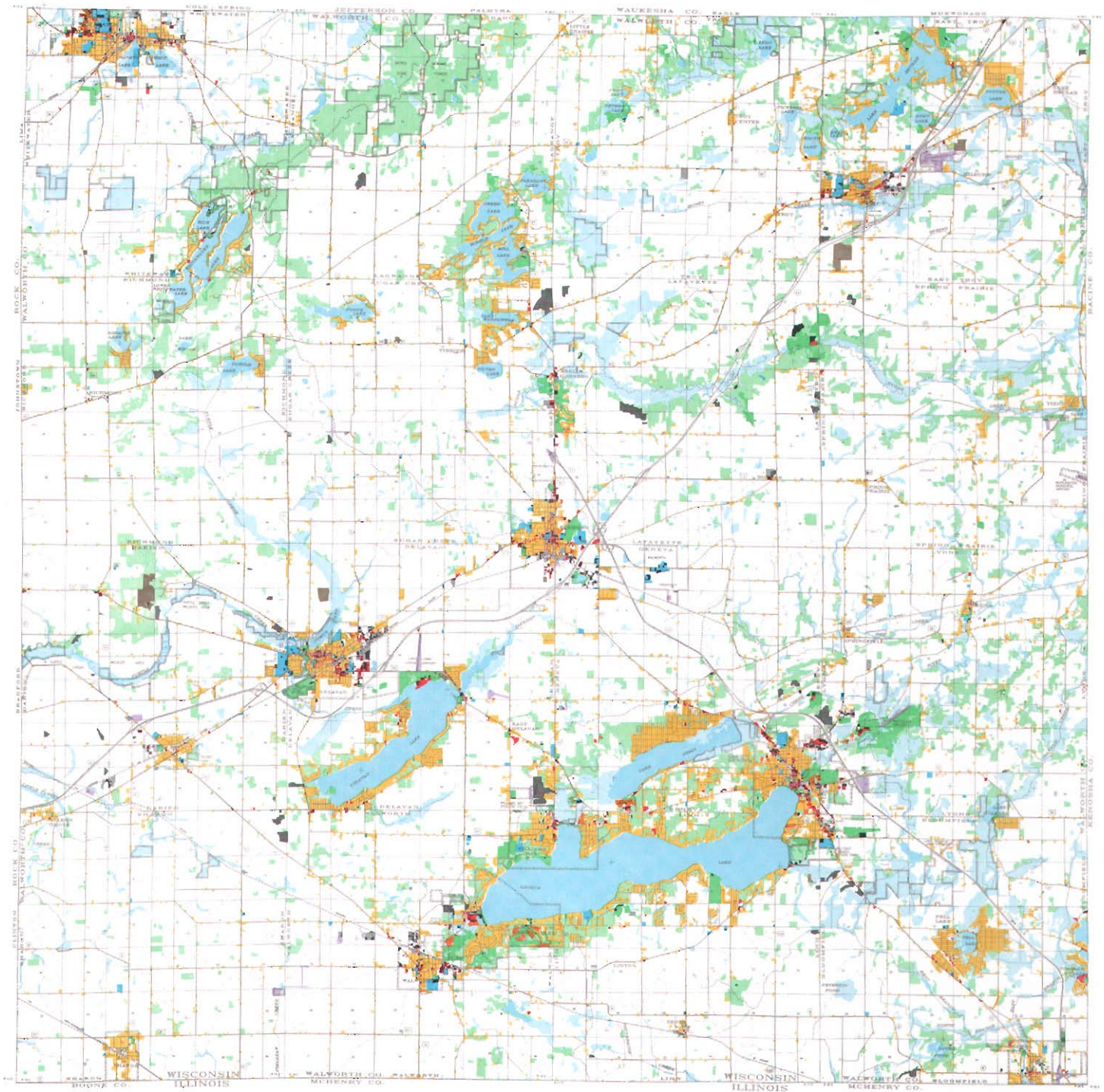
<sup>c</sup>Off-street parking areas are included in the transportation, communication, and utilities category.

<sup>d</sup>Recreational land use includes the net site area of public and nonpublic recreation sites, that is, the portion of those sites which have been developed for intensive recreational use.

<sup>e</sup>Includes unused rural land, landfill sites, and quarries.

Source: SEWRPC.

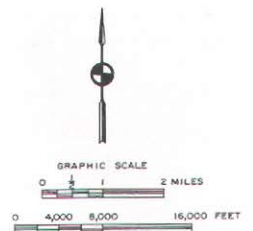
EXISTING LAND USE IN WALWORTH COUNTY: 1990



LEGEND

	SINGLE-FAMILY RESIDENTIAL		RECREATIONAL
	MULTI-FAMILY RESIDENTIAL		SURFACE WATER
	COMMERCIAL		WETLANDS
	INDUSTRIAL		WOODLANDS
	STREETS AND HIGHWAYS		EXTRACTIVE
	PARKING		LANDFILL
	TRANSPORTATION, COUMMUNICATION, AND UTILITIES		AGRICULTURAL AND OTHER OPEN LAND
	GOVERNMENTAL AND INSTITUTIONAL		

Source: SEWRPC.





ning, Zoning and Sanitation Department offices. The zoning ordinance includes an M-4 Sanitary Landfill District specifically designed to accommodate sanitary landfill sites. The installation of a solid waste incineration and waste-to-energy system would typically be accommodated in the M-2 Heavy Industry District. However, an installation associated with, and used as, an energy source for a major institutional complex may be considered as an appurtenant facility under the zoning of that complex. Each of these two use categories requires conditional-use permit approvals. The conditional-use permits provide for the application of pertinent standards for certain land uses within the district in order to abate any adverse impacts of the land uses.

A 1983 State law in effect negates the use of zoning to prevent the establishment of a proposed landfill or the expansion of an existing landfill if such landfill or landfill expansion is found feasible by the Wisconsin DNR. The Walworth County Board challenged this State law; however, the challenge was dismissed by the Court in 1993.

## NATURAL RESOURCE BASE

The natural resource base is a major factor in the economy of Walworth County and is a primary determinant of the continued development potential of the County and of its ability to provide a pleasant and habitable environment for all forms of life. The principal elements of the natural resource base which are most directly related to solid waste management planning are air quality, topography, geology, soils, environmentally sensitive areas, wetlands, woodlands, water resources, and floodlands. These natural resource base features are important considerations in the siting of landfill and incineration facilities. Since these features are all described in the 1982 report and remain largely unchanged, the inventory and descriptions are not repeated in this plan update. One exception to this relates to air quality.

During the 1980s, considerable progress has been made in implementing the regional air quality and maintenance plan.<sup>2</sup> This progress is

evidenced by general improvements in monitored ambient air quality in the Region over the last decade, including data collected at the monitoring site maintained by the Wisconsin DNR on Elgin Club Road in Lake Geneva. Certain pollutant species, however, still exhibit ambient levels which remain of concern in all or parts of Southeastern Wisconsin, particularly the level of ozone. Walworth County was designated as an ozone nonattainment area in 1988. Walworth County is not designated as a nonattainment area for particulate matter, nitrogen oxide, or lead. In view of the existing air quality conditions, solid waste management facilities should be planned and designed to maintain, protect, and enhance existing air quality.

## PUBLIC UTILITY AND TRANSPORTATION SYSTEMS

Urban development is highly dependent upon public utility systems, which provide power, light, communications, heat, water, sewerage, and transportation. Of particular importance to solid waste management planning is the sanitary sewerage system, because solid waste landfill siting requires consideration of leachate treatment and disposal, which may involve conveyance to a municipal treatment plant. The transportation system essential to the solid waste system is also of particular importance and has impacts on the siting of solid waste disposal facilities. Only minimal changes have been made to the public utility base since completion of the 1982 solid waste management plan. These changes relate to the location of the public sewage treatment plants, to the arterial street and highway system, and to the location of airports.

### Sanitary Sewerage Facilities

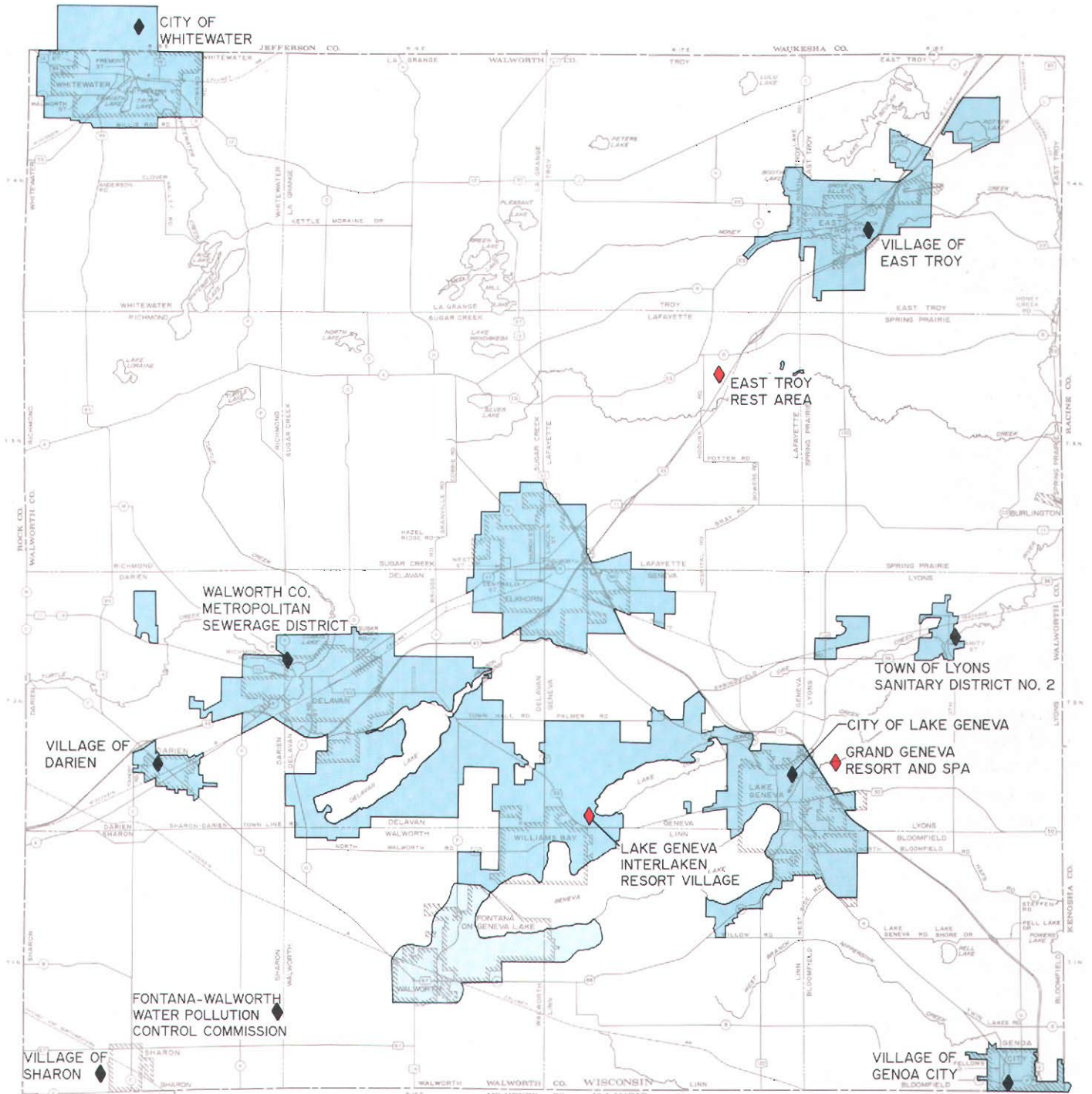
In 1992, there were nine public sewage treatment plants operating within Walworth County. In addition, there were three private sewage treatment plants serving recreational and resort facilities in Walworth County. The sanitary sewerage systems in Walworth County, included in both refined and unrefined sewer service areas, together were proposed in 1990 to serve an area of about 70 square miles, or about 12 percent of the total area of the County. The locations of the existing sewage treatment plants and the areas which these plants are proposed to serve are shown on Map 2. The nine public sewage treatment plants now in the

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<sup>2</sup>*SEWRPC Planning Report No. 28, A Regional Air Quality Attainment and Maintenance Plan for Southeastern Wisconsin: 2000, June 1980.*

Map 2

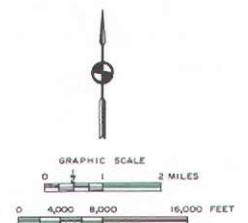
**PUBLIC AND PRIVATE SEWAGE TREATMENT PLANTS  
AND SEWER SERVICE AREAS IN WALWORTH COUNTY: 1993**



**LEGEND**

- REFINED SANITARY SEWER SERVICE AREA
- UNREFINED SANITARY SEWER SERVICE AREA
- PUBLIC SEWAGE TREATMENT PLANT
- PRIVATE SEWAGE TREATMENT PLANT

Source: SEWRPC.



County compare with 12 such plants included in the 1982 study inventory. The reduction by three resulted from consolidation of facilities in the WalCoMet service area and in the Walworth and Fontana service areas.

#### Transportation Base

The transportation systems of the County have a direct impact on the cost-effectiveness and efficiency of alternative solid waste management plans. The highway system and air transportation system are the transportation networks that are of most direct concern in solid waste management planning.

Walworth County is served by a well developed and well maintained, all-weather arterial street and highway system. This system is shown on Map 3, which includes changes which have occurred since the 1982 solid waste plan. The Wisconsin Administrative code, which regulates the location of solid waste management facilities, prohibits solid waste facilities such as landfills and incinerators within 1,000 feet of the nearest edge of the right-of-way of any State trunk highway or interstate highway unless the facility is screened by natural objects, plantings, fences, or other appropriate means so that it is not visible from the highway.

#### Airports

The air transportation system in Walworth County included 28 airports as of 1992, compared to 29 airports as of 1980. This includes the Burlington Municipal Airport, located primarily in Racine County but extending across the Racine-Walworth County line. Of these 28 airports, five were general aviation facilities open for public use. Two, Burlington Municipal and East Troy Municipal, were publicly owned and three were privately owned. The remaining 23 airports were privately owned and restricted to private use. Three of these were private-use helipads and one was a private-use seaplane base. The airport locations are shown on Map 4. General aviation airports are intended to serve business, charter, and air taxi aircraft, as well as aircraft used for agriculture, recreation, sport, and training.

The regional airport plan, as documented in SEWRPC Planning Report No. 38, A Regional Airport System Plan for Southeastern Wisconsin: 2010, recommends that the East Troy Municipal Airport be developed to a General Utility-Stage I facility, which is intended to serve multi-engine

piston and turboprop aircraft. There are two other airports within the study area which occasionally handle, or handled, turbojet aircraft: the Lake Lawn Lodge Airport and the Grand Geneva Resort and Spa Airport, the latter as of October 1991 no longer in service and not currently certified as an official airport. However, its facilities are still largely in existence.

The Wisconsin Administrative Code, which regulates the location of solid waste management facilities, prohibits the construction of solid waste landfills within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used only by piston-type aircraft or within other areas where substantial bird hazard to aircraft would be created. This criterion is applicable only when the facility will be used for handling putrescible waste.

This regulation was established to ensure that bird species typically attracted to, and gather at, landfill sites are kept away from airport traffic patterns and approaching and departing aircraft. Aircraft collision with birds has been shown to be a serious safety hazard. Turbo-powered aircraft are particularly susceptible to serious collision damage because of the sensitivity of the exposed engine turbine to foreign objects and the extreme dependence of such aircraft on engine thrust to maintain flight. Turbojet aircraft also generally require higher landing and takeoff speeds, increasing the potential severity of damage. The Wisconsin law is patterned after the Federal Aviation Administration regulation which recommends that similar buffer zones be maintained between landfills and airports for the safety of air traffic.

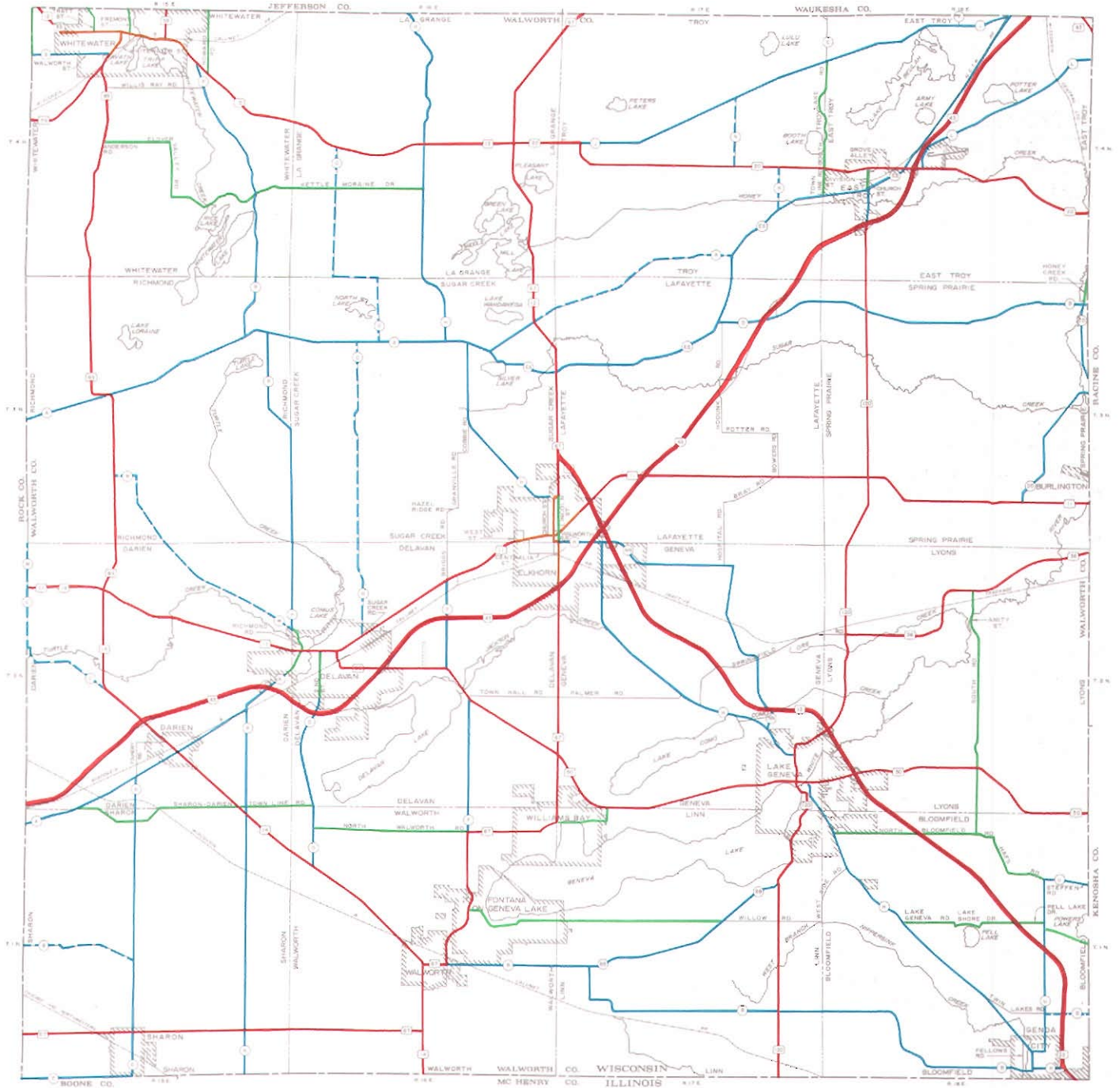
#### **SOLID WASTE SOURCES, QUANTIFICATION, AND COMPOSITION**

A knowledge of the sources, amount, and characteristics of solid waste is necessary to the development of an efficient and environmentally sound solid waste management plan. The major focus of this solid waste management planning update effort is the residential solid wastes generated within the County. Therefore, while this portion of the report describes the quantities and characteristics of all of the solid waste generated in the study area and identifies the sources of these wastes, data regarding the residential solid waste stream are presented in greater detail.



Map 3

ARTERIAL STREET AND HIGHWAY SYSTEM IN WALWORTH COUNTY: 1991



LEGEND

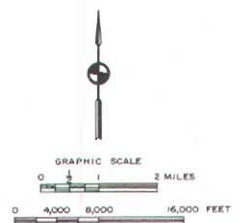
ARTERIAL STREETS AND HIGHWAYS

- STATE TRUNK HIGHWAY-FREEWAY
- STATE TRUNK HIGHWAY-NONFREEWAY
- CONNECTING HIGHWAY
- COUNTY TRUNK HIGHWAY
- LOCAL TRUNK HIGHWAY

NONARTERIAL HIGHWAYS

- COUNTY TRUNK HIGHWAY

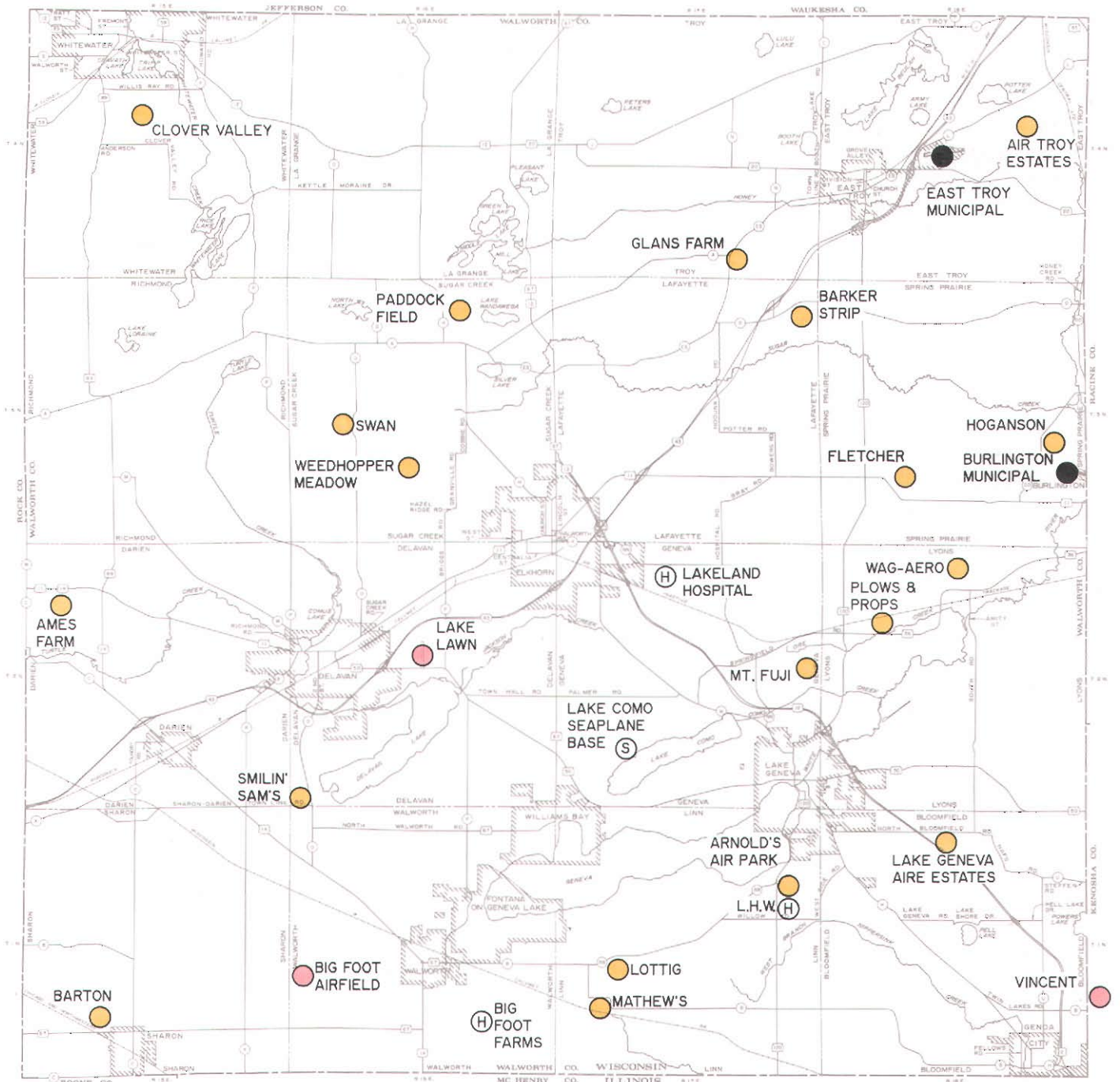
Source: SEWRPC.





Map 4

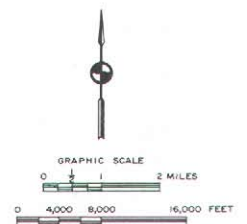
EXISTING AIRPORTS IN WALWORTH COUNTY: 1992



LEGEND

- PUBLIC USE AIRPORT-PUBLIC OWNERSHIP
- PUBLIC USE AIRPORT-PRIVATE OWNERSHIP
- PRIVATE USE AIRPORT-PRIVATE OWNERSHIP
- (H) PRIVATE USE HELIPAD-PRIVATE OWNERSHIP
- (S) PRIVATE USE SEAPLANE BASE-PRIVATE OWNERSHIP

NOTE: THE AMERICANA RESORT AND AIRPORT HAVE BEEN CLOSED SINCE OCTOBER 1991, HOWEVER, THE AIRPORT FACILITIES ARE STILL LARGELY IN EXISTENCE



Source: SEWRPC.

Information contained in this section was developed from data obtained from the Wisconsin DNR, from the local units of government, from the Walworth County Solid Waste Department, and from landfill operators, recycling solid waste facilities, and solid waste collection operators both inside and outside the County. Copies of the questionnaires utilized in the inventory of the local units of government are provided in Appendix A. Where possible, a comparison is made with the solid waste inventory data utilized in the 1982 study.

For the purposes of this planning effort, solid wastes were classified into three categories: residential wastes; nonresidential wastes, including commercial and industrial solid wastes; and special solid wastes. Certain wastes generated by residential, commercial, industrial, and agricultural sources were included in the special waste category. These categories may be more specifically described as follows:

"Residential solid wastes" is defined as solid waste generated by both urban and rural households, including households residing in multi-family dwelling units within the County, but not including major appliances, used oil and tires, and household hazardous wastes, which are included under special waste. Residential wastes are also referred to as domestic, municipal, or household wastes. Residential solid wastes consist primarily of the following materials:

- Newspaper and miscellaneous paper products and packaging
- Food waste
- Plastic and glass packaging
- Ferrous and nonferrous cans
- Used diapers
- Yard waste

"Nonresidential solid wastes" is defined as solid wastes generated by commercial and industrial establishments.

"Commercial solid wastes" is defined as those wastes generated by transportation, communications, wholesale trade, retail trade, finance, and service industry establishments, including stores, restaurants, offices, hotels, motels, and

warehouses. Additionally, this category includes solid wastes generated by recreational land uses and by governmental and institutional establishments, including hospitals and nursing homes, except such special items as pathological wastes and chemicals. These wastes are variable in character, but when taken as a category are normally composed of materials similar to residential wastes. Commercial solid waste consists primarily of the following:

- Office paper and other paper products and packaging
- Food waste
- Used drinking cups
- Used napkins
- Corrugated packaging
- Plastic packaging
- Ferrous and nonferrous cans
- Glass containers
- Yard waste

Demolition and construction solid wastes are not included in the commercial wastes category, but rather in the special wastes category.

"Industrial solid wastes" is defined as all wastes generated by light and heavy manufacturing and processing operations, lumbering, and chemical plants. The type of industries located in the County are diverse and include those involved in the manufacturing and processing of nonelectrical and electrical machinery; fabricated metal products, equipment, and supplies; food; textiles; wood products; plastics; chemicals; precision instruments; and printed materials. Industrial wastes are highly variable in character. Nonhazardous industrial wastes consist of such materials as:

- Ferrous and nonferrous scrap metals
- Plastics
- Pallets and sawdust
- Office paper and other paper products and packaging
- Ash materials

Toxic and hazardous wastes and wastewater treatment sludge, which require special consideration in processing and disposal, are not included in this category but are included in the special solid waste category.

Special wastes include selected solid wastes generated in residential, commercial, industrial, and agricultural land uses. The wastes in this category which were considered in this inventory included construction and demolition wastes, appliances, bulky wastes, trees and brush, used tires, used automobile batteries, and household toxic and hazardous wastes. These wastes usually require special handling and disposal techniques.

#### Residential Solid Waste

As already noted, the residential waste stream includes all wastes normally generated by household activities. The total annual residential solid waste load in the County during 1992 was estimated by using information provided in the 1992 Walworth County solid waste management questionnaire completed by each municipality in the County. Copies of the questionnaires utilized in the inventory of the local units of government is provided in Appendix A. The total solid waste load generated by residential land uses in Walworth County during 1992 was estimated as follows:

1. If annual residential solid waste production data were available from the 1992 questionnaires, those data were used.
2. If local data for a community were not available or incomplete, average daily per capita residential solid waste generation rates for that community were based upon average, or "typical," solid waste generation rates. These average generation rates were developed on the basis of data provided by similar communities on the 1992 questionnaires, classified by the type of collection service provided. The collection service classifications for which average data were developed were based upon the type of collection, curbside or drop-off, and by the type of recyclables collected, mixed or source-separated recyclables.
3. The annual solid waste loading calculated from application of the per capita generation rates was adjusted in those communities which experience a substantial

seasonal influx of population. This adjustment was based upon consideration of seasonal population data and on information provided by local officials and solid waste collection contractors and local landfill operators.

4. The composition of the waste stream used in the 1982 solid waste plan was updated by using data set forth in a State waste generation and composition study.<sup>3</sup>

On the basis of the data collected, it was estimated that in 1992, 40,600 tons of solid waste, or approximately 2.8 pounds per capita per day (ppcpd), were generated in the study area. As shown on Table 6, this estimated 1992 per capita generation rate can be compared to the 1980 per capita rate of 2.6 pounds estimated in the 1982 solid waste management plan. This does not include wastes classified as special wastes generated by residents; these are discussed in a subsequent section. The 1992 residential solid waste stream was estimated to include about 37,300 tons of mixed solid waste, or approximately 2.6 ppcpd and about 3,300 tons of recycled solid waste, or approximately 0.2 ppcpd, as shown by municipality in Table 7. The recycled materials consist primarily of paper, glass, plastic, and metal.

Seasonal variations in residential solid waste production were also evaluated. These seasonal variations are attributable primarily to two factors in Walworth County. The first factor is the normal changes in solid waste generation from seasonal influences, such as increases in waste quantities due to initial yard cleanup activity in the spring and leaf raking in the fall. This factor causes fluctuations in the rate of solid waste generation, but is accounted for in the average per capita production rates set forth above. The second factor contributing to seasonal changes in the generation rates is the seasonal population influx into the County. This factor, while causing fluctuations in the rate of solid waste generation, is not accounted for in the per capita production rates set forth above, which relate to the year-round resident population.

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<sup>3</sup>Franklin Associates, Ltd., Wisconsin Waste Generation and Composition Study, Waste Management Study, September 1992.

Table 6

**ESTIMATED SOLID WASTE QUANTITIES GENERATED IN  
THE WALWORTH COUNTY STUDY AREA.<sup>a</sup> 1980 AND 1992**

Solid Waste Category	1980		1992	
	Tons per Year	Pounds Per Capita per Day	Tons per Year	Pounds Per Capita per Day
Residential .....	34,643 <sup>b</sup>	2.6	40,617 <sup>c,d</sup>	2.8
Nonresidential				
Commercial .....	14,843	1.1	18,379 <sup>e</sup>	1.3
Industrial .....	32,500 <sup>f</sup>	2.4	28,275 <sup>g</sup>	2.0
Special Wastes				
Bulky .....	1,345	0.1	3,394 <sup>h</sup>	0.2
Tree and Brush .....	1,342 <sup>i</sup>	0.1	1,556 <sup>j</sup>	0.1
Construction and Demolition ...	3,644 <sup>k</sup>	0.3	16,683 <sup>l</sup>	1.2
Total	88,317	6.6	108,904 <sup>m</sup>	7.6

<sup>a</sup>The geographic study area considered in the Walworth County solid waste management plan update is defined as all of Walworth County plus that portion of the City of Whitewater located in Jefferson County.

<sup>b</sup>This quantity includes 1,696 tons of solid waste generated by seasonal residents.

<sup>c</sup>This quantity includes an estimated 2,970 tons of solid waste generated by seasonal residents.

<sup>d</sup>This quantity includes an estimated 3,308 tons per year, or about 0.2 pound per capita per day, of residential solid waste which are recycled, and does not include about 5,300 tons of yard waste which is currently kept onsite and out of the waste stream.

<sup>e</sup>This quantity includes an estimated 4,241 tons per year, or about 0.3 pound per capita per day, of commercial solid waste which are recycled.

<sup>f</sup>This quantity includes industrial building material and supply wastes, which are included in the construction and demolition wastes of the special waste category for 1992.

<sup>g</sup>This quantity includes an estimated 9,896 tons per year, or about 0.7 pound per capita per day, of industrial solid waste which are recycled or reused.

<sup>h</sup>This quantity includes an estimated 990 tons per year, or about 0.07 pound per capita per day, of white goods which are recycled.

<sup>i</sup>This quantity includes an estimated 671 tons per year, or about 0.05 pound per capita per day, which is recycled by individuals for use as firewood.

<sup>j</sup>This quantity includes an estimated 778 tons per year, or about 0.05 pound per capita per day, of trees and brush which are recycled through mulching or composting or used by individuals for firewood.

<sup>k</sup>This quantity includes a substantial amount of construction and demolition debris which is recycled and reused as rubble fill, and excludes industrial building material and supply wastes.

<sup>l</sup>This quantity includes an estimated 4,171 tons per year, or about 0.3 pound per capita per day, of construction and demolition debris which is recycled and reused as aggregate for road base or clean fill.

<sup>m</sup>This quantity includes an estimated 23,384 tons per year, or about 1.4 pounds per capita per day, of solid waste which is recycled or reused.

Source: Wisconsin Department of Natural Resources; Walworth County Municipalities; Walworth County Solid Waste Management Department; Landfill Operators, Waste Haulers, Recycling Centers; and SEWRPC.

Also, as already noted, residential solid waste contains a variety of components, with paper products making up the largest percentage by weight of the waste stream. There have been many studies conducted to determine the compo-

sition of residential waste. Reviewed data developed in a recent study<sup>4</sup> and limited available

<sup>4</sup>*Ibid.*

Table 7

**QUANTIFICATION OF RESIDENTIAL SOLID WASTE GENERATED  
IN THE WALWORTH COUNTY STUDY AREA BY MUNICIPALITY: 1992**

Civil Division	Total Yearly Solid Waste		Mixed Solid Waste		Recycled Solid Waste	
	Quantity of Solid Waste (tons)	Daily Generation Rate per Person (pounds)	Quantity of Mixed Solid Waste (tons)	Daily Generation Rate per Person (pounds)	Quantity of Recycled Solid Waste (tons)	Daily Generation Rate per Person (pounds)
<b>Cities</b>						
Delavan .....	3,603	3.3	3,382	3.1	222	0.2
Elkhorn .....	2,868	2.9	2,555	2.6	313	0.3
Lake Geneva .....	2,834	2.6	2,384	2.2	450	0.4
Whitewater <sup>a</sup> .....	3,718	2.3	3,469	2.1	249	0.2
Subtotal	13,024	2.7	11,790	2.5	1,234	0.2
<b>Villages</b>						
Darien .....	620	2.9	580	2.7	40	0.2
East Troy .....	2,114	4.3	1,920	3.9	194	0.4
Fontana-on-Geneva Lake ...	1,452	2.9	1,300	2.6	152	0.3
Genoa City .....	850	3.6	780	3.3	70	0.3
Sharon .....	819	3.6	728	3.2	91	0.4
Walworth .....	742	2.5	622	2.1	120	0.4
Williams Bay .....	1,114	2.6	1,000	2.4	114	0.3
Subtotal	7,711	3.3	6,930	3.0	781	0.3
<b>Towns</b>						
Bloomfield .....	1,461	2.2	1,461	2.2	0	0.0
Darien .....	769	2.8	680	2.5	89	0.3
Delavan .....	3,491	3.1	3,265	2.9	226	0.2
East Troy .....	2,297	3.1	2,000	2.7	297	0.4
Geneva .....	1,430	2.3	1,303	2.1	127	0.2
Lafayette .....	600	2.6	582	2.5	18	0.1
LaGrange .....	1,445	3.4	1,360	3.2	85	0.2
Linn .....	1,521	3.0	1,486	3.0	35	0.1
Lyons .....	1,180	2.5	1,177	2.5	4	<0.1
Richmond .....	1,149	3.9	1,040	3.5	109	0.4
Sharon .....	501	2.7	464	2.5	37	0.2
Spring Prairie .....	863	2.7	799	2.5	64	0.2
Sugar Creek .....	1,237	2.5	1,214	2.5	23	<0.1
Troy .....	599	1.6	519	1.4	80	0.2
Walworth .....	661	2.7	661	2.7	0	0.0
Whitewater .....	679	2.7	578	2.3	101	0.4
Subtotal	19,882	2.7	18,589	2.5	1,293	0.2
<b>Total</b>	<b>40,617</b>	<b>2.8</b>	<b>37,309</b>	<b>2.6</b>	<b>3,308</b>	<b>0.2</b>

<sup>a</sup>Quantities reflect the total solid waste generated in the City of Whitewater, which includes the portions of the City which lie in Walworth County and Jefferson County. Quantities do not reflect wastes generated by the 3,701 students attending the University of Wisconsin-Whitewater, which are considered commercial solid waste. Generation rates allocate the 1992 quantities to the 1990 population of the study area.

Source: Walworth County Municipalities, Walworth County Solid Waste Management Department, and SEWRPC.

information regarding recyclables in Walworth County were used to develop the average composition of residential wastes in Walworth County. According to this information, the average composition of residential solid waste stream is shown graphically in Figure 2 and in tabular form in Table 8.

#### Nonresidential Solid Waste Stream

As already noted, the nonresidential waste stream includes all wastes normally generated by the activities of the commercial and industrial businesses. The total annual nonresidential solid waste generated in the County during 1992 was estimated by updating the estimates devel-



oped in the 1982 plan, using such information as updated land use distribution, categorical employment distribution, economic activity, and estimated recycling proficiencies.

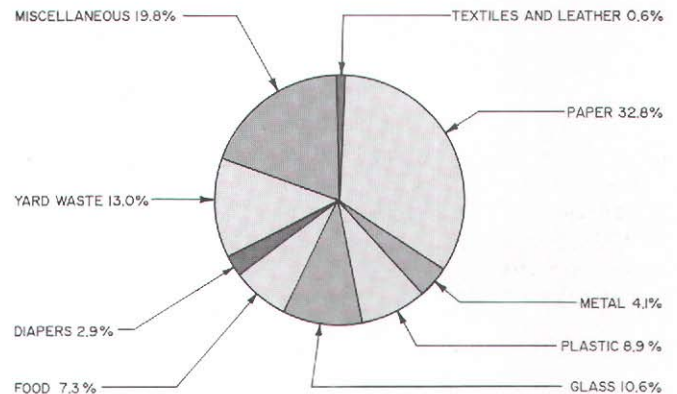
**Commercial Wastes:** As already noted, commercial solid wastes are generated by transportation, communications, wholesale trade, retail trade, finance, and service industry establishments, including stores, restaurants, offices, hotels, motels, and warehouses. Additionally, this category includes solid wastes generated by recreational land uses and governmental and institutional establishments, including hospitals and nursing homes, except special items such as pathological wastes and chemicals. Construction and demolition solid wastes are not included in the commercial wastes subcategory, but rather in the special wastes category.

The 1982 Walworth County solid waste management plan estimated the total commercial solid waste generation rate at 1.1 ppcpd. Economic activity, as measured by the proportion of workers employed in each employment category, is one means of relating commercial activity within the County. In 1980, about 64 percent of the work force in Walworth County were employed in activities generating commercial solid waste. This compares to about 68 percent of the employment being related to these commercial activities countywide in 1990. Thus, there has been an increase of approximately 25 percent in the number of people employed in commercial activities from 1980 to 1990. However, there has only been an increase of about 8 percent in the area occupied by land uses which generate commercial solid waste between 1980 and 1990. On the basis of this information and the increased awareness of the need to recycle, a commercial solid waste generation rate of 1.0 pound per person per day was recommended to be used. This corresponds to an estimated 14,100 tons of commercial solid waste generated in the County in 1992. This quantity does not include an estimated 4,200 tons per year, or 0.3 ppcpd, of commercial solid wastes, comprised primarily of paper and cardboard, which are recycled.

**Industrial Wastes:** As already noted, industrial solid wastes consist of the residue from a variety of manufacturing and processing activities. The waste from industry is primarily scrap paper, wood, glass, plastics, metals, and sands. This subcategory does not include hazardous and

Figure 2

**COMPOSITION OF RESIDENTIAL SOLID WASTE  
IN THE WALWORTH COUNTY STUDY AREA: 1992**



Source: Franklin Associates, Ltd., *Wisconsin Waste Generation and Composition Study, Waste Management Study*, September 1992, prepared for the Wisconsin Department of Natural Resources, and SEWRPC.

toxic wastes such as oils, solvents, and sludge, which are included in the special solid waste category. Industrial solid wastes are generated by a variety of light and heavy manufacturing and processing operations, lumbering, and chemical plants. The types of industries located in the County are diverse, including those involved in the manufacturing and/or processing of nonelectrical and electrical machinery; fabricated metal products, equipment, and supplies; food; textiles; wood products; plastics; chemicals; precision instruments; and printed materials.

The 1982 Walworth County solid waste management plan estimated the total industrial solid waste generation rate at 2.4 ppcpd, which included building materials and supplies wastes. Economic activity, as measured by the proportion of workers employed in each employment category, is one means of relating industrial activity within the County. In 1980, about 25 percent of the work force in Walworth County was employed in activities generating industrial solid waste. This percentage did not change significantly from 1980 to 1990. While the industrial percentage of the County work force remained essentially the same, there has been an increase of approximately 14 percent in the number of people employed in industrial activities from 1980 to 1990. In addition, there has been an increase of about 52 percent in the amount of

Table 8

## COMPOSITION OF RESIDENTIAL SOLID WASTE IN THE WALWORTH COUNTY STUDY AREA: 1992

Product Category	Quantity (tons)	Percentage of Waste Stream
Newspaper	4,880	12.0
Corrugated Containers	617	1.5
Magazines	1,033	2.6
High-Grade Office Paper	219	0.5
Mixed Wastepaper	6,578	16.2
Aluminum Cans	672	1.7
Steel Cans <sup>a</sup>	988	2.4
Foam Polystyrene Packaging	45	0.1
Foam Polystyrene Nondurable Goods	17	<0.1
Plastic Containers	913	2.2
Other Plastic Packaging	1,376	3.4
Other Plastic Nondurable Goods	1,315	3.2
Glass Containers	3,935	9.7
Other Glass <sup>b</sup>	349	0.9
Yard Waste	5,280	13.0
Food Waste	2,976	7.3
Disposable Diapers	1,170	2.9
Textiles and Leather <sup>c</sup>	228	0.6
Miscellaneous Durable Goods <sup>d</sup>	2,457	6.1
Household Batteries	75	0.2
Miscellaneous Packaging	252	0.6
Unclassified	5,242	12.9
Total	40,617	100.0

<sup>a</sup>Steel cans include bi-metal cans and tin cans.

<sup>b</sup>Other glass includes glass contained in durable goods category.

<sup>c</sup>Quantities shown include rubber from sources other than tires.

<sup>d</sup>Quantity shown excludes glass which is included in the other glass category, and rubber and leather included in textiles and leather category.

Source: Franklin Associates, Ltd., Wisconsin Waste Generation and Composition Study, Waste Management Study, September 1992, prepared for the Wisconsin Department of Natural Resources, and SEWRPC.

area devoted to land uses which generate industrial solid waste between 1980 and 1990. On the basis of this information and the increased awareness of the need to recycle, with an estimated 35 percent of the industrial wastes being recycled or reused, an industrial solid waste generation rate of 1.3 pounds per person per day was recommended to be used. This corresponds to an estimated 18,400 tons of industrial solid waste generated in the County in 1992. This

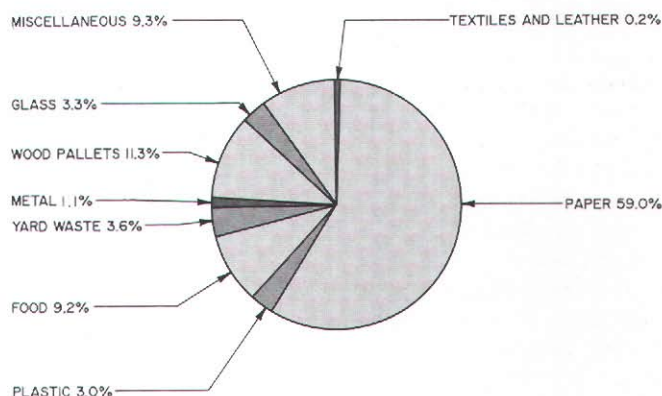
quantity does not include industrial building material and supply wastes, which is considered as construction and demolition debris of the special waste category, nor does it include an estimated 9,900 tons per year, or 0.7 pound per capita per day, of industrial solid wastes comprised primarily of paper, wood, glass, and miscellaneous materials which are recycled or reused and thus do not require disposal consideration.



The total annual solid waste load, excluding special wastes, generated by nonresidential land uses in the study area during 1992 was estimated to be approximately 32,500 tons at an estimated generation rate of about 2.3 ppcpd. This does not include solid wastes which are recycled or reused or wastes classified as special waste. The nonresidential waste stream consists of a variety of components, with paper products making up over one-half of the weight, and wood pallets and food wastes the next largest components of the waste in that order. The average composition of the nonresidential waste stream is shown graphically in Figure 3 and in tabular form in Table 9.

Figure 3

**COMPOSITION OF NONRESIDENTIAL WASTE  
IN THE WALWORTH COUNTY STUDY AREA: 1992**



Source: Franklin Associates, Ltd., *Wisconsin Waste Generation and Composition Study, Waste Management Study*, September 1992, prepared for the Wisconsin Department of Natural Resources, and SEWRPC.

### Special Waste Category

Special wastes under consideration include such bulky wastes as appliances and furniture, trees and brush, construction and demolition wastes, used tires and automobile batteries, and household toxic and hazardous wastes. These wastes appear in the solid waste stream and pose special collection and disposal problems. In general, these wastes should not be mixed with residential, commercial, and nonhazardous industrial wastes, but rather should be collected and disposed of separately.

Bulky Wastes: This subcategory includes discarded appliances (white goods) and items of furniture and furnishings. These items, because of their size and weight, cannot normally be handled on regular residential and commercial collection systems. Therefore, transport of these wastes is generally by the homeowner, through special municipal arrangements, or by special arrangements with private waste haulers. The generation of these items varies seasonally.

Bulky wastes require special disposal consideration. Landfilling major appliances is now prohibited under State law; they must be recycled or scrapped. Special consideration is required in landfilling furniture and furnishings since they can cause voids and take up considerable space. Some landfills set bulky wastes aside for pickup by private recycling operators. Information gathered from the Statewide waste generation and composition study indicates the Statewide generation rate for bulky wastes is about 0.24 ppcpd. If applied to the study area, this results in about 3,400 tons per year being generated in study area, as shown in Table 10.

Tree and Brush: On the basis of observations within the County, it appears that most log-size tree wood is now salvaged for use as fuel and that wastes are mainly limbs and shrubs. It was estimated that 1,560 tons per year of tree and brush solid waste are generated in the study area at a generation rate of 0.11 ppcpd, the same generation rate used in the 1982 solid waste management report. Of this quantity approximately 50 percent, or about 780 tons per year, or about 0.5 pound per capita per day, is recycled through composting or mulching or used as firewood.

Construction and Demolition Wastes: This subcategory of wastes includes residues generated by the building and paving industries. Information gathered from the Statewide waste generation and composition study indicates that the Statewide generation rate of construction and demolition debris is about 0.9 ppcpd, which, if applied to the study area, results in about 12,500 tons per year being generated in the study area. This quantity does not include an estimated 4,200 tons per year, or 0.3 ppcpd, which is recycled or reused or not disposed of in licensed sanitary landfills.

Tires: Discarded tires originate from a variety of sources, including scrapyards, commercial sales outlets, reprocessors, and all types of tire users. Generally, most of the tires requiring disposal



Table 9

## COMPOSITION OF NONRESIDENTIAL SOLID WASTE IN THE WALWORTH COUNTY STUDY AREA: 1992

Product Category	Quantity (tons)	Percentage of Waste Stream
Newspaper . . . . .	793	1.7
Corrugated Containers . . . . .	13,894	29.8
Magazines . . . . .	793	1.7
High-Grade Office Paper . . . . .	3,639	7.8
Mixed Wastepaper . . . . .	8,398	18.0
Aluminum Cans . . . . .	233	0.5
Steel Cans <sup>a</sup> . . . . .	280	0.6
Foam Polystyrene Packaging . . . . .	8	<0.1
Foam Polystyrene Nondurable Goods . . . . .	93	0.2
Plastic Containers . . . . .	327	0.7
Other Plastic Packaging . . . . .	513	1.1
Other Plastic Nondurable Goods . . . . .	467	1.0
Glass Containers . . . . .	1,213	2.6
Other Glass <sup>b</sup> . . . . .	327	0.7
Yard Waste . . . . .	1,680	3.6
Food Waste . . . . .	4,292	9.2
Textiles and Leather <sup>c</sup> . . . . .	93	0.2
Wood Pallets . . . . .	5,272	11.3
Miscellaneous Durable Goods <sup>d</sup> . . . . .	2,333	5.0
Miscellaneous Packaging . . . . .	140	0.3
Miscellaneous Inorganic Wastes . . . . .	1,866	4.0
Total	46,654	100.0

<sup>a</sup>Steel cans include bi-metal cans and tin cans.

<sup>b</sup>Other glass includes glass contained in durable goods category.

<sup>c</sup>Quantities shown include rubber from sources other than tires.

<sup>d</sup>Quantity shown excludes glass which is included in the other glass category, and rubber and leather included in textiles and leather category.

Source: Franklin Associates, Ltd., Wisconsin Waste Generation and Composition Study, Waste Management Study, September 1992, prepared for the Wisconsin Department of Natural Resources, and SEWRPC.

Table 10

## STUDY AREA BULKY WASTE GENERATION RATES

Item	Residential Waste		Nonresidential Waste		Total	
	Generation Rate (pounds per capita per day)	Quantity (tons)	Generation Rate (pounds per capita per day)	Quantity (tons)	Generation Rate (pounds per capita per day)	Quantity (tons)
Appliances . . . . .	0.06	848	0.01	142	0.07	990
Furniture, Furnishings . . . . .	0.10	1,414	0.07	990	0.17	2,404
Total	0.16	2,262	0.08	1,132	0.24	3,394

Source: Franklin Associates, Ltd., and SEWRPC.

are from automobiles. Truck, bus, and other more costly, specially designed, heavy equipment tires are usually reused. Disposal of discarded tires is a significant problem. Whole tires do not compact well in landfills and have a tendency to "float" to the surface; shredding is impeded by the steel belts in many tires; open burning results in smoke, odor, and air pollution problems; and reclamation is often more costly than manufacturing new tires. Information gathered from the Statewide waste generation and composition study and various other sources indicates the Statewide generation rate for tires is about one tire per capita per year, which, if applied to the study area, results in about 75,000 tires per year being generated in Walworth County. The Statewide study also indicates that 25 percent of discarded tires, or about 18,750 tires in Walworth County, are recycled or reused.

**Toxic and Hazardous Wastes:** Toxic and hazardous wastes are defined as those wastes which, because of physical, chemical, or infectious characteristics, may pose a substantial threat to human health or safety or to the environment when improperly treated, stored, or disposed of. Characteristics of hazardous wastes include toxicity, flammability, corrosivity, reactivity, carcinogenicity, and bioaccumulation. Toxic and hazardous wastes occur in many forms, including solids, liquids, gases, and sludge.

The Federal and State governments are playing an ever increasingly important role in the establishment and enforcement of regulations concerning the handling and disposal of these wastes. Further information on the regulation of these wastes is provided later in this chapter.

Hazardous wastes have three major sources: 1) manufacturing industries, 2) end users of such finished products as paints and pesticides, and 3) institutions. All these types of generating sources are located within the County; however, only household toxic and hazardous wastes will be considered in this report.

Households are considered to be sources of toxic and hazardous wastes. Automotive supplies, pesticides, paints, solvents, cleaning products, batteries, and many other compounds and finished products used by residents can be a significant source of potentially dangerous materials. Typically, these materials are disposed of by dumping them down household

drains or discarding them, along with residential solid wastes, into the waste stream.

The Walworth County Solid Waste Management Department organized a Clean Sweep Household Hazardous Waste Collection Program to provide a safer disposal alternative for household hazardous waste and to educate Walworth County residents regarding the dangers of hazardous materials. This program was begun in August of 1992 and was very successful. The first-time collection had a participation rate of about 1.2 percent of the Walworth County households, which is well above the State average of 0.76 percent participation for over 50 Clean Sweep programs held in Wisconsin over the last eight years. The program collected over 7,088 pounds of potentially hazardous materials at a rate of about 22 pounds per participating household, as shown in Table 11.

Vehicle batteries are considered toxic and hazardous wastes. Discarded vehicle batteries come from a variety of sources, including scrapyards, commercial sales outlets, and battery reprocessors. Information gathered from the Statewide waste generation and composition study and related studies was used to estimate that about 15,000 batteries are discarded or recycled per year in Walworth County.

### Summary

The quantities of solid waste estimated to be generated in the study area in 1992 are summarized by type of waste in Table 12. The total solid waste generated in the study area in 1992 is estimated to be 108,900 tons per year, at a generation rate of approximately 7.6 ppcpd, applying the 1990 resident population of the study area. This quantity does not include an estimated 75,000 automobile tires and 15,000 batteries which are discarded or recycled each year. The 1992 solid waste quantity and generation rate exhibited increases of approximately 23 percent and 15 percent, respectively, over those experienced in 1980. Of the 1990 total, approximately 79 percent, or about 85,500 tons per year, or about 5.9 ppcpd, were estimated not to be recycled or reused and required disposal. The remaining 21 percent, or about 23,400 tons per year, or about 1.6 ppcpd, were estimated to be recycled or reused and did not require disposal.

Seasonal variation in the solid waste quantities is a significant factor in Walworth County. This

Table 11

**WALWORTH COUNTY CLEAN SWEEP HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM: 1992**

Type of Waste	Quantities of Waste Disposed of	
	Pounds	Volume
Flammable Liquids (paints, fuels, thinner, turpentine, etc.)	3,691	Six 55-gallon drums 26 30-gallon drums Three 16-gallon drums
Flammable Gas (aerosol containers)	1,052	12 30-gallon drums Two 16-gallon drums One 15-gallon drum
Poisons, ORM-A (pesticides, herbicides, rodent bait, etc.)	1,280	Four 55-gallon drums
Acids, Alkalies, Oxidizers (household cleaners, resins, pool chemicals, etc.)	710	One 30-gallon drum Four 16-gallon drums Two 15-gallon drums Three 5-gallon drums
Others and Special Wastes	355	One 55-gallon drum Two 16-gallon drums Two 3-gallon drums
Total <sup>a</sup>	7,088	11 55-gallon drums 39 30-gallon drums 11 16-gallon drums Three 15-gallon drums Three 5-gallon drums Two 3-gallon drums

<sup>a</sup>Also collected: used metal containers, 500 pounds; used motor oil, 225 gallons; used antifreeze, 75 gallons; automobile batteries, 21.

Source: Walworth County Solid Waste Management Department.

seasonal variation is an important consideration in the design of alternative solid waste management systems. Two main factors account for seasonal variations in the solid waste generated in Walworth County. The first factor is the added quantity of solid waste generated by the seasonal and weekend populations during the summer months of May through August. The other factor contributing to the seasonal variation is the normal variation in solid waste generation caused by the change in activities that take place with the change of seasons. In Walworth County the months of April through October result in higher than average waste generation by residents because of outside activity and yard work. Figure 4 illustrates the estimated seasonal distribution of the solid waste generation in the study area.

## EXISTING SOLID WASTE MANAGEMENT SYSTEMS

There have been significant changes in the solid waste management systems operating in Walworth County since the preparation of the 1982 solid waste management plan. The solid waste systems existing as of 1992 are summarized in this section.

### Source Separation and Recycling

Resource recovery programs can be divided into pre-collection and post-collection categories. Pre-collection programs entail the separation of such recyclable solid waste materials as newspaper, glass, plastic, aluminum, and tin by the generator before these materials are collected with the other waste components. These source-separa-

Table 12

ESTIMATED SOLID WASTE QUANTITIES GENERATED IN THE WALWORTH COUNTY STUDY AREA.<sup>a</sup> 1992

Solid Waste Category	Quantity per Year	Per Capita
Residential . . . . .	40,617 tons <sup>b,c</sup>	2.8 pounds per day
Nonresidential		
Commercial . . . . .	18,379 tons <sup>d</sup>	1.3 pounds per day
Industrial . . . . .	28,275 tons <sup>e</sup>	2.0 pounds per day
Special Wastes		
Bulky . . . . .	3,394 tons <sup>f</sup>	0.2 pound per day
Tree and Brush . . . . .	1,556 tons <sup>g</sup>	0.1 pound per day
Construction and Demolition . . . . .	16,683 tons <sup>h</sup>	1.2 pounds per day
Tires . . . . .	75,000 tires <sup>i</sup>	1 tire per year
Toxic and Hazardous <sup>j</sup> . . . . .	N/A	N/A
Vehicle Batteries . . . . .	15,000 batteries <sup>k</sup>	0.2 battery per year

NOTE: N/A indicates data not available.

<sup>a</sup>The geographic study area considered in the Walworth County solid waste management plan update is defined as all of Walworth County plus that portion of the City of Whitewater located in Jefferson County.

<sup>b</sup>This quantity includes an estimated 2,970 tons of solid waste generated by seasonal residents.

<sup>c</sup>This quantity includes an estimated 3,308 tons per year, or about 0.2 pound per capita per day, of residential solid waste which are recycled, and does not include about 5,300 tons of yard waste which is currently kept onsite and out of the waste stream.

<sup>d</sup>This quantity includes an estimated 4,241 tons per year, or about 0.3 pound per capita per day, of commercial solid waste which are recycled.

<sup>e</sup>This quantity includes an estimated 9,896 tons per year, or about 0.7 pound per capita per day, of industrial solid waste which are recycled or reused.

<sup>f</sup>This quantity includes an estimated 990 tons per year, or about 0.07 pound per capita per day, of white goods which are recycled.

<sup>g</sup>This quantity includes an estimated 778 tons per year, or about 0.05 pound per capita per day, of trees and brush which are recycled through mulching or composting or used by individuals for firewood.

<sup>h</sup>This quantity includes an estimated 4,171 tons per year, or about 0.3 pound per capita per day, of construction and demolition debris which is recycled and reused as aggregate for road base or clean fill.

<sup>i</sup>This quantity includes an estimated 18,750 discarded tires which are recycled and reused.

<sup>j</sup>This solid waste category refers to household toxic and hazardous solid wastes only.

<sup>k</sup>This quantity includes an estimated 13,500 batteries which are recycled and reused.

Source: Wisconsin Department of Natural Resources; Walworth County Municipalities; Walworth County Solid Waste Management Department; Landfill Operators, Waste Haulers, Recycling Centers; and SEWRPC.

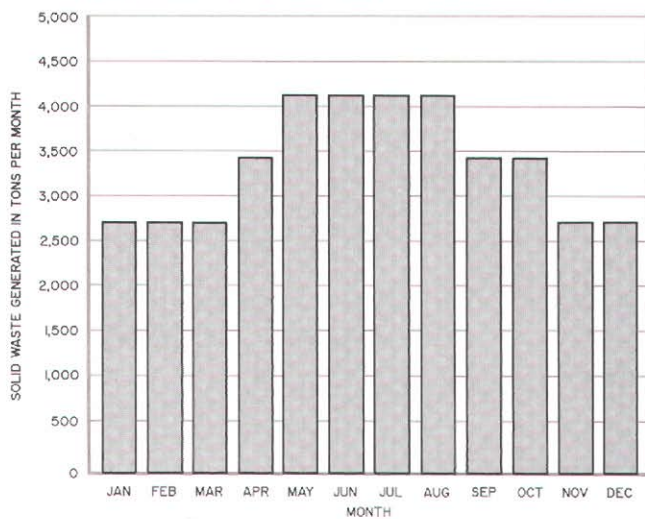
tion programs offer low-cost methods of reducing the need for further transportation, processing, and disposal. Some of the recycling programs in the County provide for a high degree of separation at the source, which allows recycled waste to be transported directly from its point of collection to market. However, such programs

require a high level of public cooperation and must therefore rely heavily upon public education. Post-collection materials recovery, or the recovery of materials after they have been mixed in collector vehicles, has higher technology requirements and greater initial capital and operating costs.



Figure 4

SEASONAL RESIDENTIAL  
GENERATION OF SOLID WASTE IN THE  
WALWORTH COUNTY STUDY AREA: 1992



NOTE: The quantities shown above do not include the special waste category.

Source: SEWRPC.

Source separation and recycling are significant elements of the existing solid waste management functions in Walworth County. There has been a significant change in the recycling operations in the County since the 1982 plan. In 1992, there were recycling programs in all but two of the 27 communities; there has been a shift toward more of these operations being run by private business. A list of the recycling at processing transfer facilities serving Walworth County municipalities is shown in Table 13. The other known recycling operations serving the County are listed in Table 14.

More of the municipal recycling programs now use curbside collection procedures. Of the 25 community recycling programs, nine communities used curbside collection, 15 communities used drop-offs, and one community used both. Curbside recycling collection programs have been shown to capture a larger percentage of the residential waste stream for recycling. Data from the County solid waste questionnaire shows that the per capita collection rate of curbside recycling programs approximates 0.4 pound per day, compared to about 0.2 pound per capita per day for drop-off recycling programs. It is estimated that 3,300 tons of residential solid waste were recycled through the

municipal programs in the Walworth County study area in 1992, accounting for about 8 percent of the total residential solid waste generated within the study area.

Commercial generators of solid waste also recycle their waste, usually at a higher percentage rate than the residential sector. However, the most significant recycling operations in terms of percentage and quantity of waste recycled are the recycling programs routinely carried out by many of the industries in the County. No survey of the industries in the County, as was done in the original plan, was undertaken because the commercial and industrial sectors are not the focus of this update. In the 1982 plan it was estimated that 25 percent of the solid waste generated by industry was recycled. However, because of the increased awareness, popularity, and financial benefits of recycling, it is assumed that about 35 percent of the generated industrial wastes are being recycled or reused. Other surveys, such as the survey conducted in Kenosha County in 1985, which showed that industry recycled about 70 percent of the wastes it generated, have shown a much larger percentage of industrial solid wastes are recycled or incinerated. The 1985 Kenosha survey also indicated that about 22 percent of the solid wastes generated by the commercial sector are recycled or incinerated.

Yard waste is another component of the waste stream which can be recycled. Yard waste consists of many different types organic material. However, the organic material which is recycled in Walworth County is mostly such vegetative material as grass clippings, leaves, garden wastes, brush, and tree branches and trunks. The yard waste is usually recycled in one of two ways: by composting or by woodchipping the woody items.

Composting is the biological degradation process by which the organic materials in solid wastes are converted into nuisance-free, humus-like material that can be used as a soil conditioner. Woodchipping is a process by which the larger wood items are ground and chipped into mulch. According to data compiled from the 1992 County questionnaires, there were eight municipalities operating composting programs and two more in the start-up process. The data also show that there are 11 community woodchipping programs operating. Both these recycled yard

Table 13

**SOLID WASTE RECYCLING AT PROCESSING OR TRANSFER  
FACILITIES SERVING WALWORTH COUNTY MUNICIPALITIES: 1992**

Recycling Operation	Location	Waste Accepted	Municipality with Which Primary Collection and/or Initial Storage is Contracted
Browning Ferris, Inc.	Muskego	Aluminum, glass, paper, plastic, tin	City of Delavan and Town of Spring Prairie
Fiber Resource Recovery	Zenda	Aluminum, glass, paper, plastic	Villages of Darien, Genoa City, Sharon, and Walworth; Towns of Linn, Lyons, and Sharon
John's Disposal Service	Whitewater	Aluminum, glass, paper, plastic, oil, batteries, and tires	City and Town of Whitewater
Keinbaum Iron and Metal	Whitewater	Aluminum, tin, scrap iron and metal, and appliances	Town of Geneva
New Way Recycling	Sharon	Plastic	City of Delavan
Otto Jacobs Company	Lake Geneva	Appliances, tires, tree limbs, used oil	Town of Geneva
Valley Sanitation Company, Inc.	Fort Atkinson	Aluminum, glass, paper, plastic, tin, appliances, and sheet metal	City of Elkhorn; Village of East Troy; Towns of East Troy, Lafayette, LaGrange, Richmond, Sugar Creek and Troy
Waste Management	Darien Madison	Aluminum, glass, paper, plastic, tin	City of Lake Geneva; Villages of Fontana-on-Geneva Lake and Williams Bay; Town of Darien

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Management Department, and SEWRPC.

waste products can be used by local farms, landscaping companies, greenhouses, nurseries, sod farms, topsoil and potting soil vendors, golf courses, local government agencies, and the general public.

Yard waste management systems within Walworth County have significantly changed since 1992; when the initial inventory of solid waste management facilities for this planning effort was completed, there were very limited facilities in use. This change has occurred in direct response to the Statewide ban on yard waste disposal in landfills, which became effective at the beginning of 1993. For this reason, a new inventory of yard waste management systems was undertaken during October and November of 1993 by the Walworth County Solid Waste Management staff.

There were 12 composting sites, including eight publicly operated and four privately operated sites, in the County as of December 1993 at the locations shown on Map 5. Summary information regarding these composting sites and other yard waste management practices being carried out in the County in 1993 is provided in Table 15. As can be seen, composting sites are operated by the Cities of Elkhorn, Lake Geneva, and Whitewater; the Villages of Fontana-on-Geneva Lake, Walworth, and Williams Bay; and the Towns of East Troy and LaGrange. The City of Elkhorn compost site is located on lands in the southeast portion of the Walworth County Lakeland Complex and is also used by the County and by the Towns of Delavan and Lafayette and the Village of East Troy on a limited basis. In addition, there are four privately operated compost operations serving the County.

Table 14

## OTHER SOLID WASTE RECYCLING OPERATIONS SERVING WALWORTH COUNTY: 1992

Name	Location	Types of Waste Accepted
<b>Non-Profit Organizations</b>		
Goodwill Store .....	Burlington	Clothing, household articles, furniture, and usable appliances
St. Vincent De Paul .....	Burlington	Clothing, household articles, furniture, and usable appliances
<b>Private Recyclers in Walworth County</b>		
John's Disposal Service .....	Whitewater	Glass, plastics, aluminum, paper, scrap metal, and batteries
Kienbaum Iron and Metal .....	Whitewater	Glass, aluminum, scrap metal, and batteries
Osborn Recycling .....	Delavan	Aluminum
Rufus Young .....	Sharon	Plastic
Southern Lakes Recycle .....	Elkhorn	Aluminum and paper
<b>Private Recyclers outside Walworth County</b>		
A-1 Recycling .....	Milwaukee	Glass, paper, aluminum, and scrap metal
FCF Metal Salvage .....	Burlington	Scrap metal
Foster Forbes .....	Burlington	Glass and aluminum
Janesville Recycling Center .....	Janesville	Paper, scrap metal, aluminum, glass, and plastic
Lorman Iron & Metal .....	Fort Atkinson	Aluminum and scrap metal
Samuals Recycling .....	Janesville	Aluminum, glass, plastic, and paper
Recycling World, Inc. ....	Milwaukee	Aluminum, glass, paper, scrap metal, and plastic
S & M Recycling .....	Milwaukee	Aluminum, glass, paper, scrap metal, and plastic
SEI Recycling .....	Burlington	Aluminum, scrap metal, plastic, and batteries
Wisconsin Paperboard Corporation .....	Milwaukee	Aluminum, paper, and glass

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Management Department, and SEWRPC.

Open burning of leaves and brush and woody material is currently allowed by 24 of the 27 municipalities in the County, as indicated on Table 15. In addition, 18 of the municipalities operate some type of brush or wood waste chipping equipment on an as-needed basis.

Seasonal curbside collection of yard waste, primarily leaves, is carried out by seven of the municipalities and five municipalities have only drop-off collections of yard waste. Private curbside collection services for source-separated yard waste is used by residences in some communities.

Household hazardous waste is also a component of the waste stream which can and should be collected separately from the other components of the waste stream. Household hazardous wastes consist of primarily automotive supplies, pesticides, paints, solvents, cleaning products, and batteries. These wastes are often collected through Clean Sweep programs. These programs

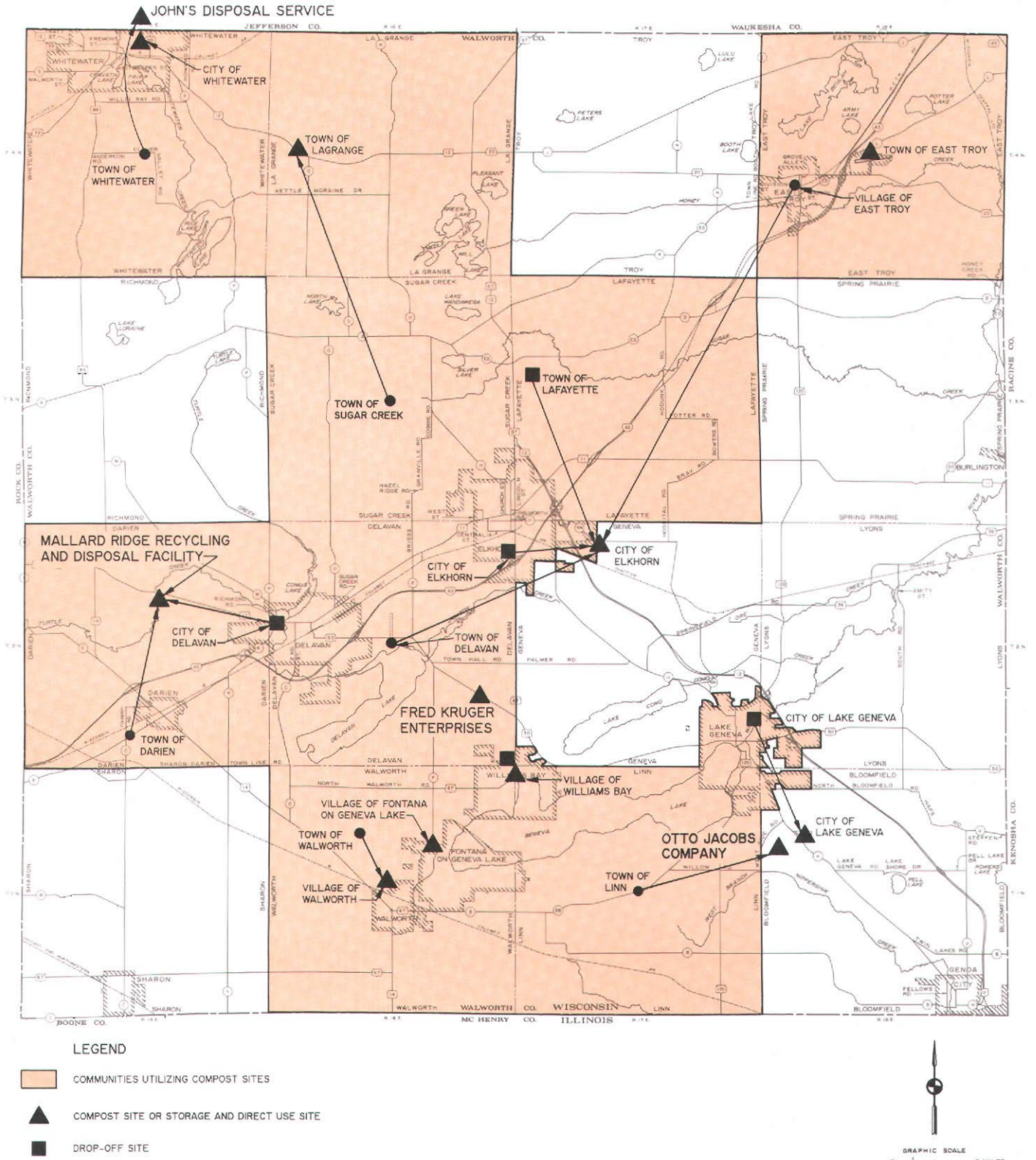
are usually annual or biannual drop-off programs whereby residents transport the hazardous wastes to designated locations where they are collected, packaged, manifested, and transported for disposal by hazardous waste contractors with the assistance of local municipal departments, nonprofit groups, and volunteers.

Walworth County held its first Clean Sweep Household Hazardous Waste Collection Program on Saturday, August 8, 1992, at disposal sites in the City of Whitewater and at the County Lakeland Complex near the City of Elkhorn. The program was organized by the Walworth County Solid Waste Management Department and was designed to accept unwanted household chemicals from Walworth County residents. The purpose of the program was to provide a safer disposal alternative for household hazardous waste and to educate the Walworth County residents regarding the dangers of hazardous materials. This program was very successful for a first-time collection, with a participation rate



Map 5

EXISTING YARD WASTE MANAGEMENT SYSTEMS IN WALWORTH COUNTY: 1993



Source: Walworth County Solid Waste Management Department and SEWRPC.



Table 15

## SUMMARY OF YARD WASTE MANAGEMENT PRACTICES IN WALWORTH COUNTY: 1993

Civil Division	Compost Site Used	Yard Waste Collection		Residential Brush Collection	Other Brush Collection	Leaf Burning Ordinance	Chipping Equipment Available	Comments
		Public Curbside Collection <sup>a</sup>	Drop-Off Site					
City of Delavan	Mallard Ridge Recycling and Disposal facility	X	X	--	X	--	X	Brush, Christmas trees chipped curbside; drop-off site accepts grass clippings, garden waste
City of Elkhorn	City of Elkhorn	X	X	X	--	X	X	Christmas trees chipped curbside
City of Lake Geneva	City of Lake Geneva <sup>b</sup>	X	X	X	--	X	X	Brush, Christmas trees chipped curbside; drop-off site accepts grass clippings, garden waste
City of Whitewater	City of Whitewater	X	--	X	--	X	X	Brush, Christmas trees chipped curbside and at compost site
Village of Darien	Mallard Ridge Recycling and Disposal facility	--	--	--	--	--	--	Compost site accepts grass clippings, leaves, garden waste, twigs
Village of East Troy	City of Elkhorn	--	--	--	X	--	--	Storm cleanup
Village of Fontana-on-Geneva Lake	Village of Fontana-on-Geneva Lake	X	--	X	--	--	X	Brush, Christmas trees chipped curbside and at compost site
Village of Genoa City	--	--	--	X	--	--	X	Brush, Christmas trees chipped curbside; residents must call for service
Village of Sharon	--	--	--	X	--	--	X	Drop-off brush site at Village garage; chipper shared with Town of Sharon
Village of Walworth	Village of Walworth	X	--	--	X	--	X	Christmas trees chipped at compost site; chipper shared with Village of Fontana-on-Geneva Lake
Village of Williams Bay	Village of Williams Bay	X	X	X	--	--	X	Brush, Christmas trees chipped curbside
Town of Bloomfield	--	--	--	--	X	--	X	--
Town of Darien	Mallard Ridge Recycling and Disposal facility	--	--	--	X	--	X	Drop-off site at Mallard Ridge Recycling and Disposal facility
Town of Delavan	City of Elkhorn	--	--	X	--	--	X	Chipping done curbside; residents contract with private service for yard waste collection
Town of East Troy	Town of East Troy	--	--	--	X	--	X	--
Town of Geneva	--	--	--	--	X	--	--	Currently considering curbside chipping
Town of Lafayette	City of Elkhorn	--	X	--	--	--	--	Private yard waste collection by Ven Housen Disposal Service
Town of LaGrange	Town of LaGrange	--	--	--	X	--	X	Christmas trees accepted at compost site
Town of Linn	Otto Jacobs Company	--	--	--	--	--	--	Currently considering purchase of chipper

Table 15 (continued)

Civil Division	Compost Site Used	Yard Waste Collection		Residential Brush Collection	Other Brush Collection	Leaf Burning Ordinance	Chipping Equipment Available	Comments
		Public Curbside Collection <sup>a</sup>	Drop-Off Site					
Town of Lyons	--	--	--	--	X	--	X	--
Town of Richmond	--	--	--	--	--	--	--	Planning to purchase chipper in 1994
Town of Sharon	--	--	--	X	X	--	X	Chipper shared with Village of Sharon
Town of Spring Prairie	--	--	--	--	--	--	--	--
Town of Sugar Creek	Town of LaGrange	--	--	X	X	--	X	--
Town of Troy	--	--	--	--	--	--	--	--
Town of Walworth	Village of Walworth	--	--	X	--	--	X	Brush, Christmas trees chipped at compost site
Town of Whitewater	John's Disposal Service	--	--	--	X	--	--	Spring brush collection only, Town encourages residents to use John's Disposal Service in White-water for composting

<sup>a</sup>Public curbside collection for leaves only, with the exception of the Village of Fontana-on-Geneva Lake, which accepts leaves and grass.

<sup>b</sup>City of Lake Geneva compost site available for use only by City Public Works Department and landscape companies.

Source: Walworth County Solid Waste Management Department and SEWRPC.

of about 1.2 percent of the Walworth County households, which is well above the State average of 0.76 percent participation for over 50 Clean Sweep programs held in Wisconsin during the last eight years.

#### Storage, Collection, and Transport

Solid waste storage may be defined as the temporary holding of material in containers at a transfer or processing station, either before or after collection. Collection and transportation includes the pickup of solid wastes from various sources and hauling these wastes to the location where the collection vehicles are emptied. The collection and transport of residential solid wastes in Walworth County is provided primarily through municipal contract with private waste haulers; however, some residents contract individually with private haulers, and still others transport their wastes to disposal sites in their own vehicles. Some municipalities contract with private haulers to pick up the wastes of only part of their community, while others contract on an individual basis. Some municipalities contract with different waste haulers to

collect only the mixed or the recycled solid waste generated in the community. Other information regarding the collection of residential solid wastes in Walworth County may be found in Appendix B, which is a tabulation of the data from the 1992 Walworth County questionnaire. Table 16 lists the known residential solid waste haulers and the communities which they serve. The existing solid waste disposal facilities and transportation pattern for the residential wastes generated in and around the County are shown separately for the mixed and the recycled solid waste on Maps 6 and 7, respectively.

Private industry provides most collection and transportation services for commercial and industrial wastes in Walworth County. The major licensed private collection services, also called waste haulers, operating in the County are shown in Table 17. Private collection services are arranged for, either on an individual contract basis with each commercial establishment or industry, or by contracts with municipalities to collect commercial solid waste generated within that municipality along with

Table 16

**RESIDENTIAL SOLID WASTE HAULERS OPERATING IN WALWORTH COUNTY**

Name of Source	Location	Communities Served with Mixed Solid Waste Service	Communities Served with Recycled Solid Waste Service
John's Disposal Service	Whitewater	City and Town of Whitewater	City and Town of Whitewater
Kaiser and Sons <sup>a</sup>	Delavan	Village of Fontana-on-Geneva Lake	--
Nieuwenhuis Brothers	Delavan	Villages of Darien, Sharon, and Williams Bay; Town of Sharon	Village of Sharon and Town of Sharon
Ven Housen Disposal Service	Elkhorn	City of Elkhorn; Villages of East Troy and Genoa City; Towns of East Troy, LaGrange, Richmond, and Troy	City of Elkhorn; Village of East Troy; Towns of East Troy, Lafayette, LaGrange, Richmond, Sugar Creek, and Troy
Waste Management	Darien (mixed only) Madison (recycled only)	City of Lake Geneva; Towns of Bloomfield, Darien, Geneva, Lafayette, Linn, and Sharon	City of Lake Geneva; Villages of Fontana-on-Geneva Lake and Williams Bay; Town of Darien
Fiber Resource Recovery	Zenda	--	Villages of Darien, Genoa City, and Walworth; Towns of Linn and Lyons

<sup>a</sup>Formerly Lakeland Lawn and Trash Service.

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Management Department, and SEWRPC.

Table 17

**LICENSED SOLID WASTE COLLECTION AND TRANSPORTATION SERVICES OPERATING IN WALWORTH COUNTY:1992**

Name of Service	License Number	Location
John's Disposal Service . . . . .	10386	Whitewater, Wisconsin
Lakeland Lawn and Trash Service . . . . .	12946	Delavan, Wisconsin
Nieuwenhuis Brothers . . . . .	10371	Delavan, Wisconsin
Otto Jacobs Company . . . . .	10885	Lake Geneva, Wisconsin
Town & Country Waste Service (BFI) . . . . .	10370	Muskego, Wisconsin
Ven Housen Disposal Service . . . . .	11743	Elkhorn, Wisconsin
Waste Management of Wisconsin - Rockford (Geneva Lakes) . . .	12646	Roscoe, Illinois

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Management Department, and SEWRPC.

its residential wastes. Individual agreements are usually the basis for industrial solid waste collection and transportation.

Residential solid wastes in the County are usually picked up once a week. The frequency of industrial, commercial, and multifamily waste collection depends on the quantities generated and the capacity of the storage containers.

**Transfer and Transportation**

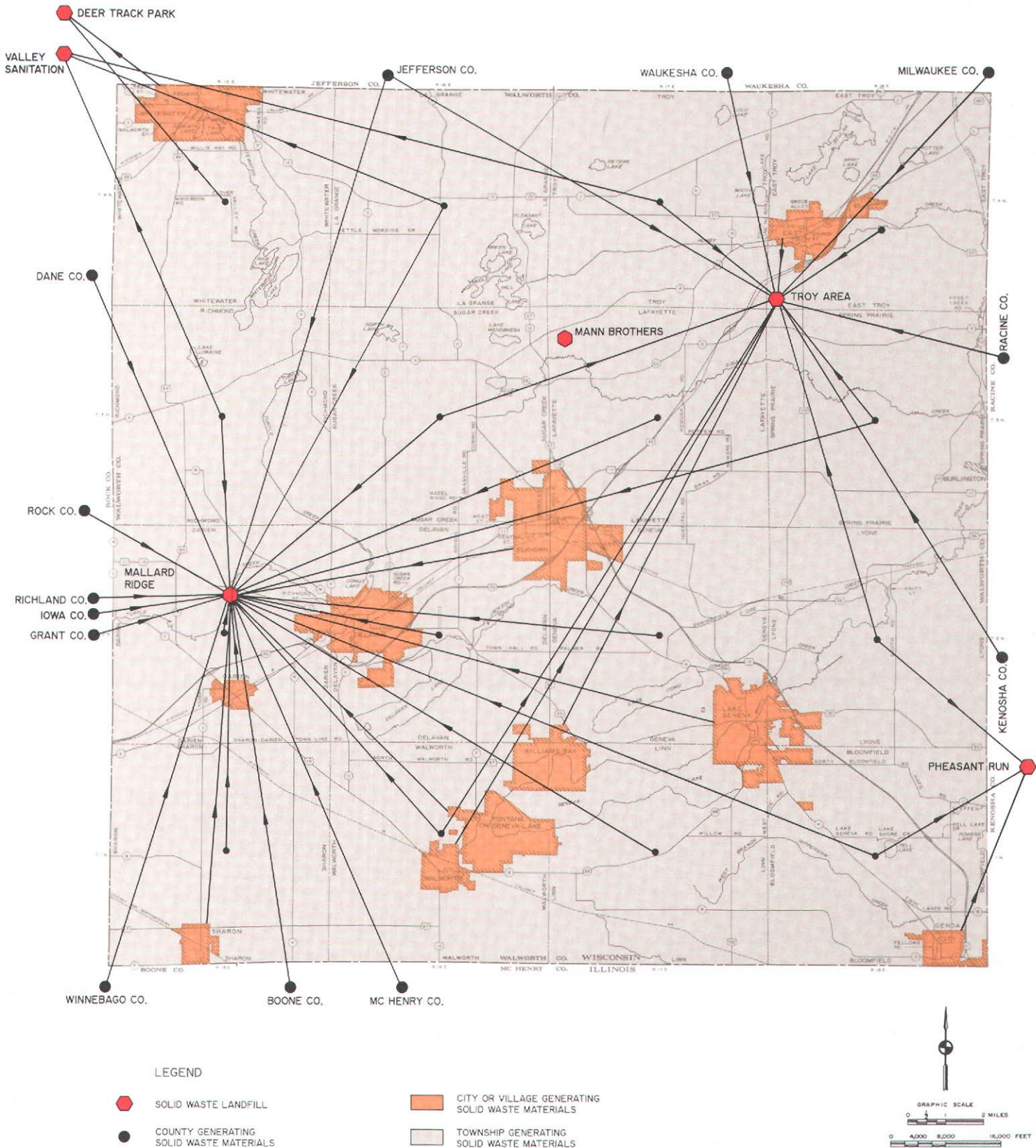
Transfer and transportation refers to the means, methods, facilities, and equipment used to transfer wastes from small collection vehicles to

larger vehicles and to transport them to either processing centers and markets, as is the case with recyclables, or to processing centers and disposal sites, as is the case with most mixed solid waste.

Transfer operations remove and transfer wastes from the collection vehicles and other relatively small vehicles to transport equipment, which generally has larger capacity than the collection vehicles. These transfer operations occur at transfer stations. There was only one known transfer station for mixed residential solid wastes operating in the County in 1992.

Map 6

EXISTING RESIDENTIAL UNRECYCLED SOLID WASTE TRANSPORTATION PATTERNS AND DISPOSAL SITES: 1992

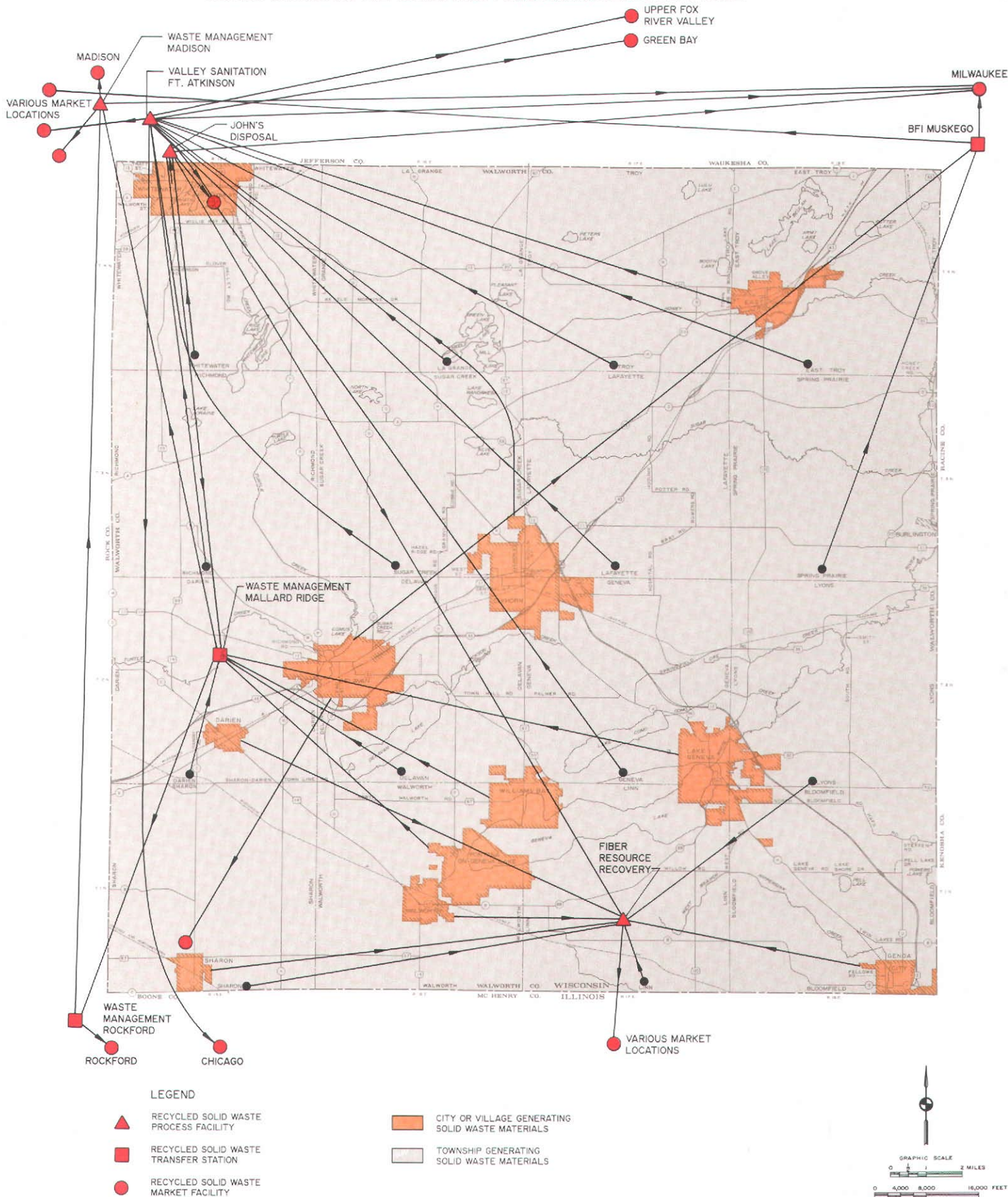


Source: Walworth County Municipalities, Walworth County Solid Waste Management Department, and SEWRPC.



Map 7

# EXISTING RESIDENTIAL RECYCLED SOLID WASTE TRANSPORTATION PATTERNS AND PROCESSING FACILITIES: 1992



Source: Walworth County Municipalities, Walworth County Solid Waste Management Department, and SEWRPC.

This transfer station, operated by the Otto Jacobs Company, is located in the northwest one-quarter of U. S. Public Land Survey Section 7, Township 1 North, Range 18 East, in the Town of Bloomfield, north of West Side Road and west of CTH H, just south of the City of Lake Geneva. This facility is used for the collection and transfer of a variety of materials, including noncombustible wastes, wood matter, trash refuse, garbage, and construction and demolition debris. Solid waste materials from Walworth County deposited at this site are dropped off primarily by local residents and private contractors. The volume handled at the transfer station is estimated to be 120 to 160 cubic yards per week.

While the Otto Jacobs station is the only known transfer station for mixed residential solid wastes, there were transfer stations for recycled residential solid waste. These transfer stations often act as warehouses for the recycled goods until such time as a large enough quantity of a certain type of recyclable for transport is collected or a market price is achieved for a certain recyclable. Many times the transfer stations act as separation points for the recycled wastes before they go to their separate markets.

#### Processing

Processing of solid waste means the transformation of the physical or chemical characteristics of solid waste by mechanical, chemical, or biological processes to accomplish three objectives. First, processing may be used to improve the efficiency of subsequent solid waste management functions by reducing the storage requirements and hauling costs. One example of this is baling newspaper to reduce hauling costs to the disposal site. Second, processing may be used to recover materials for recycling or reuse. Items such as paper, plastic, glass, ferrous metals, and aluminum are valuable and can be recovered for recycling or reuse. Finally, combustible organic materials can be converted to intermediate products and/or energy by biodigestion or incineration. There are, however, no known incineration facilities currently operating in Walworth County.

#### Disposal

As already noted, landfilling is the primary method of solid waste disposal in Walworth County. Many of the landfills that received waste from Walworth County at the time of the original

management plan have now been closed. In fact, only three of those 10 landfills still remain open and receive solid waste from Walworth County. These three are the Valley Sanitation landfill; the former Greidanus landfill, now renamed the Mallard Ridge Recycling and Disposal Facility; and the Mann Brothers Sand and Gravel Company landfill. As of 1992, there were six licensed active landfills within, and adjacent to, the Southeastern Wisconsin Region receiving wastes from Walworth County. As shown in Table 18, of these six active landfills, only three are located in Walworth County. A brief description of each of these landfills follows.

#### Mallard Ridge Recycling and Disposal Facility:

In August 1986, ownership and operation of the Greidanus Landfill transferred to Waste Management of Wisconsin, Inc. (WMWI). As previously mentioned, the Greidanus Landfill was renamed the Mallard Ridge Recycling and Disposal Facility. The Mallard Ridge landfill is located in the northeast one-quarter of U. S. Public Land Survey Section 9, Township 2 North, Range 15 East, in the Town of Darien, on STH 11, west of Lawson School Road. This commercial, general-use landfill is used to dispose of a variety of materials, including noncombustible wastes, wood matter, trash refuse, garbage, construction and demolition debris, special wastes, and petroleum-contaminated soil. Solid wastes from Walworth County deposited at this site are collected primarily by private contractors serving selected communities, commercial establishments, and industries. This landfill has been accepting solid wastes from not only Walworth County, but also from Dane, Jefferson, Racine, and Rock counties in Wisconsin and from portions of Winnebago, Boone, and McHenry Counties in Illinois. The original 15.5-acre landfill, operated by Jake Greidanus, is now full; however, there have been expansions amounting to a new total licensed area of 44 acres in 1991, with a total design capacity of about 3,000,000 cubic yards of waste. In 1990 and 1991, respectively, 128,556 and 202,875 tons of material were disposed of at the site. The service life remaining is less than one year, but there is potential for expansion.

In October 1990, WMWI submitted plans for an additional 80-acre expansion, but scaled these plans back to a 52-acre expansion to avoid significant wetlands impacts. This new expan-

Table 18

**ACTIVE SOLID WASTE DISPOSAL SITES AND TRANSFER STATIONS  
ACCEPTING SOLID WASTES FROM THE WALWORTH COUNTY STUDY AREA: 1992**

Facility Name	Owner/Operator	License Number	Location <sup>b</sup>	Facility Type	User and Operational Restrictions	Waste Types Accepted <sup>a</sup>							
						A	B	C	D	E	F	G	H
Deer Track Park	Deer Track Park, Inc.	3230	Northeast 1/4 of Section 8, Town of Farmington, Jefferson County	Clay-lined sanitary landfill with geomembrane liner and cap	General use No waste from City of Milwaukee	X	X	X	X	X	X	X	--
Mallard Ridge Recycling and Disposal Facility	Waste Management of Wisconsin, Inc.	0140	Northeast 1/4 of Section 9, Town of Darien, Walworth County	Clay-lined sanitary landfill	General use	X	X	X	X	X	X	X	X
Pheasant Run	Waste Management of Wisconsin, Inc.	3062	Southeast 1/4 of Section 32, Town of Paris, Kenosha County	Clay-lined sanitary landfill	General use Wastes accepted from the following counties only: Kenosha, Racine, and Walworth, Wisconsin, and Lake and McHenry, Illinois	X	X	X	X	X	X	X	X
Otto Jacobs Transfer Station	Otto Jacobs Company	2759	Northwest 1/4 of Section 7, Town of Bloomfield, Walworth County	Transfer station	Accept waste from local residents and contractors	X	X	X	X	X	--	--	--
Valley Sanitation Landfill	Valley Sanitary Company, Inc.	2686	Northeast 1/4 of Section 35, Town of Koshkonong, Jefferson County	Clay-lined sanitary landfill	General use	X	X	X	X	X	X	X	X
Troy Area Landfill	Browning Ferris Industries	3090	Northeast 1/4 of Section 31, Town of East Troy, Walworth County	Clay-lined sanitary landfill with geomembrane cap	General use	X	X	X	X	X	X	X	--
Mann Brothers Landfill	Mann Brothers, Inc.	01996	Southwest 1/4 of Section 7, Town of Lafayette, Walworth County	Demolition and construction waste landfill	Private use Restricted to Mann Brothers, Inc., waste only	--	X	--	--	X	--	--	--

Facility Name	Licensed Area (acres)	Total Design Capacity <sup>c</sup> (cubic yards)	Waste Design Capacity <sup>d</sup> (cubic yards)	Remaining Capacity <sup>e</sup> (cubic yards)	Waste Load (cubic yards per week)	Expansion Plan Submitted to Department of Natural Resources	Cover Frequency	Tipping Fee
Deer Track Park	38	2,862,000	N/A	2,826,000	4,500	No	Daily	\$8.50 per cubic yard
Mallard Ridge Recycling and Disposal Facility	45	2,460,400	1,866,450	< 500,000	15,000	Yes	Daily	\$9.10 per cubic yard
Pheasant Run	80	7,000,000	5,600,000	3,470,000 <sup>f</sup>	5,000	Yes	Daily	\$9.00 per cubic yard
Otto Jacobs Transfer Station	N/A	N/A	N/A	N/A	120 to 160	No	N/A	\$14.00 per cubic yard
Valley Sanitary Landfill	29	2,017,000	N/A	1,206,500	2,710	No	Daily	\$8.50 per cubic yard
Troy Area Landfill	51	4,925,000	3,828,000	1,570,000	10,600	Yes	Daily	\$24.00 per ton
Mann Brothers Landfill	6	500,000	N/A	200,000	73	No	As necessary	N/A

NOTE: N/A indicates information is not applicable.

<sup>a</sup>Waste type indicators mean: A - Noncombustible; B - Wood matter; C - Trash and refuse; D - Garbage; E - Construction and demolition debris; F - Special waste; G - Petroleum-contaminated soil; H - Foundry sand.

<sup>b</sup>See Map 6.

<sup>c</sup>Total design capacity includes volumes of both waste and cover material, but excludes cap material.

<sup>d</sup>Waste design capacity includes the volume of waste only.

<sup>e</sup>Remaining capacity as of January 1993.

<sup>f</sup>Remaining capacity as of November 1991.

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Management Department, Landfill and Transfer Station Engineers, and SEWRPC.



sion would extend the site life of the landfill an estimated seven years, with an additional capacity of 5,197,000 cubic yards at a projected annual waste load of 780,000 cubic yards of waste per year, including daily and intermediate cover material. As of May 1992, the firm owned 620 acres associated with the Mallard Ridge Recycling and Disposal Facility.

**Troy Area Landfill, Inc.:** Browning Ferris Industries (BFI) owns and operates the Troy Area Landfill, which began operations in June of 1987. This landfill lies in the north one-half of U. S. Public Land Survey Section 31, Township 4 North, Range 18 East, in the Town of East Troy, on STH 120, just south of IH 43 and north and east of Swaboda and Townline Roads, respectively, south of the Village of East Troy. This commercial, general-use landfill is used to dispose of a variety of materials, including noncombustible wastes, wood matter, trash refuse, garbage, construction and demolition debris, special wastes, and petroleum-contaminated soil. Solid waste from Walworth County deposited at this site is collected primarily by private contractors serving selected communities, commercial establishments, and industries. The service area of the landfill includes portions of Milwaukee, Waukesha, Jefferson, Racine, Kenosha, and Walworth Counties. The landfill had a licensed area of 51 acres in 1991 and a total design capacity of 3,828,000 cubic yards of waste at the beginning of 1993. In 1990 and 1991, respectively, 267,045 and 260,612 tons of material were disposed of at the site. The remaining capacity at the beginning of 1993 was 1,570,000 cubic yards and the remaining service life was about two years at an estimated weekly waste load of 10,600 cubic yards.

BFI submitted plans for a 60-acre expansion. If approved, this expansion would extend the site life of the landfill an estimated 12.5 years and furnish an additional waste capacity of 6,287,400 cubic yards at a projected annual waste load of approximately 500,000 cubic yards. At the end of 1991, Browning Ferris Industries owned 221 acres of land associated with the Troy Area Landfill.

**Deer Track Park Landfill:** Deer Track Park, Inc., owns and operates the Deer Track Park landfill, which began operations on June 18, 1992. This landfill lies in the north one-half of the northeast one-quarter of U. S. Public Land Survey Section 8, Township 7 North, Range 15 East, in the

Town of Farmington, just north of IH 94, on Christberg and Ranch Drives, northeast of the Village of Johnson Creek, Jefferson County. This commercial, general-use landfill is used to dispose of a variety of materials, including noncombustible wastes, wood matter, trash refuse, garbage, construction and demolition debris, special wastes, and petroleum-contaminated soil. Solid waste materials from Walworth County deposited at this site are collected primarily by John's Disposal Service, a private contractor serving the City and Town of Whitewater. At the beginning of 1993, the landfill had a licensed area of 38 acres and a total design capacity of 2,862,000 cubic yards. In 1992, 36,000 cubic yards of material were disposed of at the site. The remaining capacity at the beginning of 1993 was 2,826,000 cubic yards and the remaining service life was about 12 years at an estimated annual waste load of 234,000 cubic yards. As of 1990, Deer Track Park, Inc., owned 203 acres of land associated with the landfill.

**Pheasant Run Landfill:** Waste Management of Wisconsin owns and operates this landfill, located in the southeast one-quarter of U. S. Public Land Survey Section 32, Township 2 North, Range 21 East, in the Town of Paris, Kenosha County, north and east of CTH K and USH 45. This commercial, general-use landfill disposes of a variety of materials, including noncombustible wastes, wood matter, trash refuse, garbage, construction and demolition debris, foundry sand, special wastes, and petroleum-contaminated soil. Solid waste from Walworth County deposited at this site is collected primarily by private contractors serving selected communities, commercial establishments, and industries. The service area of the landfill includes portions of Walworth, Racine, and Kenosha Counties in Wisconsin and Lake and McHenry Counties in Illinois. The landfill had a licensed area of 80 acres in 1991 and a total design capacity of 5,600,000 cubic yards of waste at the beginning of 1993. In 1990 and 1991, respectively, 261,225 and 272,296 tons of material were disposed of at the site. The remaining service life at the beginning of 1993 was about six to eight years at an estimated weekly waste load of 5,000 cubic yards. As of 1990, WMWI owned 689 acres of land associated with the landfill.

**Valley Sanitation Landfill:** Valley Sanitation Company, Inc., owns and operates a landfill sited in the northeast one-quarter of U. S. Public



Land Survey Section 35, Township 5 North, Range 14 East, in the Town of Koshkonong, on STH 12, southeast of the City of Fort Atkinson, Jefferson County. This commercial, general-use landfill disposes of a variety of materials, including noncombustible wastes, wood matter, trash refuse, garbage, construction and demolition debris, special wastes, and petroleum-contaminated soil. Solid waste from Walworth County deposited at this site is collected primarily by private contractors serving selected communities, commercial establishments, and industries. The landfill had a licensed area of 29 acres in 1991 and a total design capacity of 2,017,600 cubic yards of waste at the beginning of 1993. In 1990 and 1991, respectively, 66,789 and 74,159 tons of material were disposed of at the site. The remaining capacity at the beginning of 1993 was 1,206,500 cubic yards, with a remaining service life of about eight and one-half years at an estimated annual waste load of 141,000 cubic yards. The Valley Sanitation Company has requested an initial site inspection from the Wisconsin DNR regarding expansion of the landfill. This inspection was performed by the Department on September 23, 1992. As of 1990, Valley Sanitation, Inc., owned 175 acres of land associated with the landfill.

Mann Brothers Sand and Gravel Company Landfill: Mann Brothers Sand and Gravel Company owns and operates a landfill in the northeast one-quarter of the southwest one-quarter of U. S. Public Land Survey Section 7, Township 3 North, Range 17 East, in the Town of Lafayette, on and west of Hodges Road, just south of Sugar Creek, north and east of CTH ES and USH 12, respectively. This private-use landfill disposes of wood and construction and demolition debris generated in the operation of the Company business. There are no operating hours set for the landfill since use of the landfill for solid waste disposal is restricted to the Company. Disposed materials are covered as necessary following deposition. The landfill had a licensed area of six acres in 1992 and a total design capacity of 500,000 cubic yards, which included both waste and cover material. The remaining waste capacity at the beginning of 1993 was 200,000 cubic yards, which amounts to a remaining service life of about 50 years at an estimated annual waste load of 3,800 cubic yards per year. At the end of 1992, Mann Brothers Sand and Gravel Company owned 12.7 acres of land associated with the landfill.

#### Cost of Solid Waste Management

Utilizing the inventory data collected, the costs of the existing residential solid waste management in the County study area were estimated. Table 19 presents the total estimated solid waste management cost in 1992, which includes the costs of collection, transportation, and disposal of residential solid wastes in the study area by civil division. The total annual cost of the residential solid waste management in the study area is estimated to be \$2,984,270, or about \$37.55 per capita per year, or \$99.94 per household per year, and about \$73.47 per ton. Approximately \$2,647,784, or about 89 percent of the total cost of residential solid waste management in the study area, was incurred for the management of nonrecycled solid waste, or about \$33.10 per capita per year, or \$88.05 per household per year, and about \$70.97 per ton. Approximately \$336,506, or about 11 percent of the total cost of residential solid waste management in the study area, was incurred for the residential recycled solid waste management of the study area, or about \$4.45 per capita per year, or \$11.87 per household per year, and about \$101.74 per ton.

It was further estimated that 50 percent of the total cost of residential solid waste management in the study area was paid under municipal contract and the other 50 percent was paid under individual contracts.

In general, individuals contracting for private collection pay a higher cost per ton, compared to service provided by local governments providing or contracting for collection, transfer, and disposal. As might be expected, transfer sites and landfills, which require individual township residents to provide collection and transport services, are generally the most inexpensive operations since there are no collection costs involved. However, it should be noted that while recycling drop-off programs are less costly than curbside recycling programs, they generally receive only about one-half of the amount of recycled solid waste that the curbside programs collect.

The costs described above do not include the costs of the solid waste management of hazardous household wastes or all residentially generated special wastes and yard wastes. As previously noted, Walworth County held its first Clean Sweep Household Hazardous Waste Collection Program in 1992. The cost of this annual

Table 19

## RESIDENTIAL SOLID WASTE MANAGEMENT DATA FOR WALWORTH COUNTY

Civil Division	1990 Population	1990 Households	Total Yearly Solid Waste (tons)	Daily Total Solid Waste Generation Rate per Person (pounds)	Total Yearly Cost for Mixed Solid Waste and Recyclable Solid Waste (dollars)	Transfer, Transport, and Disposal by Municipality or under Municipal Contract <sup>a</sup>		Total Yearly Cost per Person (dollars)	Total Yearly Cost per Household (dollars)	Total Cost per Ton for Mixed Solid Waste and Recyclable Solid Waste (dollars)	Type of Service <sup>b</sup>
						Cost (dollars)	Percentage of Cost				
<b>Cities</b>											
Delavan <sup>c,d,e,f</sup>	6,073	2,355	3,604	3.3	\$ 336,768	\$ 3,300	1.0	\$55.45	\$143.00	\$ 93.46	Curbside pick-up and drop-off
Elkhorn <sup>g</sup>	5,337	2,100	2,868	2.9	243,688	220,957	90.7	45.66	116.04	84.96	Curbside pick-up
Lake Geneva <sup>g</sup>	5,979	2,599	2,834	2.6	235,537	207,600	88.1	39.39	90.63	83.10	Curbside pick-up
Whitewater <sup>h</sup>	12,636	3,631	3,718	2.3	202,137	173,000	85.6	22.62	55.67	54.37	Curbside pick-up and drop-off
<b>Subtotal</b>	<b>30,025</b>	<b>10,685</b>	<b>13,024</b>	<b>2.7</b>	<b>\$1,018,130</b>	<b>\$ 604,857</b>	<b>59.4</b>	<b>\$33.91</b>	<b>\$ 95.29</b>	<b>\$ 78.18</b>	<b>--</b>
<b>Villages</b>											
Darien	1,158	390	620	2.9	\$ 39,150	\$ 39,150	100.0	\$33.81	\$100.38	\$ 63.15	Curbside pick-up
East Troy <sup>i</sup>	2,664	979	2,114	4.3	86,000	86,000	100.0	32.28	87.84	40.68	Curbside pick-up
Fontana-on-Geneva Lake <sup>f,j</sup>	1,635	652	1,452	2.9	98,900	98,900	100.0	35.82	89.83	68.10	Curbside pick-up and drop-off
Genoa City	1,277	455	850	3.6	32,630	32,630	100.0	25.55	71.71	38.39	Curbside pick-up and drop-off
Sharon <sup>i</sup>	1,250	448	819	3.6	39,788	39,778	100.0	31.82	88.79	48.57	Curbside pick-up
Walworth <sup>k</sup>	1,614	658	742	2.5	72,456	64,800	89.4	44.89	110.12	97.64	Curbside pick-up
Williams Bay <sup>f,j</sup>	2,108	844	1,114	2.6	61,300	61,300	100.0		26.42	55.03	Curbside pick-up and drop-off
<b>Subtotal</b>	<b>11,706</b>	<b>4,426</b>	<b>7,711</b>	<b>3.3</b>	<b>\$ 430,214</b>	<b>\$ 422,000</b>	<b>98.2</b>	<b>\$32.83</b>	<b>\$ 32.83</b>	<b>\$ 55.79</b>	<b>--</b>
<b>Towns</b>											
Bloomfield <sup>l</sup>	3,723	1,412	1,461	2.2	\$ 85,184	\$ 44,000	51.7	\$22.88	\$ 22.88	\$ 58.29	Curbside pick-up
Darien <sup>m</sup>	1,490	522	769	2.8	54,648	0	0.0	36.68	104.69	71.08	Curbside pick-up and drop-off
Delavan <sup>d,j</sup>	4,195	1,614	3,491	3.1	342,144	0	0.0	55.40	144.00	98.02	Back yard pick-up and drop-off
East Troy <sup>i,j</sup>	3,687	1,269	2,297	3.1	147,649	147,649	100.0	36.28	105.42	64.28	Curbside pick-up and back yard pick-up
Geneva <sup>d,f,n</sup>	3,472	1,213	1,430	2.3	76,016	41,300	54.3	21.89	62.67	53.15	Curbside pick-up and drop-off
Lafayette <sup>c,e</sup>	1,276	436	600	2.6	60,852	3,300	5.4	47.69	139.57	101.39	Curbside pick-up and drop-off
LaGrange <sup>d,j,o</sup>	1,643	606	1,445	3.4	74,436	74,436	100.0	32.15	87.16	51.53	Curbside pick-up and drop-off
Linn <sup>f,j,p</sup>	2,062	817	1,521	3.0	69,840	46,740	66.9	27.36	69.05	45.93	Curbside pick-up and drop-off
Lyons <sup>c,e,f</sup>	2,579	968	1,179	2.5	131,076	3,300	2.5	50.82	135.41	111.07	Curbside pick-up and drop-off
Richmond <sup>j</sup>	1,405	526	1,149	3.9	67,769	0	0.0	42.01	112.20	58.98	Curbside pick-up
Sharon <sup>c,d,e</sup>	1,016	333	501	2.7	45,606	1,650	3.6	44.89	136.95	91.10	Curbside pick-up and drop-off
Spring Prairie <sup>c,d,e</sup>	1,752	560	863	2.7	77,560	3,640	4.7	44.27	138.50	89.84	Curbside pick-up and drop-off

Table 19 (continued)

Civil Division	1990 Population	1990 Households	Total Yearly Solid Waste (tons)	Daily Total Solid Waste Generation Rate per Person (pounds)	Total Yearly Cost for Mixed Solid Waste and Recyclable Solid Waste (dollars)	Transfer, Transport, and Disposal by Municipality or under Municipal Contract <sup>a</sup>		Total Yearly Cost per Person (dollars)	Total Yearly Cost per Household (dollars)	Total Cost per Ton for Mixed Solid Waste and Recyclable Solid Waste (dollars)	Type of Service <sup>b</sup>
						Cost (dollars)	Percentage of Cost				
Towns (continued)											
Sugar Creek <sup>c,e</sup>	2,661	895	1,237	2.5	\$ 122,220	\$ 4,080	3.3	\$45.93	\$136.56	\$ 98.83	Curbside pick-up and drop-off
Troy <sup>m</sup>	2,051	678	599	1.6	44,602	26,650	59.8	21.75	65.78	74.44	Drop-off
Walworth <sup>e,g</sup>	1,341	457	661	2.7	60,324	0	0.0	44.98	132.00	91.29	Curbside pick-up
Whitewater <sup>q,r</sup>	1,378	497	679	2.7	76,000	76,000	100.0	55.15	152.92	111.93	Curbside pick-up
Subtotal	35,731	12,803	19,882	2.7	\$1,535,926	\$ 472,745	30.8	\$38.27	\$108.35	\$ 77.25	--
Total	77,462	27,914	40,617	2.8	\$2,984,270	\$1,500,160	50.3	\$37.55	\$ 99.94	\$ 73.47	--

<sup>a</sup>These data are representative of only the portion of the communities which are served by municipal service or under municipal contract, by either general- or special-purpose units of government.

<sup>b</sup>All collections are weekly unless otherwise noted.

<sup>c</sup>The quantity provided in the inventory data was representative of only a portion of the community's population. Therefore, this quantity was added to an estimated quantity representing the remaining portion of the community, based on the generalized mixed solid waste generation rate of 2.5 pounds per capita per day, associated with drop-off recycling programs.

<sup>d</sup>The total yearly recyclable solid waste quantity collected in this community was estimated by applying a generalized recyclable solid waste generation rate of 0.2 pound per capita per day, associated with drop-off recycling programs.

<sup>e</sup>The cost provided in the inventory data was representative of only a portion of the community's population. Therefore, this cost was added to an estimated cost representing the remaining portion of the community, based on the generalized mixed solid waste curbside collection rate of \$132 per household per year, associated with a typical individual collection contract in the County.

<sup>f</sup>The total cost for the management of the residential recyclable solid waste of this community was estimated by using a generalized recyclable solid waste cost of \$3,300, associated with drop-off recycling programs.

<sup>g</sup>The quantity provided in the inventory data was representative of only a portion of the community's population. Therefore, this quantity was added to an estimated quantity representing the remaining portion of the community, based on the generalized total solid waste generation rate of 2.7 pounds per capita per day, associated with no recycling collection program.

<sup>h</sup>This community is composed of a large percentage of its residential population residing in multi-family dwellings of four housing units or greater per dwelling. The total residential mixed solid waste costs and quantities given in the County survey, represent only the population residing in single-family to multi-family dwellings of three housing units or less. These costs and quantities were added to estimated costs and quantities representing the remaining population, based on a cost rate of \$17.33 per household per year and a quantity generation rate of 0.74 pound per capita per day, each rate being based on inventory data provided regarding multi-family residential units.

<sup>i</sup>The total yearly recyclable solid waste quantity collected in this community was estimated by applying a generalized recyclable solid waste generation rate of 0.4 pound per capita per day to the population of the community as a whole, associated with curbside collection recycling programs.

<sup>j</sup>The total quantity, total cost, and cost per ton of the solid waste management, consisting of both the mixed and the recycled solid waste of this community reflects the management of both the year-round and seasonal residents of this community; while the daily generation rate, cost per person, and cost per household rates relate to the year-round residents only.

<sup>k</sup>The number of households served under the municipal contract, as given in the County survey, had an estimated cost based on the generalized rate of \$84 per household per year, associated with the average municipal curbside collection contract rate per household. This estimated cost was added to another cost estimated for the remaining portion of the community not served under the municipal contract. This second estimated cost was based on a generalized rate of \$132 per household per year, associated with the average individual collection contract in the County.

<sup>l</sup>A factor of 88 tons per month was used for the Pell Lake area which represents about 78 percent of the Town's population, and has a group contract for the collection of their mixed solid waste at an estimated cost of \$40 per household per year. An estimated generation factor of 2.7 pounds per capita per day was assumed for the remaining 22 percent of the population which contract for collection on an individual basis, at an estimated generalized cost of \$132 per household per year.

## Footnotes to Table 19 (continued)

<sup>m</sup>The total quantity and cost of the residential solid waste management in the Towns of Darien and Troy were estimated because a significant portion of their residents choose not to use the drop-off facility provided by the Town, but rather subscribe to curbside collection of their mixed solid waste on an individual basis. An additional 2.5 pounds per capita per day were added to the mixed solid waste quantity given in the County survey; and a rate of \$132 per household per year was also added to account for the 79 percent and 20 percent of the communities, respectively, which subscribe to curbside pickup.

<sup>n</sup>The yearly mixed solid waste quantity generated in the Town of Geneva was determined as follows. A factor of 80 tons per month was used for the Lake Como Beach Property Owners Association which represents about 78 percent of the Town's population, and has a group contract for the collection of their mixed solid waste at an estimated cost of \$40 per household per year. The remaining 22 percent of the population contract for collection on an individual basis, and a generalized generation factor of 2.5 pounds per capita per day at an estimated annual cost of \$132 per household was assumed for the remaining population.

<sup>o</sup>The total cost for the residential mixed solid waste management of this community was estimated by applying a generalized mixed solid waste community collection rate of \$84 per household per year to the year-round households, and applying one-third that rate to the seasonal households.

<sup>p</sup>The yearly mixed solid waste quantity generated in the Town of Linn was determined as follows. A factor of 107 tons per month was used for the Town of Linn Sanitary District which represents about 79 percent of the Town's year-round population, and all of the Towns seasonal population; and has a group contract for the collection of their mixed solid waste at an estimated cost of \$48 per year-round household per year. The remaining 21 percent of the year-round population contract for collection on an individual basis, and a generalized generation factor of 2.5 pounds per capita per day at an estimated cost of \$132 per household was assumed for this remaining population.

<sup>q</sup>The total yearly mixed solid waste quantity collected in this community was estimated by applying the generalized mixed solid waste generation factor of 2.3 pounds per capita per day, associated with curbside recycling collection programs. This community began its curbside collection program in November, 1992.

<sup>r</sup>The total cost for the management of the recycled solid waste of this community was determined by use of the generalized rate of \$28 per household per year associated with curbside recycling programs under municipal contracts.

Source: Walworth County Municipalities, Walworth County Solid Waste Management Department, and SEWRPC.

program was \$35,244.59. The program collected 7,088 pounds of household hazardous waste from a total of 321 participating households, which yields a cost of \$4.97 per pound, or \$109.80 per participating household. However, through a \$15,000 grant from State of Wisconsin DNR and about \$5,000 of contracted assistance from the City of Whitewater, the program cost Walworth County \$15,746.69, or \$2.22 per pound and \$49.06 per participating household.

## **LAWS AND REGULATIONS CONCERNING SOLID WASTE**

Within Walworth County, the responsibility for public regulation of solid waste management functions lies with the Federal, State, and local levels and units of government. There have been many changes in the laws regulating solid waste management since the 1982 plan was completed. These changes have placed more stringent requirements on solid waste disposal facilities and required increased recycling of materials. A brief discussion of the present laws, regulations, and institutional arrangements for governing solid waste management in Walworth County follows.

### **Federal Laws and Regulations**

The involvement of Federal agencies in permitting a local solid waste facility or program is generally limited. However, revisions are currently being considered for the Federal Resource Conservation and Recovery Act (RCRA) which would affect the management of solid waste by increasing environmental protection requirements. The reauthorization of RCRA will include increased requirements for solid and hazardous waste management and disposal. Changes are also being considered for the Clean Water Act and the Clean Air Act that will affect the management of solid waste.

The section of RCRA dealing with municipal solid waste landfills, termed Subtitle D, contains regulations relating to locational, operational, and design criteria, groundwater monitoring, closure and post-closure, and financial assurance. The Clean Water Act regulates activities involving wetlands, sludge, disposal, and leachate treatment requirements. The Clean Air Act regulates emission standards and controls for solid waste treatment, storage, and disposal facilities.

### **State Authority**

The Wisconsin DNR has permit authority for the management of air, water, and solid or hazardous waste pollutants as mandated under the Clean Air Act, the Clean Water Act, and RCRA. These permitting activities are delegated to the jurisdiction of the DNR and its various departmental bureaus, including the Bureau of Air Management, the Bureau of Solid and Hazardous Waste, and the Bureau of Wastewater Management.

Chapter 144 of the State Statutes authorizes the DNR to establish minimum standards for the location, design, construction, sanitation, operation, monitoring, and maintenance of solid waste facilities. This chapter also provides for the preparation of county and regional solid waste management plans, sets open burning standards for solid waste, establishes a solid waste capacity fee for solid waste incinerators, provides for the cleanup of tire dumps, and sets requirements for used oil fuel facilities. Chapter 144 also provides for the development of standards for the identification, transportation, storage, treatment, and disposal of hazardous wastes. Finally, Chapter 144 provides the authority and mechanisms to enforce requirements developed under the law and sets forth the site approval process and negotiation/arbitration process used to site solid waste disposal facilities.

Chapter 159 of the Statutes was established because of the passage of Wisconsin Act 335 into law in April of 1990. Act 335, known as The Recycling Law, was developed with the objective of reducing the amount of waste being deposited in Wisconsin landfills by banning recyclable materials from landfills and requiring communities to initiate recycling programs. Chapter 159 establishes the State of Wisconsin's solid waste reduction, reuse, recycling, composting, and resource recovery policy. This chapter prohibits the landfilling or incineration of certain recyclable materials. These materials and the corresponding schedules which ban these materials from disposal are as follows.

- January 1, 1991: Lead acid batteries and appliances may not be landfilled or incinerated, waste oil may not be landfilled or incinerated without energy recovery.
- January 3, 1993: Yard wastes may not be landfilled or incinerated without energy recovery.



- January 1, 1995: Newspapers and other materials printed on similar paper, magazines, and other materials printed on similar paper; corrugated paper; office paper; containers made of aluminum, glass, steel, plastic and bi-metal; and foam polystyrene packaging may not be landfilled or burned with or without energy recovery. In addition, waste tires may not be landfilled or burned without energy recovery. There is an exception to the 1995 incineration bans for units of government in the current service area of incinerators which were operating in April 1990. These units of government may continue to burn combustible materials banned in 1995.

In order to be exempt from the landfill and incineration restrictions which take effect in 1995 and remain eligible for grant funding, a responsible unit or an out-of-State unit must develop an effective recycling program. Proposed NR 544 will establish the criteria, based on the statutes, which a recycling program will need to meet by 1995 in order to be approved as effective. Chapter 159 also designates municipalities as "responsible units for recycling" and gives them the duty to develop a recycling program which will comply with new landfill and incineration restrictions, provides for control of municipal waste flow, establishes a financial assistance program for responsible units, and grants the DNR the authority to develop standards relating to the establishment of effective recycling programs by responsible units.

Chapters NR 400 to 494 of the Wisconsin Administrative Code contain definitions and specific requirements for air permit fees, control of emissions, and operation permits. Chapters NR 500 to 555 contain definitions and specific requirements for solid waste management including:

- NR 502—Solid waste storage, transportation, transfer, incineration, air curtain destructors, processing, wood burning, one-time disposal, and small demolition facilities
- NR 504—Landfill location, performance, and design criteria

- NR 506—Landfill operational criteria
- NR 508—Landfill monitoring, remedial actions, and in-field conditions reports
- NR 510—Initial site reports for landfills
- NR 512—Feasibility reports for landfills
- NR 514—Plan of operation and closure plans for landfills
- NR 516—Landfill construction documentation
- NR 518—Land spreading of solid waste
- NR 520—Solid waste management fees and financial responsibility requirements
- NR 536—Dump closure cost-sharing grant program
- NR 540—Waste separation and recycling facilities
- NR 542—Recycling grants to responsible units
- NR 543—State market development priorities for recycled and recyclable materials
- NR 548—Waste reduction and recycling demonstration grants
- NR 550—Environmental response and repair
- NR 551—Abandoned container response
- NR 555—Waste tire removal and recovery

Chapter NR 600 contains definitions and specific requirements for the identification, transportation, storage, treatment, and disposal of hazardous waste.

#### County and Local Government Authority

Chapter 144 of the Wisconsin Statutes grants counties the authority to develop and adopt solid waste management plans consistent with State criteria. Authority is also given to counties in Chapter 59 to establish a solid waste management board. County solid waste management boards are granted the authority to establish and operate a solid waste management system or participate in such a system jointly with other counties, cities, villages, or towns.

Chapter 159 of the Wisconsin Statutes requires municipalities defined as responsible units to develop and implement recycling programs for the materials banned from landfills. Currently, every city, village, and township in Walworth County is considered a responsible unit and each has the authority to implement and require participation in their recycling programs.

This is most often done by passing a local recycling ordinance.

Walworth County currently has a zoning ordinance and an erosion control ordinance whose restrictions apply to any recycling, composting, or solid waste disposal facility located in any unincorporated area of the County.

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## Chapter III

### ANTICIPATED GROWTH AND CHANGE

#### INTRODUCTION

This Walworth County solid waste management planning effort is intended to address the anticipated solid waste management needs of the County through the year 2010 and to reevaluate the means of meeting those needs, with emphasis on recycling, yard waste disposal, and household hazardous waste disposal. This requires information regarding anticipated population, household, land use, and employment levels in the study area so that the probable composition, quantity, and spatial distribution of the solid wastes to be collected, transported, and recycled or disposed of can be estimated, and the size, characteristics, and location of the facilities necessary to manage these wastes can be determined properly. Accordingly, this chapter presents forecasts of those facets of the socio-economic development of the County pertinent to the sound development of a long-range solid waste management plan.

The population, household size and distribution, land use, and employment forecasts presented in this chapter are based upon information presented in the new regional land use plan for the design year 2010. This plan is set forth in full in SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin—2010, January 1992. This plan was intended to update and revise as necessary the previously adopted SEWRPC regional land use plan for the year 2000, prepared and adopted by the Commission on December 19, 1977. This plan served as the basis of the initial Walworth County solid waste management plan. The year 2000 plan is documented in SEWRPC Planning Report No. 25, A Regional Land Use Plan and A Regional Transportation Plan for Southeastern Wisconsin: 2000. The design year 2010 plan is based upon the same basic concepts as the year 2000 plan, refining and detailing the previous plan as required with respect to changes in the levels and spatial distribution of population, households, and employment; land use patterns; and public facility and utility systems development.

Following this introduction, this chapter is divided into three sections. The first describes the set of alternative futures which were used to

develop a range of future projections of population, household, and employment levels. These alternative futures provide a range of conditions for which plan components can be designed and against which alternative plans can be tested and evaluated. The second section sets forth the forecast population, household, and employment levels and attendant land use pattern selected for use in updating the County solid waste management plan. The third section presents estimated future solid waste quantities, characteristics, and sources to be utilized in the plan design, analysis, and evaluation.

#### YEAR 2010 PLAN: ALTERNATIVE FUTURES

During periods of major change in social and economic conditions, there is great uncertainty as to whether or not historic trends will continue. In order to deal with this uncertainty, the Southeastern Wisconsin Regional Planning Commission incorporated the use of "alternative futures" into the preparation of the new year 2010 land use plan. Under this approach, the development and evaluation of alternative land use plans is based, not upon a single most probable forecast of future socio-economic conditions, but rather upon a number of alternative futures chosen to represent a range of conditions which may occur over the plan design period. The alternative futures are intended to supplement the recommended plan by indicating a range of possible future conditions with respect to the level and distribution of population, households, economic activity, and attendant land use patterns in the Region. The purpose of the approach is to allow the evaluation of the performance of alternative plans over a variety of possible future conditions in order to identify those alternatives that perform well under a wide range of such conditions.

Under the alternative futures approach, three alternative future growth scenarios were postulated for Southeastern Wisconsin. The sets of conditions postulated for each "future" were intended to represent consistent, reasonable scenarios of future changes in resident population and economic activity levels in the Region

through the year 2010. Two scenarios, the "high-growth" scenario and the "low-growth" scenario, were intended to represent reasonable extremes, while the third scenario, the "intermediate-growth" scenario, was intended to represent the most-likely future.

From these three growth scenarios, four alternative land use plans in addition to a recommended land use plan were developed for the design year 2010. Each plan was based upon different potential growth rates and development patterns. Three of these plans envision a decentralized regional settlement pattern. The "high-growth decentralized" plan was designed to accommodate the future population and economic activity levels that could be anticipated under a high-growth scenario. The "intermediate-growth decentralized" plan and the "low-growth decentralized" plan were designed to accommodate the population and economic activity levels that would be anticipated under the intermediate- and low-growth scenarios, respectively. The fourth plan, the "high-growth centralized" plan, was designed to accommodate population and economic activity levels anticipated under the high-growth scenario, emphasizing a centralized, rather than a decentralized development pattern for the Region, as did the other three alternative futures. Together, these four alternative futures land use plans were intended to bracket conceptually the new recommended year 2010 regional land use plan, which was based upon an intermediate-growth centralized scenario. While many variations of the four alternative futures plans are possible, it is believed that the four alternative futures plans, in conjunction with the recommended plan, provide a good representation of the range of possible future conditions with respect to the overall scale and distribution of land use development in the Region through the year 2010.

The new year 2010 regional land use plan has been scaled to a carefully selected set of population, household, and employment forecasts for the Region. Consideration of these alternative conditions is particularly important in considering countywide solid waste management because it gives consideration to the range of possible future conditions. As an example, the design of certain facilities which can readily be expanded in stages may be based initially on the recom-

mended intermediate-growth centralized plan, or even on a low-growth stage of that recommended plan, recognizing that the expansion of such facilities can be readily accommodated if a higher-growth future occurs. Examples of such a facility would be solid waste landfills designed for modular expansion or recycling centers where adequate open land is reserved. Conversely, certain facilities or facility sites may have to be constructed or secured initially using the higher growth future condition in areas where development is taking place, making expansion or relocation costly in the future. An example of such a facility would be a recycling intermediate processing facility of a size which required only one line of processing equipment. By considering the range of future conditions, the most robust as well as cost-effective and environmentally sound alternative design can be selected.

Following review of these five sets of potential future conditions, it was decided that the development of alternative solid waste management plans under this updating effort be based upon the intermediate-growth, centralized land use scenario, the same scenario chosen for the original solid waste management plan and the scenario adopted as a basis for the year 2010 regional land use plan. This alternative future land use plan was then refined by adjusting the limits of the year 2010 urban areas to reflect the planned urban services area envisioned to be provided by the year 2010 with public water and sewer systems and by adjusting the limits of the prime agricultural land to reflect the refinements made to the planned urban areas. Use of this refined alternative will result in the compatibility of this update plan with other regional and Walworth County plans, which presents a reasonable indication of possible future conditions and provides a conservative approach to facility sizing.

However, it is further proposed to evaluate the performance of the alternative solid waste plans to be considered under a likely range of future possible conditions represented by one or more of the alternative futures set forth above. In this respect, it was determined to consider, in addition to the future solid waste quantities which may be anticipated to be generated under the recommended future scenario, the quantities which may be anticipated under the high-growth decentralized scenario.



PLANNING ANALYSIS AREAS WITH 1990 AND FORECAST  
YEAR 2010 POPULATION FOR THE WALWORTH COUNTY STUDY AREA



For solid waste management system planning purposes, Walworth County was divided into

As shown in Figure 5 and Table 21, under the intermediate-growth future scenario, the resident population of the study area may be expected to increase by about 16 percent, from about 77,500



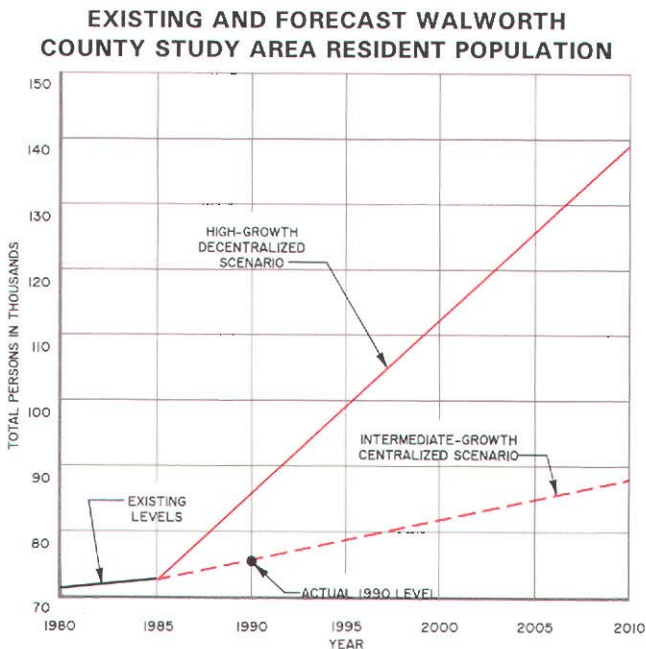
Table 20

**ACTUAL AND PLANNED POPULATION LEVELS IN THE WALWORTH  
COUNTY STUDY AREA BY PLANNING ANALYSIS AREA: 1980-2010**

Planning Analysis Area	Actual 1980		Actual 1990		Forecast 2000		Forecast 2010	
	Population	Percent of Total	Population	Percent of Total	Population	Percent of Total	Population	Percent of Total
<b>Intermediate-Growth Centralized Scenario</b>								
32	9,539	12.9	10,154	13.1	11,100	13.5	11,700	13.1
33	16,100	21.8	17,062	22.0	17,230	19.2	17,405	19.4
34	48,290	65.3	50,250	64.9	55,600	67.3	60,500	67.5
Total	73,929	100.0	77,466	100.0	82,583	100.0	89,605	100.0
<b>High-Growth Decentralized Scenario</b>								
32	9,539	12.9	10,154	13.1	13,740	12.1	16,100	11.4
33	16,100	21.8	17,062	22.0	22,268	19.6	28,047	19.8
34	48,290	65.3	50,250	64.9	77,740	68.3	97,300	68.8
Total	73,929	100.0	77,466	100.0	113,748	100.0	141,447	100.0

Source: SEWRPC.

Figure 5



Source: U. S. Bureau of the Census and SEWRPC.

persons in 1990 to about 89,600 persons by the year 2010. Under the high-growth future scenario, the resident population of the study area may be expected to increase by about 83 percent from 77,500 persons in 1990 to about 141,400 persons by the year 2010. It should be noted that

the base year and forecast year population levels are somewhat higher than those for Walworth County per se, because the study area includes a portion of the City of Whitewater, outside the County.

#### Households

Forecasts of increases in the number of households have particularly important implications for solid waste planning, since it is the household which generates residential solid wastes. The number of households in the study area is expected to increase under both year 2010 future scenarios being considered, as shown in Table 21 and on Figure 6. Under the intermediate-growth scenario, the number of households in the study area is expected to increase by about 28 percent, from about 27,900 in 1990 to about 35,900 in the year 2010. Under the high-growth scenario, the number of households in the study area is expected to increase by about 86 percent, from the year 1990 figure to about 51,800 in 2010. It should be noted that these household numbers are somewhat higher than the Walworth County household numbers because the study area includes the portion of the City of Whitewater located outside of the County.

As noted in Chapter II, the study area currently has a substantial seasonal population influx and a substantial number of occasional or recreational use housing units which must be consid-

Table 21

**SELECTED SOCIO-ECONOMIC DATA FOR WALWORTH COUNTY STUDY  
AREA BASED ON YEAR 2010 ALTERNATIVE FUTURES LAND USE PLANS**

Future Conditions	Existing 1990	2010 Intermediate-Growth Centralized Scenario	2010 High-Growth Decentralized Scenario
Resident Population .....	77,466	89,600	141,447
Households .....	27,900	35,900	52,100
Employment .....	37,100	40,500	55,500
Urban Land Use (acres) <sup>a</sup> .....	39,211	42,756	50,216

<sup>a</sup>Urban land uses include residential; commercial; industrial; transportation, communication, and utility; governmental and institutional; and recreational land uses and unused urban lands. Includes only the Walworth County portion of the study area.

Source: SEWRPC.

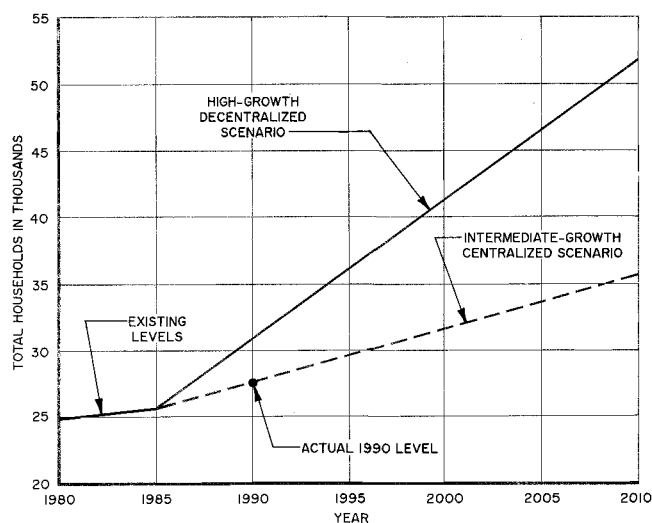
ered in the estimation of future solid waste quantities. Because of the highly attractive recreational resources in the County and its proximity to several large population centers, this seasonal population influx, and corresponding effect on solid waste generation, may be expected to continue.

Between 1980 and 1990, the number of seasonal housing units in the County remained essentially the same, at about 7,700. This stability may be attributable in part to the conversion of seasonal second homes to year-round residences. Another factor to be considered in this respect is that new second homes constructed in the County are often designed for year-round use. Thus, most newly constructed second homes, or vacation homes, are now classified as year-round structures. This trend in vacation or second homes may result in an increase in the solid waste loadings and may increase the periods of seasonal use over a greater portion of the year because of the use of second homes for longer periods of time and for winter as well as summer recreational uses. Nevertheless, the predominant impact of the seasonal and weekend population may be expected to continue to occur during the summer months.

For the purposes of this study, the percentage of solid waste attributable to seasonal and weekend population is assumed to remain at a constant proportion to the total solid waste stream that currently exists, which is approximately 7 percent of the total waste stream. It is antici-

Figure 6

**EXISTING AND FORECAST WALWORTH  
COUNTY STUDY AREA RESIDENT HOUSEHOLDS**



Source: U. S. Bureau of the Census and SEWRPC.

pated that the quantity of these wastes will increase in a direct relationship to the anticipated increases in the study area population.

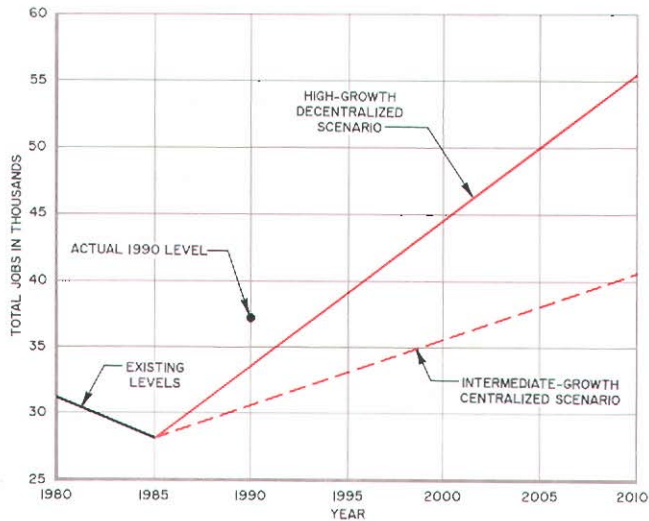
#### Employment

As shown in Table 21 and Figure 7, total employment in Walworth County is anticipated to increase from about 37,100 jobs in 1990 to about 40,500 and 55,500, under the intermediate-growth scenario and high-growth scenario, respectively. Review of Figure 7 indicates that



Figure 7

### EXISTING AND FORECAST WALWORTH COUNTY EMPLOYMENT LEVELS



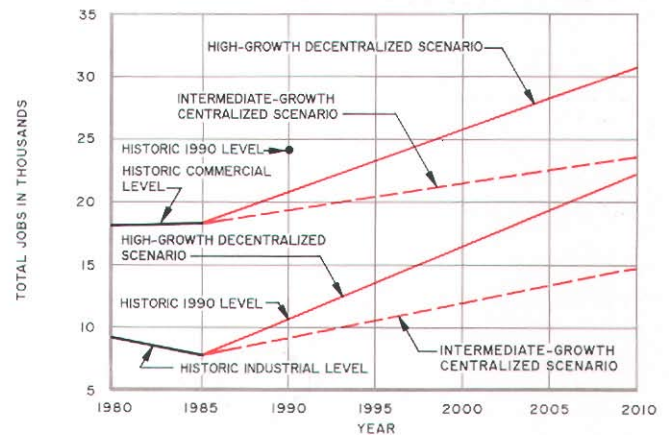
Source: Wisconsin Department of Labor, Industry and Human Relations and SEWRPC.

the 1990 employment level in Walworth County is above the 1990 projections for the high-growth decentralized land use plan. In this regard, it should be noted that employment levels can vary markedly over short periods due to changes in the structure of the local, State, and National economy. In this case, the significant change between the actual 1980 and 1990 levels is probably largely due to the recovery after 1984 of a Statewide and National recession that began in the late 1970s, as well as to increases in commercial, recreational, and service industry jobs due to local conditions. The long-term planned employment levels for the year 2010 set forth herein are considered reasonable despite the short-term differences noted.

As shown in Figure 8, the anticipated levels of employment in activities which generate commercial solid waste, under the two respective future scenarios, are anticipated to range from being relatively stable under the intermediate-growth scenario to an increase of 6,400 jobs, or about 27 percent, under the high-growth scenario, when compared to 1990 levels. The levels of employment in activities which generate industrial solid waste are anticipated to increase by about 4,000 and 11,600 jobs, or about 37 and 108 percent, when compared to levels experienced in 1990, under the intermediate-growth and high-growth scenarios, respectively.

Figure 8

### COMMERCIAL AND INDUSTRIAL EMPLOYMENT LEVELS IN WALWORTH COUNTY



Source: Wisconsin Department of Labor, Industry and Human Relations and SEWRPC.

### Land Use

Existing land uses and the County zoning that regulates land use development and redevelopment in the unincorporated areas of the County were discussed in Chapter II. The existing 1990 and forecast year 2010 land uses within the County under the intermediate-growth centralized and high-growth decentralized land use future scenarios are set forth in Table 22. The year 2010 plan under the intermediate-growth scenario is shown on Map 9. Map 9 reflects the refinements to the planned urban areas and the prime agricultural lands developed by the Walworth County Park and Planning Commission staff and the Regional Planning Commission in 1993. The refined land use plan shown on Map 9, was adopted by the Walworth County Board on October 19, 1993. As indicated in Table 22 and Figure 9, about 3,500 and 11,000 acres of rural land may be expected to be converted from rural to urban land uses under the intermediate-growth and high-growth land use plans, respectively.

While industrial solid wastes are usually only produced on lands with industrial land uses, commercial solid wastes are produced on commercial as well as transportation, communication, and utility; governmental and institutional; and recreational land uses. Therefore, while it is expected that the amount of strictly commercial land uses will remain relatively unchanged under the intermediate-growth centralized scenario and increase by about 68 acres under the

Table 22

**DISTRIBUTION OF EXISTING AND PROPOSED LAND USE IN WALWORTH  
COUNTY: EXISTING 1990 AND PLANNED 2010 UNDER THE INTERMEDIATE-GROWTH  
CENTRALIZED AND HIGH-GROWTH DECENTRALIZED LAND USE SCENARIOS**

Land Use Category	Existing 1990		2010 Intermediate-Growth Centralized Scenario				2010 High-Growth Decentralized Scenario			
	Acres	Percent of Major Category	Planned Increment 1990-2010		Total (acres)	Percent of Major Category	Planned Increment 1990-2010		Total (acres)	Percent of Major Category
			Acres	Percent			Acres	Percent		
<b>Urban</b>										
Residential <sup>a</sup> .....	17,379	44.3	2,153	12.4	19,532	45.7	7,208	41.5	24,587	49.0
Commercial .....	849	2.2	-26	-3.1	823	1.9	68	8.0	917	1.8
Industrial <sup>b</sup> .....	807	2.0	365	45.2	1,172	2.7	893	110.7	1,700	3.4
Transportation, Communication, and Utilities <sup>c</sup> .....	14,777	37.7	911	6.2	15,688	36.7	2,584	17.5	17,361	34.6
Governmental and Institutional .....	1,248	3.2	86	6.9	1,334	3.1	217	17.4	1,465	2.9
Recreational <sup>d,e</sup> .....	3,454	8.8	345	10.0	3,799	8.9	520	15.1	3,974	7.9
Unused Urban .....	707	1.8	-299	-42.3	408	1.0	-495	-70.0	212	0.4
Subtotal	39,221	100.0	3,535	9.0	42,756	100.0	10,995	28.0	50,216	100.0
<b>Rural</b>										
Residential <sup>f</sup> .....	--	--	221	--	221	0.1	442	--	442	0.1
Agricultural .....	247,015	74.9	-820	-0.3	246,195	75.5	-7,585	-3.1	239,430	75.1
Other Open Lands <sup>g</sup> .....	82,720	25.1	-2,936	-3.5	79,784	24.4	-3,852	-4.7	78,868	24.8
Subtotal	329,735	100.0	-3,535	-1.1	326,200	100.0	-10,995	-3.3	318,740	100.0
<b>Total</b>	<b>368,956</b>	<b>--</b>	<b>0</b>	<b>0.0</b>	<b>368,956</b>	<b>--</b>	<b>0</b>	<b>0.0</b>	<b>368,956</b>	<b>--</b>

<sup>a</sup>Includes residential areas under development.

<sup>b</sup>Includes wholesaling and storage operations.

<sup>c</sup>Includes off-street parking areas.

<sup>d</sup>Includes the net site area of public and nonpublic recreation sites, that is, the portion of those sites which have been developed for intensive recreational use.

<sup>e</sup>Incremental recreational land use includes only that net area recommended for public recreational use.

<sup>f</sup>Rural residential uses are included in the urban residential land category.

<sup>g</sup>Includes woodlands, water, wetlands, unused rural land, landfill sites, and quarries.

Source: SEWRPC.

high-growth decentralized scenario; it is expected that the amount of land use on which commercial solid wastes are generated is expected to increase over 1990 levels by about 1,300 and 3,400 acres, or about 6 and 17 percent under the intermediate-growth and high-growth scenarios, respectively. The amount of industrial land use will increase over 1990 levels by about 370 and 890 acres, or about 45 and 111 percent under the two respective alternative plans.

#### **SOLID WASTE TYPES, QUANTITIES, AND SOURCES TO BE UTILIZED IN ALTERNATIVE PLAN DESIGN**

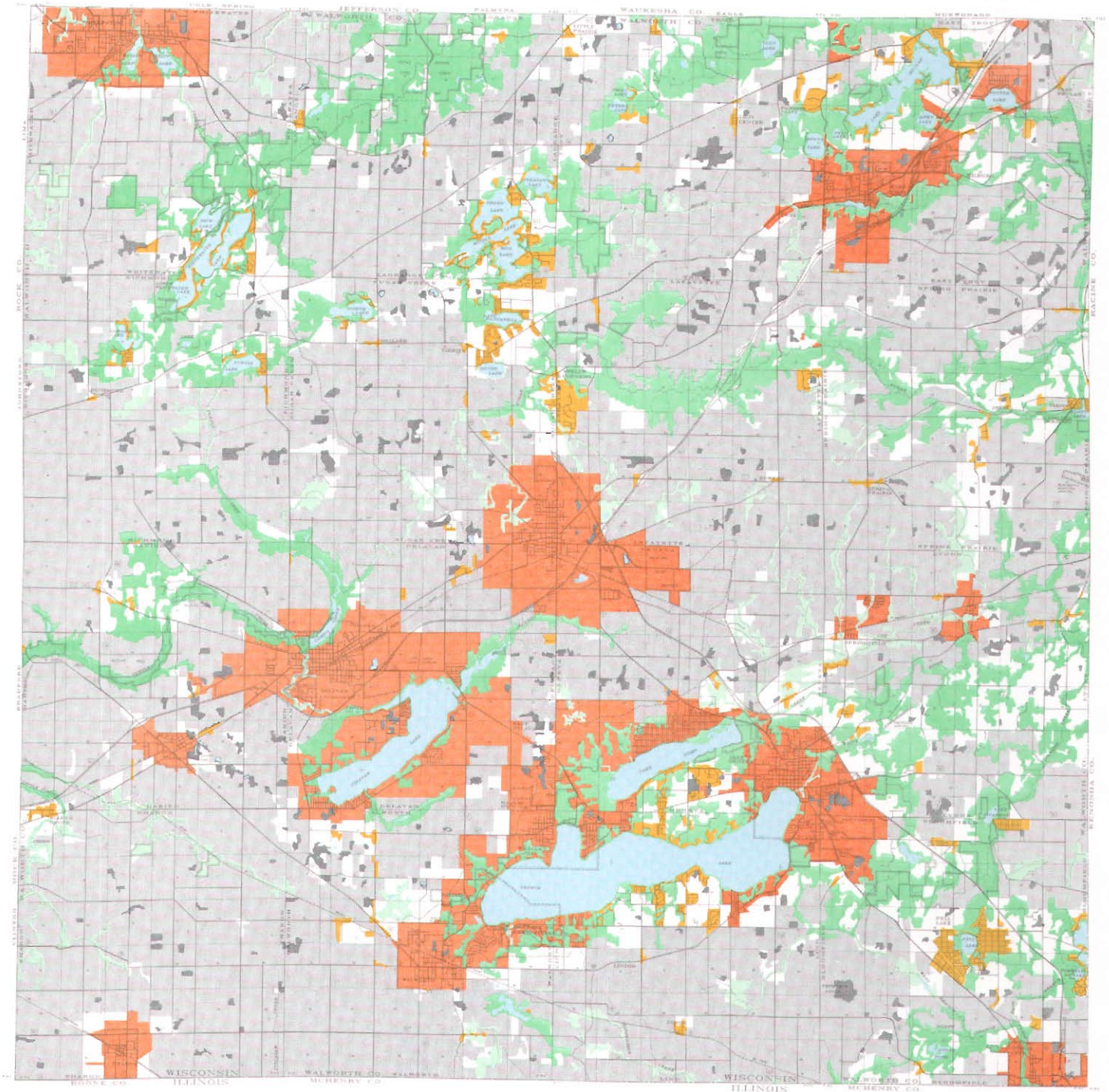
The type and quantity of solid waste generated in the Walworth County study area in 1992 and

the sources of that waste were described in Chapter II. This section of the report provides estimates of the quantities and composition of solid waste which may be expected to be generated within the study area over the planning period through the year 2010 under both the intermediate-growth and high-growth future condition scenarios.

Table 23 presents estimates of the solid waste quantities not expected to be recycled which are generated in each of the three planning analysis areas of the study area in 1992 and thus require disposal under the intermediate-growth and high-growth scenarios for the year 2010. These quantities are also summarized by planning analysis area on Map 10. Table 24 summarizes the solid waste quantities which were estimated



RECOMMENDED LAND USE PLAN FOR WALWORTH COUNTY: 2010



LEGEND

- PLANNED URBAN SERVICE AREA
- EXISTING URBAN LANDS OUTSIDE OF PLANNED URBAN SERVICE AREA
- PRIME AGRICULTURAL LAND
- OTHER AGRICULTURAL, RURAL RESIDENTIAL, AND OPEN LAND
- PRIMARY ENVIRONMENTAL CORRIDOR
- SECONDARY ENVIRONMENTAL CORRIDOR
- ISOLATED NATURAL RESOURCE AREA
- SURFACE WATER

Source: SEWRPC.

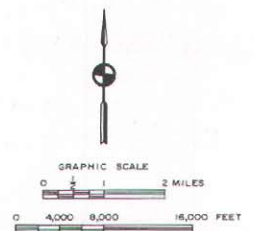
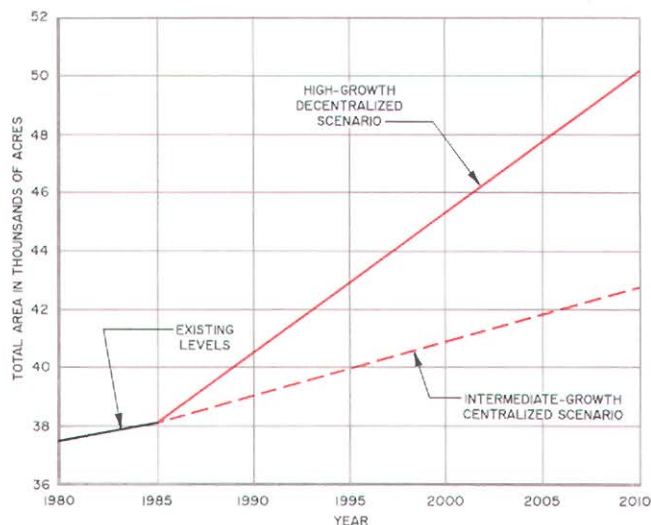




Figure 9

**EXISTING AND PLANNED  
WALWORTH COUNTY URBAN LAND USE**



Source: SEWRPC.

to be recycled in each of the three planning analysis areas of the study area in 1992 and under the intermediate-growth and high-growth plans for the year 2010. These quantities are summarized by planning analysis area on Map 11. The estimated characteristics of the solid waste stream for the year 2010 are indicated in Table 25. The methodology utilized to estimate the quantities and characteristics of each type of solid waste is described below.

As already noted in Chapter II, seasonal variation in the solid waste quantities is an important consideration in the design of alternative solid waste management systems. Two main factors account for seasonal variations in the solid waste generated in Walworth County. The first factor is the added quantity of solid waste generated by the seasonal and weekend populations during the summer months. The other factor contributing to seasonal waste generation is the normal change in activities that take place with the change of seasons, mainly outside activity and yard work. Figure 10 illustrates the estimated monthly seasonal distribution of the residential solid waste generation in the study area under the future conditions.

### Residential Solid Waste

As described in Chapter II, the existing residential solid waste quantities were estimated, utilizing waste production data from local units of government; then comparisons were made with the generation rates developed in the previous County solid waste plan. Over approximately the last 10 years, it is estimated that the per capita generation rate for residential waste in Walworth County increased by about 7 percent. The total residential solid waste loadings generated in the study area for the year 2010 were estimated as follows:

1. On the basis of a review of the data developed in the Wisconsin waste generation and composition study (see Table 26 for full citation of this work), which projected an increase in the per capita generation rate of about 3.5 percent over the period of 1990 to 2000; it was estimated that the year 2010 per capita generation rate of the County would increase by 7 percent over the 1992 rates.
2. The increased 2010 per capita generation rate was applied to the forecast population levels under the recommended intermediate-growth centralized and under the high-growth decentralized alternative future condition scenarios to calculate the total residential waste loads anticipated under a range of future conditions.
3. The 2010 annual waste loading was adjusted to account for the seasonal influx of population at the same levels experienced in the study area in 1992.
4. The composition of the future 2010 waste stream was estimated by using data set forth in the Wisconsin waste generation and composition study, referred to above.

It was thus estimated that by the year 2010, 50,400 tons per year, at a rate of approximately 3.1 pounds per capita per day (ppcpd); about 80,700 tons per year would be generated by the residential land uses under the intermediate-growth centralized and high-growth decentralized scenarios, respectively. This represents an increase of about 9,700 tons per year, or about 24 percent, or slightly more than 1 percent a year over the 1992 level under the intermediate-

Table 23

**ESTIMATED SOLID WASTE QUANTITIES NOT RECYCLED IN THE WALWORTH  
COUNTY STUDY AREA BY PLANNING ANALYSIS AREA: 1990-2010**

Planning Analysis Area	Resident Population <sup>a</sup>	Residential Waste (tons per year)	Commercial Waste (tons per year)	Industrial Waste (tons per year)	Special Wastes			Total (tons per year)
					Bulky Waste (tons per year)	Tree and Brush (tons per year)	Construction and Demolition (tons per year)	
Existing 1990-1992								
32	10,154	5,500	1,853	2,409	315	102	1,640	11,819
33 <sup>b</sup>	17,062	6,400	3,114	4,048	530	171	2,756	17,019
34	50,250	25,409	9,171	11,922	1,559	505	8,116	56,682
Total	77,466	37,309	14,138	18,379	2,404	778	12,512	85,520
Intermediate-Growth Centralized Scenario								
32	11,700	4,399	1,848	3,046	512	118	1,922	11,845
33 <sup>b</sup>	17,405	5,292	2,749	4,531	762	175	2,859	16,368
34	60,500	23,706	9,556	15,750	2,651	607	9,937	62,207
Total	89,605	33,397	14,153	23,327	3,925	900	14,718	90,420
High-Growth Decentralized Scenario								
32	16,100	6,083	2,119	3,540	705	162	2,644	15,253
33 <sup>b</sup>	28,047	9,290	3,690	6,167	1,228	282	4,607	25,264
34	97,300	38,081	12,800	21,395	4,261	976	15,982	93,495
Total	141,447	53,454	18,609	31,102	6,194	1,420	23,233	134,012

<sup>a</sup>The resident population levels are based on the 1990 census. Solid waste quantities are based on 1992 inventory data.

<sup>b</sup>Planning analysis area 33 consists solely of lands within Walworth County. However, the population and solid waste quantities generated in the portion of the City of Whitewater located in Jefferson County have been added to the population and solid waste quantities of planning analysis area 33 because it is included as part of the Walworth County solid waste management plan update study area.

Source: SEWRPC.

growth scenario. It represents an increase of about 40,000 tons, or about 99 percent, or slightly more than 5 percent per year, over the 1992 level under the high-growth scenario. These quantities do not include wastes which are classified as special wastes, generated by residents; they are discussed later in this chapter.

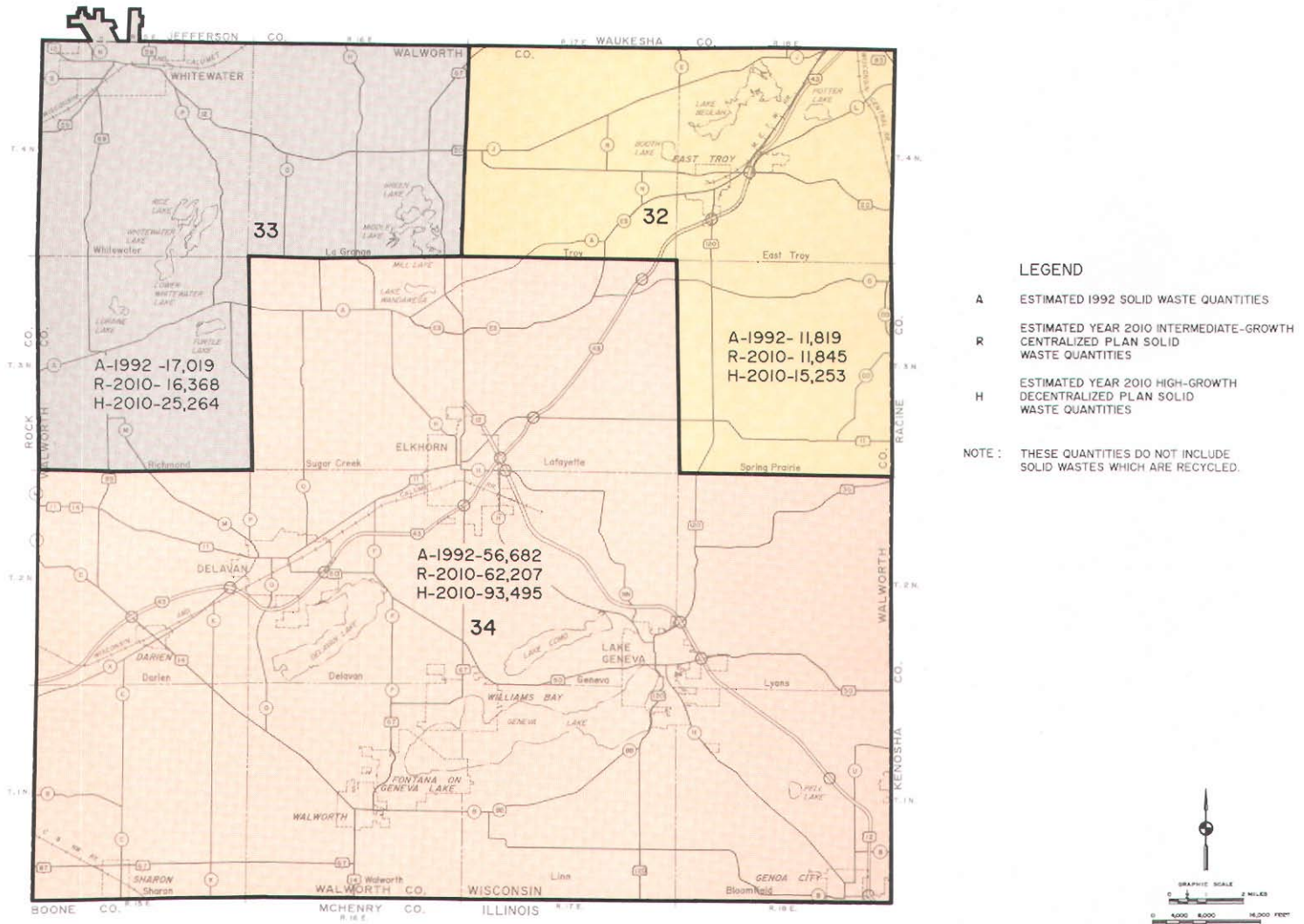
Of these quantities, approximately 3,500 and 5,600 tons per year under the two future development scenarios considered, or about 7 percent of the total, were estimated to be generated by the seasonal population of the study area. The total quantities were also estimated to include 33,400 and 53,500 tons of unrecycled mixed solid waste, or approximately 2.0 ppcpd and about 17,000 and 27,200 tons of recycled solid waste, or approximately 1.0 ppcpd under the two future development scenarios, respectively.

The per capita generation rate of recycled solid waste may be expected to increase by about 350 percent over the next two decades, to approximately 1.0 ppcpd. Of this increase, approximately 120 percent, or 0.3 ppcpd, may be attributed to the yard waste component of the residential waste stream being banned from landfills as of January 1993. More specifically, it is estimated that 90 percent of all yard waste is expected to be excluded from the mixed solid waste stream and will have to be managed through community programs such as composting or retained onsite. The other 230 percent of the increase, or about 0.7 ppcpd, is attributed to the expected increase in recycling due to the other material landfill disposal bans as proposed to be implemented under Chapter 159 of the State Statutes and proposed Chapter NR 544 of the Wisconsin Administrative Code, which sets forth goals for



Map 10

**PLANNING ANALYSIS AREAS WITH ESTIMATED 1992 AND  
FORECAST YEAR 2010 SOLID WASTE QUANTITIES REQUIRING  
DISPOSAL FOR THE WALWORTH COUNTY STUDY AREA**



Source: SEWRPC.

collection of recyclables. In order to meet these goals, it is assumed that more communities will change to curbside collection of recyclable waste and improve their recycling programs.

As noted in Chapter II, paper products comprise the largest percentage, about 33 percent by weight, of the residential waste stream in 1990. It is estimated that paper will remain the largest percentage of the waste stream in 2010, and will in fact increase to over 36 percent of the

residential water stream. Based on information developed in the State waste generation and composition study, the average composition of the residential solid waste stream is shown graphically in Figure 11 and in tabular form in Table 26.

**Nonresidential Solid Waste Stream**

In Chapter II the total annual nonresidential solid waste generated in the County during 1992 was estimated by updating the estimates devel-

Table 24

**ESTIMATED RECYCLED SOLID WASTE QUANTITIES NOT REQUIRING DISPOSAL IN  
THE WALWORTH COUNTY STUDY AREA BY PLANNING ANALYSIS AREA: 1990-2010**

Planning Analysis Area	Resident Population <sup>a</sup>	Residential Waste (tons per year)	Commercial Waste (tons per year)	Industrial Waste (tons per year)	Special Wastes			Total (tons per year)
					Bulky Waste (tons per year)	Tree and Brush (tons per year)	Construction and Demolition (tons per year)	
Existing 1990-1992								
32	10,154	635	556	1,297	130	102	546	3,266
33 <sup>b</sup>	17,062	544	934	2,180	218	171	919	4,966
34	50,250	2,129	2,751	6,419	642	505	2,706	15,152
Total	77,466	3,308	4,241	9,896	990	778	4,171	23,384
Intermediate-Growth Centralized Scenario								
32	11,700	2,303	792	2,492	128	117	640	6,472
33 <sup>b</sup>	17,405	2,672	1,178	3,707	191	175	953	8,876
34	60,500	11,983	4,094	12,887	662	608	3,312	33,546
Total	89,605	16,958	6,064	19,086	981	900	4,905	48,894
High-Growth Decentralized Scenario								
32	16,100	3,207	1,020	2,897	176	161	881	8,342
33 <sup>b</sup>	28,047	4,699	1,777	5,046	307	281	1,536	13,646
34	97,300	19,297	6,163	17,505	1,067	978	5,327	50,337
Total	141,447	27,203	8,960	25,448	1,550	1,420	7,744	72,325

<sup>a</sup>The resident population levels are based on the 1990 census. Solid waste quantities are based on 1992 inventory data.

<sup>b</sup>Planning analysis area 33 consists solely of lands within Walworth County. However, the population and solid waste quantities generated in the portion of the City of Whitewater located in Jefferson County have been added to the population and solid waste quantities of planning analysis area 33 because it is included as part of the Walworth County solid waste management plan update study area.

Source: SEWRPC.

Table 25

**COMPOSITION OF SOLID WASTES GENERATED IN THE WALWORTH  
COUNTY SOLID WASTE MANAGEMENT PLAN UPDATE STUDY AREA: 2010**

Component	Intermediate-Growth Centralized Scenario		High-Growth Decentralized Scenario	
	Quantity Generated <sup>a</sup> (tons)	Percentage of Total by Weight	Quantity Generated <sup>b</sup> (tons)	Percentage of Total by Weight
Paper .....	57,958	41.6	82,581	40.0
Construction and Demolition Debris .....	19,623	14.1	30,977	15.0
Food .....	8,738	6.3	12,765	6.2
Wood Pallets .....	7,328	5.3	9,842	4.8
Plastic .....	7,146	5.1	11,007	5.3
Yard Waste .....	6,878	4.9	10,646	5.2
Glass .....	5,495	3.9	8,462	4.1
Bulky Wastes .....	4,906	3.5	7,744	3.8
Metal .....	2,578	1.9	3,983	1.9
Tree and Brush .....	1,800	1.3	2,840	1.4
Disposable Diapers .....	1,108	0.8	1,774	0.9
Textiles .....	427	0.3	652	0.3
Unclassified and Miscellaneous .....	15,329	11.0	23,064	11.1
<b>Total</b>	<b>139,314</b>	<b>100.0</b>	<b>206,337</b>	<b>100.0</b>

<sup>a</sup>This includes 16,958 tons of residential wastes, 6,064 tons of commercial wastes, 19,086 tons of industrial wastes, 981 tons of bulky wastes, 900 tons of tree and brush, and 4,905 tons of construction and demolition debris, or a total of 48,894 tons which are recycled or reused and do not enter the solid waste stream requiring disposal.

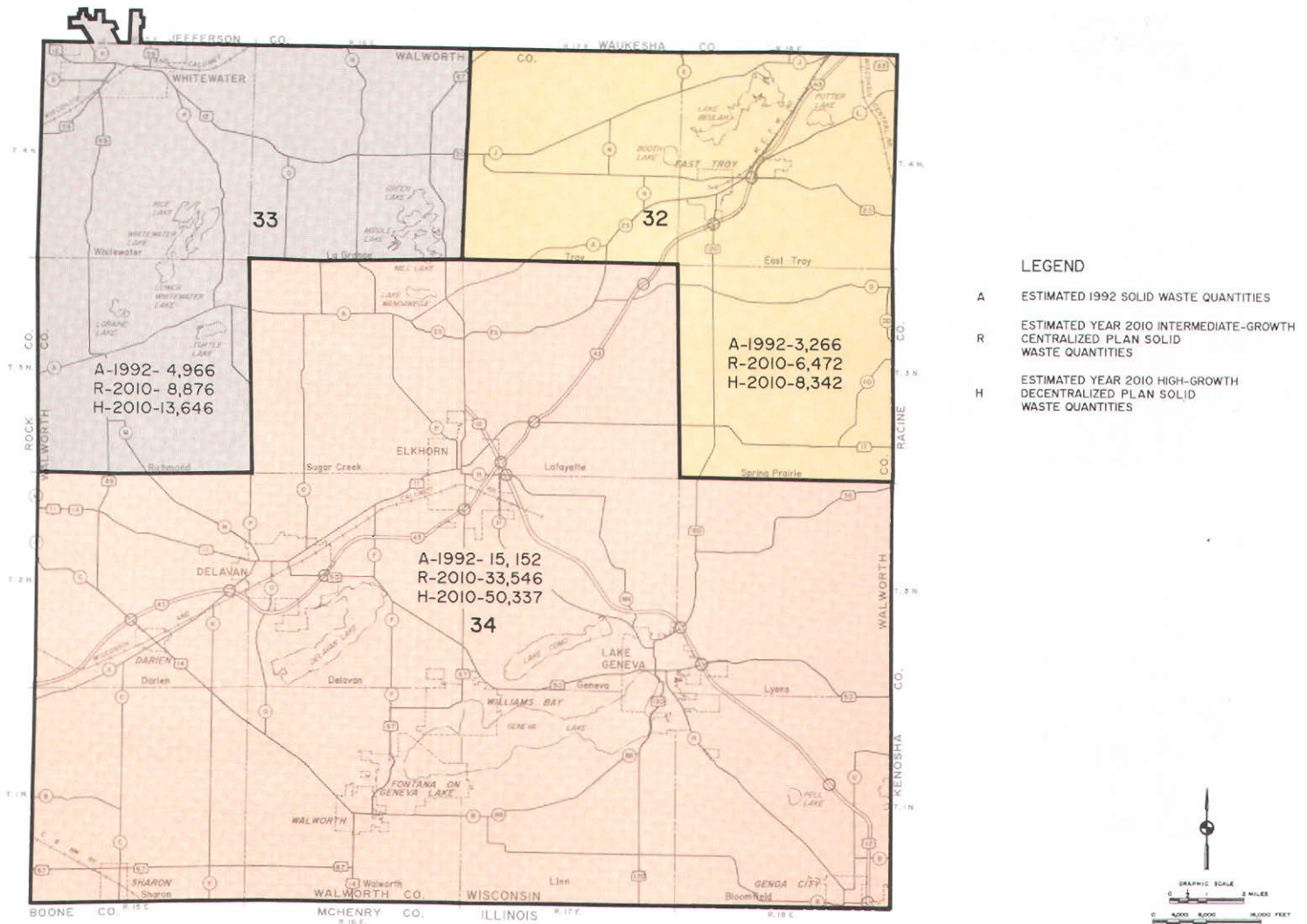
<sup>b</sup>This includes 27,203 tons of residential wastes, 8,960 tons of commercial wastes, 25,448 tons of industrial wastes, 1,550 tons of bulky wastes, 1,420 tons of tree and brush, and 7,744 tons of construction and demolition debris, or a total of 72,325 tons which are recycled or reused and do not enter the solid waste stream requiring disposal.

Source: SEWRPC.



Map 11

PLANNING ANALYSIS AREAS WITH ESTIMATED 1992  
AND FORECAST YEAR 2010 RECYCLED SOLID WASTE  
QUANTITIES FOR THE WALWORTH COUNTY STUDY AREA



Source: SEWRPC.

oped for the 1982 plan, using information such as updated land use distribution, categorized employment distribution, economic activity, and estimated recycling proficiencies.

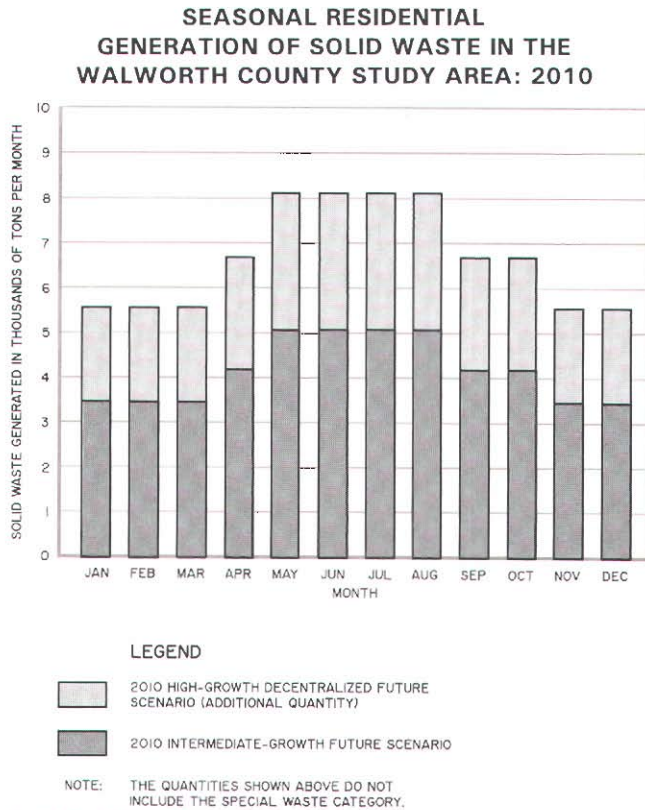
**Commercial Wastes:** In 1990, about 68 percent of the work force in Walworth County was employed in activities generating commercial solid waste. It is anticipated that the number of people employed in commercial activities from 1990 to 2010 will remain stable under the intermediate-growth scenario and that there will be an increase of about 20 percent under the

high-growth scenario. In addition, it is anticipated that the area occupied by commercial land uses will remain relatively unchanged under the intermediate-growth centralized scenario and will increase about 8 percent under the high-growth decentralized scenario.

On the basis of this information, the total quantity of commercial solid waste is estimated to increase by 10 percent, from about 18,400 tons per year in 1992 to about 20,200 tons per year by 2010 under the intermediate-growth scenario. Also, because of increased government regula-

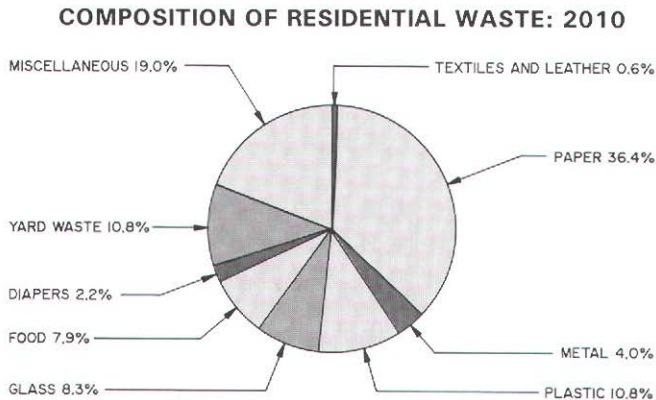


Figure 10



Source: SEWRPC.

Figure 11



Source: Franklin Associates, Ltd., *Wisconsin Waste Generation and Composition Study, Waste Management Study*, September 1992, prepared for the Wisconsin Department of Natural Resources, and SEWRPC.

tions and an awareness of the need to recycle, the proportion of recycled commercial waste may be expected to increase approximately 30 percent, from about 23 percent of the total commercial waste, or 4,200 tons in 1992, to about 30 percent of the total commercial waste, or

6,100 tons in 2010. The mixed commercial solid waste is expected to remain about the same as in 1992, at about 14,100 tons. Thus, the total commercial solid waste generation rate of 1.2 pounds per capita per day is estimated to consist of 0.4 ppcpd and 0.8 ppcpd of recycled and mixed solid waste, respectively, under the intermediate-growth scenario.

Also, on the basis of the above information, the total quantity of commercial solid waste is estimated to increase 50 percent, from about 18,400 tons per year in 1992 to about 27,600 tons per year in 2010, under the high-growth scenario. Also, due to increased governmental regulations and awareness of the need to recycle, the proportion of recycled waste may be expected to increase approximately 30 percent, from about 23 percent of the total commercial waste, or 4,200 tons per year in 1992, to about 33 percent of the total commercial waste, or about 9,000 tons in 2010. The level of unrecycled or mixed commercial solid waste is expected to decrease from about 77 percent to about 67 percent of the total commercial waste in 2010. However, because of the increases in commercial activity, the quantity of mixed commercial waste is expected to increase from about 14,100 tons in 1992 to about 18,600 tons in 2010. Thus, the total commercial solid waste generation rate of 1.0 pound per capita per day is estimated to consist of 0.3 ppcpd and 0.7 ppcpd of recycled and mixed solid waste, respectively, under the high-growth scenario.

**Industrial Wastes:** In 1990, about 28 percent of the work force in Walworth County was employed in activities generating industrial solid waste. It is anticipated that there will be about a 40 and a 115 percent increase in the number of people employed in industrial activities from 1990 to 2010 under the intermediate-growth and high-growth scenarios, respectively. Between 1990 and 2010, increases of about 70 and 150 percent, respectively, are also anticipated in the urban land areas occupied by land uses which generate industrial solid waste under these scenarios.

Accordingly, the total quantity of industrial solid waste may be expected to increase by approximately 14,100 tons per year, or about 50 percent, from about 28,300 tons per year in 1992 to about 42,400 tons per year in 2010, under the intermediate-growth scenario. Because increased government regulations and aware-

Table 26

**EXISTING AND FORECAST COMPOSITION OF RESIDENTIAL SOLID  
WASTE IN THE WALWORTH COUNTY STUDY AREA: 1992 AND 2010**

Product Category	1992 Existing		2010 Intermediate-Growth Centralized Scenario				2010 High-Growth Decentralized Scenario			
	Quantity (tons)	Percent of Total	Quantity (tons)	Percent of Total	Change: 1992-2010		Quantity (tons)	Percent of Total	Change: 1992-2010	
					Quantity (tons)	Percent			Quantity (tons)	Percent
Newspaper .....	4,880	12.0	5,589	11.1	709	14.5	8,953	11.1	4,073	83.5
Corrugated Containers .....	617	1.5	1,158	2.3	541	87.7	1,855	2.3	1,238	200.6
Magazines .....	1,033	2.6	1,561	3.1	528	51.1	2,500	3.1	1,467	142.0
High-Grade Office Paper .....	219	0.5	453	0.9	234	106.8	726	0.9	507	231.5
Mixed Wastepaper .....	6,578	16.2	9,570	19.0	2,992	45.5	15,324	19.0	8,748	133.0
Aluminum Cans .....	672	1.7	1,057	2.1	385	57.3	1,694	2.1	1,022	152.1
Steel Cans <sup>a</sup> .....	988	2.4	957	1.9	-31	-3.1	1,532	1.9	544	55.1
Foam Polystyrene Packaging .....	45	0.1	50	0.1	5	11.1	81	0.1	36	80.0
Foam Polystyrene Nondurable Goods ...	17	<0.1	50	0.1	33	1.9	81	0.1	64	376.5
Plastic Containers .....	913	2.2	1,460	2.9	547	59.9	2,339	2.9	1,426	156.2
Other Plastic Packaging .....	1,376	3.4	1,913	3.8	537	39.0	3,065	3.8	1,689	122.7
Other Plastic Nondurable Goods .....	1,315	3.2	1,964	3.9	649	49.4	3,146	3.9	1,831	139.2
Glass Containers .....	3,935	9.7	3,676	7.3	-259	-6.9	5,888	7.3	1,953	49.6
Other Glass <sup>b</sup> .....	349	0.9	504	1.0	155	44.4	807	1.0	458	131.2
Yard Waste .....	5,280	13.0	5,438	10.8	158	3.0	8,711	10.8	3,431	65.0
Food Waste .....	2,976	7.3	3,978	7.9	1,002	33.7	6,372	7.9	3,396	114.1
Disposable Diapers .....	1,170	2.9	1,108	2.2	-62	-5.3	1,774	2.2	604	51.6
Textiles and Leather <sup>c</sup> .....	228	0.6	302	0.6	74	32.5	484	0.6	256	112.3
Miscellaneous Durable Goods <sup>d</sup> .....	2,457	6.1	3,726	7.4	1,269	51.6	5,969	7.4	3,512	143.9
Household Batteries .....	75	0.2	101	0.2	26	34.7	161	0.2	86	114.7
Miscellaneous Packaging .....	252	0.6	302	0.6	50	19.8	484	0.6	232	92.1
Unclassified .....	5,242	12.9	5,438	10.8	196	3.8	8,711	10.8	3,469	66.2
<b>Total</b>	<b>40,617</b>	<b>100.0</b>	<b>50,355</b>	<b>100.0</b>	<b>9,738</b>	<b>24.0</b>	<b>80,657</b>	<b>100.0</b>	<b>40,040</b>	<b>98.6</b>

<sup>a</sup>Steel cans include bi-metal cans and tin cans.

<sup>b</sup>Other glass includes glass contained in durable goods category.

<sup>c</sup>Quantities shown include rubber from sources other than tires.

<sup>d</sup>Quantity shown excludes glass which is included in the other glass category, and rubber and leather included in textiles and leather category.

Source: Franklin Associates, Ltd., *Wisconsin Waste Generation and Composition Study, Waste Management Study, September 1992, prepared for the Wisconsin Department of Natural Resources; and SEWRPC.*

ness of the need to recycle, the volume of industrial recycled waste may be expected to increase by approximately 30 percent, from about 35 percent of the total waste, or 9,900 tons per year in 1992, to about 45 percent of the total industrial waste, or about 19,100 tons in 2010, and the proportional quantity of unrecycled mixed industrial solid waste may be expected to decrease from about 65 percent to 55 percent of the total industrial solid waste. However, because of the increase in industrial activity, the quantity of mixed industrial waste may be expected to increase from about 18,400 tons in 1992 to about 23,300 tons in 2010. The total industrial solid waste generation rate of 2.6 pounds per capita per day is thus estimated to consist of 1.2 ppcpd and 1.4 ppcpd of

and 1.4 ppcpd of industrial recycled and unrecycled mixed solid waste, respectively, under the intermediate-growth scenario.

On the basis of the information above, the total quantity of industrial solid waste is expected to increase by approximately 28,300 tons per year, or about 100 percent, from about 28,300 tons per year in 1992 to about 56,600 tons per year in 2010 under the high-growth scenario. Because of increased governmental regulations and awareness of the need to recycle, the proportion of industrial recycled waste is expected to increase approximately 30 percent, from about 35 percent of the total waste, or 9,900 tons per year in 1992, to about 45 percent of the total industrial waste, or about 25,500 tons in 2010, and the propor-

tional quantity of mixed industrial solid waste is expected to decrease from about 65 percent to 55 percent of the total industrial solid waste. However, because of the increase in industrial activity, the quantity of mixed industrial waste is expected to increase from about 18,400 tons in 1992 to about 31,100 tons in 2010. The total industrial solid waste generation rate of 2.2 pounds per capita per day is estimated to consist of 1.0 ppcpd and 1.2 ppcpd of industrial recycled and unrecycled mixed solid waste, respectively, under the high-growth scenario.

The 2010 nonresidential waste stream is estimated to consist of a variety of components, with paper products making up over one-half of the weight and wood pallets and food wastes the next largest components of the waste. The average composition of the nonresidential waste stream is shown graphically on Figure 12 and in tabular form in Table 27.

#### Special Waste Category

The forecast special wastes being considered are the same as those inventoried in Chapter II for 1992, which include such bulky wastes as appliances and furniture, trees and brush, construction and demolition wastes, used automobile tires and batteries, and household toxic and hazardous wastes. The forecast of these wastes was based on the year 2000 generation and recovery rates projected in the Wisconsin waste generation and composition study. These year 2000 rates were projected to the design year of this study by maintaining the same rate of change in these rates to the year 2010, unless otherwise noted. The forecast quantities were then computed by applying the year 2010 rates to the forecast population of the study area, under the intermediate-growth centralized and high-growth decentralized plans, respectively.

Bulky Wastes: As described in Chapter II, the 1992 estimates of quantities of bulky wastes were based on a per capita rate of about 0.24 ppcpd. The 2010 design year per capita generation rate was estimated to increase by 25 percent over the next two decades to an estimated 0.30 ppcpd. This increase was primarily due to a projected increase in the generation rate of furniture and furnishings, which was estimated to increase from 0.17 ppcpd in 1992 to 0.23 ppcpd in the year 2010. The generation rate of appliances is estimated to remain at 0.07 ppcpd, as in 1992; however, the appliance recovery or recy-

cling rate was estimated to increase to 0.06 ppcpd. Under the intermediate-growth and high-growth scenarios, respectively, about 4,900 and 7,700 tons per year of bulky wastes, or about 0.3 ppcpd, may be expected to be generated by the year 2010. This represents increases of about 1,500 and 4,350 tons, or about 45 and 125 percent, respectively, over the amount generated in 1992. Included in these quantities are an estimated 1,000 and 1,550 tons, respectively, or 0.06 ppcpd of bulky wastes which are anticipated to be recycled.

Trees and Brush: As described in Chapter II, the existing quantity of trees and brush had an estimated generation rate of 0.11 ppcpd. The 2010 design year per capita generation rate was estimated to remain the same over the course of the design period.

Therefore, under the intermediate-growth and high-growth scenarios, about 1,800 and 2,840 tons per year of tree and brush, respectively, may be expected to be generated in the year 2010. This represents increases of about 240 and 1,280 tons, or about 15 and 82 percent, respectively, over the amount generated in 1992. Included in these quantities are an estimated 900 and 1,400 tons, or about 0.05 ppcpd of tree and brush wastes which are anticipated to be recycled or reused through composting and mulching or used as firewood.

Construction and Demolition Wastes: As described in Chapter II, the existing quantity of construction and demolition debris was estimated on the basis of the generation rate of 1.2 ppcpd. Information provided in the Wisconsin waste generation and composition study indicates that the rate of construction and demolition debris generation may be expected to increase by less than 1 percent by the year 2000. Thus, for the Walworth County study area, the 2010 design year per capita generation rate was estimated to remain at 1.2 ppcpd over the design period. Therefore, under the intermediate-growth and high-growth scenarios, respectively, about 19,600 and 31,000 tons per year of construction and demolition debris may be expected to be generated by the year 2010. This represents increases of about 2,900 and 14,300 tons, or about 17 and 86 percent, respectively, over the amount generated in 1992. Included in these quantities are an estimated 4,900 and 7,700 tons, or about 0.3 ppcpd of construction and demolition waste which are anticipated to be recycled



Table 27

**EXISTING AND FORECAST COMPOSITION OF NONRESIDENTIAL SOLID  
WASTE IN THE WALWORTH COUNTY STUDY AREA: 1992 AND 2010**

Product Category	1992 Existing		2010 Intermediate-Growth Centralized Scenario				2010 High-Growth Decentralized Scenario			
	Quantity (tons)	Percent of Total	Quantity (tons)	Percent of Total	Change: 1992-2010		Quantity (tons)	Percent of Total	Change: 1992-2010	
					Quantity (tons)	Percent			Quantity (tons)	Percent
Newspaper	793	1.7	752	1.2	-41	-5.2	1,009	1.2	216	27.2
Corrugated Containers	13,894	29.8	21,151	33.8	7,257	52.2	28,409	33.8	14,514	104.5
Magazines	793	1.7	1,002	1.6	209	26.4	1,346	1.6	183	23.1
High-Grade Office Paper	3,639	7.8	6,576	10.5	2,937	80.7	8,832	10.5	5,193	142.7
Mixed Wastepaper	8,398	18.0	10,146	16.2	1,748	20.8	13,627	16.2	5,229	62.3
Aluminum Cans	233	0.5	313	0.5	80	34.3	421	0.5	188	80.7
Steel Cans <sup>a</sup>	280	0.6	251	0.4	-29	-10.4	336	0.4	56	20.0
Foam Polystyrene Packaging	8	<0.1	18	<0.1	10	125.0	24	<0.1	16	200.0
Foam Polystyrene Nondurable Goods	93	0.2	125	0.2	33	35.5	168	0.2	75	80.6
Plastic Containers	327	0.7	438	0.7	111	33.9	589	0.7	262	80.1
Other Plastic Packaging	513	1.1	564	0.9	51	9.9	757	0.9	244	47.6
Other Plastic Nondurable Goods	467	1.0	564	0.9	97	20.8	757	0.9	290	62.1
Glass Containers	1,213	2.6	939	1.5	-274	-22.6	1,262	1.5	49	4.0
Other Glass <sup>b</sup>	327	0.7	376	0.6	49	15.0	505	0.6	178	54.4
Yard Waste	1,680	3.6	1,440	2.3	-240	-14.3	1,935	2.3	255	15.2
Food Waste	4,292	9.2	4,760	7.6	468	10.9	6,393	7.6	2,101	49.0
Textiles and Leather <sup>c</sup>	93	0.2	125	0.2	32	34.4	168	0.2	75	80.6
Wood Pallets	5,272	11.3	7,328	11.7	2,056	39.0	9,842	11.7	4,570	86.7
Miscellaneous Durable Goods <sup>d</sup>	2,333	5.0	2,944	4.7	611	26.2	3,954	4.7	1,621	69.5
Miscellaneous Packaging	140	0.3	188	0.3	48	34.3	252	0.3	112	80.0
Miscellaneous Inorganic Waste	1,866	4.0	2,630	4.2	764	40.9	3,533	4.2	1,667	89.3
<b>Total</b>	<b>46,654</b>	<b>100.0</b>	<b>62,630</b>	<b>100.0</b>	<b>15,976</b>	<b>34.2</b>	<b>84,119</b>	<b>100.0</b>	<b>37,464</b>	<b>80.3</b>

<sup>a</sup>Steel cans include bi-metal cans and tin cans.

<sup>b</sup>Other glass includes glass contained in durable goods category.

<sup>c</sup>Quantities shown include rubber from sources other than tires.

<sup>d</sup>Quantity shown excludes glass which is included in the other glass category, and rubber and leather included in textiles and leather category.

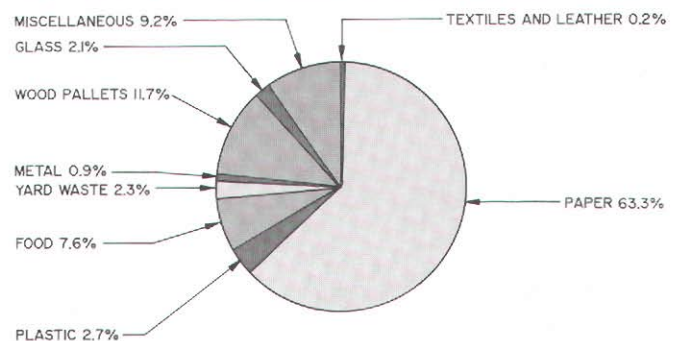
Source: Franklin Associates, Ltd., Wisconsin Waste Generation and Composition Study, Waste Management Study, September 1992, prepared for the Wisconsin Department of Natural Resources; and SEWRPC.

or reused and not disposed of in licensed sanitary landfills.

**Tires:** As described in Chapter II, the existing quantity of discarded tires was estimated based on a generation rate of about one tire per capita per year, which resulted in about 75,000 tires per year being generated in Walworth County, with about 25 percent of that number being recycled or reused. Using information provided by the Wisconsin waste generation and composition study, the generation rate of tires is projected to decrease by approximately 10 percent by the year 2000. There being no significant indicators to reflect further decreases to the 2010 design year, the per capita generation rate was estimated at 0.9 tire per person per year, a decrease of 10 percent.

Figure 12

**COMPOSITION OF NONRESIDENTIAL WASTE: 2010**



Source: Franklin Associates, Ltd., Wisconsin Waste Generation and Composition Study, Waste Management Study, September 1992, prepared for the Wisconsin Department of Natural Resources, and SEWRPC.

Therefore, under the intermediate-growth and high-growth scenarios, about 80,600 and 127,300 tires per year, respectively, may be expected to be generated by the year 2010. This represents increases of about 5,600 and 52,300 tons, or about 7 and 70 percent, respectively, over the amount generated in 1992. The State waste generation and composition study further indicated that tire recycling would increase from about 25 percent in 1990 to 26 percent in the year 2000. However, because of the 1995 tire landfill disposal ban in Chapter 159 of the State Statutes, it was assumed that 100 percent of the discarded tires would be recycled, retreaded, or reused by the 2010 design year.

Toxic and Hazardous Wastes: As noted in Chapter II, only household toxic and hazardous wastes are considered in this report. Household wastes are typically composed of automotive supplies, pesticides, paints, solvents, cleaning products, batteries, and many other compounds and finished products.

Car and truck batteries are considered as hazardous wastes. Discarded batteries originate from a variety of sources, including scrapyards, commercial sales outlets, and battery reproducers. The Wisconsin waste generation and composition study estimated increases in the battery use of 19 percent and in the recovery rate to 100 percent recovery in the year 2000. It is expected that there will be offsetting factors, including the use of batteries with longer lives. The 2010 design year per capita generation rate was therefore assumed to be unchanged, resulting in approximately 18,000 and 28,000 batteries being generated in the study area under the intermediate-growth and high-growth scenarios, respectively. These quantities reflect increases of 3,000 and 13,000 batteries, or 20 and 87 percent, over the quantities estimated for 1992. It was further estimated that 100 percent of these batteries would be recovered in the design year.

### Summary

To prepare a technically sound and viable updated plan for solid waste management in Walworth County, it is necessary to forecast the quantities and types of solid wastes which may be expected to be generated over the plan design period. It was decided that the development of alternative solid waste management plans under

this updating effort be based upon the intermediate-growth centralized plan. However, in order to evaluate the performance of the alternative solid waste management plans described in this report and to ensure that the proposed solid waste management facilities could adequately handle the range of solid waste quantities which might occur over the plan period, it was also determined to consider the performance of these plans under a range of future possible conditions. Thus, consideration was also given to a future scenario which would result in a relatively high solid waste generation.

As shown in Table 28, the quantity of solid waste estimated to be generated in the study area under the intermediate-growth centralized scenario for the year 2010 is 139,300 tons per year at a per capita generation rate of 8.5 pounds per day. This is an increase of approximately 30,000 tons, or about 28 percent, over the 108,900 tons estimated to be generated in 1992. Of the estimated 2010 total, approximately 35 percent, and about 48,900 tons per year, or about 3.0 pounds per capita per day, were estimated to be recycled or reused and would not require disposal. About 65 percent, or about 90,400 tons per year, or about 5.5 pounds per capita per day, were estimated to require disposal. While the amount of solid waste requiring disposal was estimated to increase by 4,900 tons per year, or about 6 percent, compared to 1992, the per capita generation rate of wastes requiring disposal was estimated to decrease by 0.5 pounds per day, as a result of an estimated increase in recycling over the planning period.

Also shown in Table 28 are the solid waste estimates for the year 2010 under the high-growth scenario. It was estimated that 206,300 tons per year, at a per capita generation rate of 8.0 pounds per day, would be generated under this alternative future scenario. Of this total, 35 percent, or about 72,300 tons per year, or about 2.8 pounds per capita per day, were estimated to be recycled or reused and would not require disposal. About 65 percent, or about 134,000 tons per year, or about 5.2 pounds per capita per day, were estimated to require disposal. The primary reason for this estimated increase in recycled amounts between 1992 and the year 2010 is an increased awareness of the need to recycle, and increased solid waste governmental regulation.

Table 28

**ESTIMATED SOLID WASTE QUANTITIES GENERATED IN  
THE WALWORTH COUNTY STUDY AREA:<sup>a</sup> 1992 AND 2010**

Solid Waste Category	1992		2010			
			Recommended Future Scenario		High-Growth Decentralized Future Scenario	
	Tons per Year	Per Capita	Tons per Year	Per Capita	Tons per Year	Per Capita
<b>Nonrecycled Solid Waste</b>						
Residential <sup>b</sup> .....	37,309	2.6	33,397	2.0	53,454	2.1
Nonresidential						
Commercial .....	14,138	1.0	14,153	0.9	18,609	0.7
Industrial .....	18,379	1.3	23,327	1.4	31,102	1.2
Special Wastes						
Bulky .....	2,404	<0.2	3,925	>0.2	6,194	>0.2
Tree and Brush .....	778	<0.1	900	<0.1	1,420	<0.1
Construction and Demolition .....	12,512	0.9	14,718	0.9	23,233	0.9
Subtotal	85,520	6.0	90,420	5.5	134,012	5.2
<b>Recycled Solid Waste</b>						
Residential <sup>c</sup> .....	3,308	0.2	16,958	1.0	27,203	1.0
Nonresidential						
Commercial .....	4,241	0.3	6,064	0.3	8,960	0.3
Industrial .....	9,896	0.7	19,086	1.2	25,448	1.0
Special Wastes						
Bulky .....	990	<0.1	981	<0.1	1,550	<0.1
Tree and Brush .....	778	<0.1	900	<0.1	1,420	<0.1
Construction and Demolition .....	4,171	0.3	4,905	0.3	7,744	0.3
Subtotal	23,384	1.6	48,894	3.0	72,325	2.8
Total	108,904	7.7	139,314	8.5	206,337	8.0
<b>Other Miscellaneous Recycled Solid Waste<sup>d</sup></b>						
Solid Waste Category	Quantity of Each per Year	Number Per Capita per Year	Quantity of Each per Year	Number Per Capita per Year	Quantity of Each per Year	Number Per Capita per Year
Tires .....	75,000	1.0	80,600	0.9	127,300	0.9
Vehicle and Large Equipment Batteries .....	15,000	0.2	18,000	0.2	28,000	0.2

<sup>a</sup>The geographic study area considered in the Walworth County solid waste management plan update is defined as all of Walworth County plus that portion of the City of Whitewater located in Jefferson County.

<sup>b</sup>The quantities listed for this category include solid waste generated by the seasonal residents, in the estimated amounts of 2,750, 2,594, and 4,155 tons per year, under the existing 1992 conditions, the recommended future conditions, and the high-growth decentralized future conditions, respectively.

<sup>c</sup>The quantities listed for this category include solid waste generated by the seasonal residents, in the estimated amounts of 220, 930, and 1,490 tons per year, under the existing 1992 conditions, the recommended future conditions, and the high-growth decentralized future conditions, respectively.

<sup>d</sup>All waste tires and vehicle batteries generated in the study area are estimated to be recycled or reused.

Source: Wisconsin Department of Natural Resources, and SEWRPC.



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## Chapter IV

# GENERAL DESCRIPTION AND EVALUATION OF POTENTIAL SOLID WASTE MANAGEMENT SYSTEMS

## INTRODUCTION

This chapter describes solid waste management options potentially applicable for use in Walworth County. As noted in Chapter I, the consideration of management alternatives under this plan reevaluation is to focus on residentially generated wastes and is to include options for material recycling, yard waste recycling, toxic and hazardous household waste management programs, and public education. Consideration of landfilling and incineration are discussed in Chapter VIII. The alternative management options considered have been designed to meet the solid waste management objectives set forth in Chapter I.

The first section of this chapter describes the regulatory framework under which any plan must be developed. The next four sections of the report describe the various solid waste management options which may be considered in developing alternative material recycling, yard waste composting, household toxic and hazardous waste collection and disposal, and public education programs, and identifying those options suitable for a more detailed evaluation. The last section of this chapter consists of a summary of the options considered potentially viable for use in Walworth County. The applicable options are further considered in the next three chapters, which describe and evaluate more detailed alternatives for each of the solid waste management functions considered: material recycling, yard waste recycling, and household toxic and hazardous wastes collection and disposal.

## REGULATORY FRAMEWORK FOR ALTERNATIVE PLANS DESCRIPTION

An understanding of the regulatory framework for solid waste management is essential in considering alternative solid waste management systems. The State Statutes reaffirm the State's commitment to reduce the volume of discarded items by providing the following prioritized list of waste management options in order from most to least desirable: 1) reduce, 2) reuse, 3) recycle, 4) compost, 5) incinerate with energy

recovery, 6) dispose on land, 7) incinerate without energy recovery.

The State of Wisconsin recycling initiative became law on April 27, 1990, with the passage of Act 335, known as "The Recycling Law." The intent of this act is to "establish programs and regulations that reduce the amount of municipal solid waste disposed in landfills and burned without energy recovery in the State and thus protect the public health and welfare and the environment" (Act 335, Section 1.3). Act 335 established Chapter 159 of the State Statutes, which promotes reduction in the amount of waste generated and deposited in Wisconsin landfills.

Section 159.09 of the State Statutes provides for the establishment of responsible agencies, or units, to handle local recycling activities. A "responsible unit" is defined as a municipality except where a county board of supervisors has adopted a resolution designating the county as a responsible unit. A county may adopt such a resolution at any time. However, within 90 days of adoption of a county resolution, any municipality within the county may retain responsible unit status by adopting a resolution so indicating.

Furthermore, the governing body of a responsible unit may designate by contract another unit of government to be the responsible unit. The contract must cover all duties of a responsible unit, including enforcement. Historically, Walworth County has been involved in the recycling and other solid waste management efforts within the County. However, the County is not the responsible unit and has not been designated by contract by any municipality to be the responsible unit. In addition to establishing responsible units to handle local recycling activities, the State provided for responsible units to receive grants from the State to help the responsible units pay the costs incurred in operating the required recycling programs.

In order to be exempt from the 1995 restrictions prohibiting the disposal of recyclable materials in landfills or by incineration and in order to continue to be eligible for grant funding, a

Table 29

## STANDARDS FOR COLLECTION OF RECYCLABLES

Type of Recyclable	Collection Standards			
	Pounds Per Capita per Day		Pounds Per Capita per Year	
	Rural Municipalities	Other Municipalities	Rural Municipalities	Other Municipalities
Newspaper . . . . .	0.099	0.129	36.0	47.0
Corrugated Paper . . . . .	0.016	0.019	6.0	7.0
Magazines . . . . .	0.019	0.025	7.0	9.0
Aluminum . . . . .	0.004	0.005	1.4	1.8
Steel and Bi-metal . . . . .	0.019	0.025	7.0	9.0
Plastic Containers . . . . .	0.011	0.013	4.0	5.0
Glass . . . . .	0.060	0.079	22.0	29.0
Foam Polystyrene Packaging . . . . .	0.001	0.001	0.3	0.4
Total	0.229	0.296	83.7	108.2

NOTE: Rural municipalities are those with a permanent population density of 40 persons per square mile or fewer. For purposes of NR 544, municipalities that do not meet that population criterion fall into the other category.

Source: Wisconsin Department of Natural Resources and SEWRPC.

responsible unit must develop an effective recycling program. Proposed Chapter NR 544 of the Wisconsin Administrative Code, also known as the "Effective Recycling Program Rule," will establish criteria which a recycling program must meet by 1995 in order to be approved as "effective." The rule will most directly affect local units of government that are responsible units for recycling and will establish new requirements for those who collect and transport recyclable materials and for those who own or operate material recovery facilities (MRFs) which serve responsible units. As this rule is currently drafted, beginning in 1995 only communities with effective recycling programs may have access to Wisconsin landfills and incinerators. The Rule is only proposed at this time and may be modified prior to approval by the Legislature.

In order to meet the requirements of draft Chapter NR 544 and have an approved effective recycling program, a responsible unit's recycling program must have the following components and provisions:

- A recycling ordinance to require recycling of the banned materials from all residential and nonresidential buildings and facilities;
- An information and education program to address recycling at residential and nonresidential building and facilities;

- A provision for the collection, processing, and marketing of recyclables from single-family and two- to four-family residences;
- By January 1995, municipalities with populations of 5,000 or over must provide at least monthly curbside collection of separated recyclables from single-family and two- to four-family residences and municipalities with populations under 5,000 shall provide either a curbside or drop-off collection system or a combination of services for the materials banned in 1995;
- Starting in 1997, collection of eight recyclable materials must meet the minimum collection standard established in the rule, as shown in Table 29;
- Equipment and staff necessary to operate and enforce the program;
- Volume-based fees for solid waste services unless the responsible unit is recycling at least 25 percent of the waste collected in the region;
- In all collection systems, the recyclable materials must be collected separately from refuse, but may be commingled in one bin, bag, or compartment;

- A report on program results will be required annually, beginning with the calendar year 1995, and due April 30, 1996.

As of June 1993, consideration is being given to refining the language in the draft of NR 544 to include provisions whereby a responsible unit with an effective recycling program may request a variance from the requirements to collect a specific recyclable material and for the Wisconsin Department of Natural Resources (DNR) to grant such a variance for up to one year if the cost of selling processed material exceeds either \$40 per ton or the cost of landfilling that material. In addition, the Department may, on its own initiative, grant a variance to the recycling requirements and disposal bans to one or more responsible units.

Alternative solid waste management systems considered in this report are designed to be in conformance with the local, State, and Federal regulations in order to be eligible to continue receiving State grant funding of recycling programs and to be exempt from landfill bans.

In addition to State-mandated regulations on responsible units, the State is also developing requirements that mandate businesses to use recycled materials. Chapter NR 546 of the Wisconsin Administrative Code, requires that Wisconsin publishers of newspapers and advertising printed on newsprint meet minimum recycled content requirements for newsprint or pay fees. These recycled content requirements are proposed at the following percentages: 10 percent in 1992 and 1993, 25 percent in 1994 and 1995, 35 percent in 1996 and 1997, 40 percent in 1998 and 1999, and 45 percent in 2000 and thereafter.

In addition to the grant program for responsible units of government noted above, the Wisconsin DNR has a waste reduction and recycling demonstration grant program available to municipalities, public entities, businesses, and nonprofit organizations for innovative waste reduction and recycling pilot projects with the potential to develop technologies and systems that will increase recycling activities Statewide and improve markets for recyclables. In addition to the State providing financial assistance to responsible units, the State's recycling initiative includes State agency programs emphasizing

ing recycling information, education, and technical assistance for locally-managed recycling programs.

## SOLID WASTE MANAGEMENT TECHNIQUES: GENERAL DISCUSSION

A general description of the various methods and management techniques which are currently being employed in Walworth County, the State of Wisconsin, and throughout the country, for material recycling, yard waste recycling, household toxic and hazardous waste management, and public educational efforts provides a useful introduction to the consideration of alternatives. On the basis of such a description, various waste management system alternatives can be identified, considered, and evaluated. The subsequent four sections of this chapter describe the various solid waste management functions and the techniques available to perform each function. The subsequent sections also identify those techniques which are considered applicable within Walworth County and which are to be considered further in the evaluation of more detailed alternative plans.

Many of the management techniques described in this section are interchangeable between solid waste types or are generally applicable to more than one waste type. The educational efforts, of course, should encompass all of the types of waste. In this respect, yard waste composting is often considered part of a material recycling program. Each of the different techniques which can be used to manage each type of waste is described. Where the techniques apply to more than one type of waste, this is noted under the description of each of those waste types.

## MATERIAL RECYCLING MANAGEMENT TECHNIQUES

Material recycling management techniques include options for pre-collection, source-separation and storage, collection, transfer, transportation, processing, and marketing.

### Pre-Collection, Source-Separation, and Storage

Pre-collection of solid waste materials refers to the methods used by generators of solid waste to manage these wastes prior to collection. There are some recycling programs currently in operation which do not require waste generators to



separate recyclables from other refuse prior to collection. These programs employ various techniques for separating and recovering recyclable materials from the nonseparated waste stream at material recovery facilities, often referred to as dirty MRFs. These techniques generally employ high-tech equipment and are costly, the resulting separated materials are difficult to market and dispose of and the revenues from selling recyclable materials recovered from MRFs is considerably lower than other methods, primarily because of the contamination of the recyclables by the other components of the waste stream. Therefore, these types of facilities are not considered further in this report.

The source-separation of waste products that can be recycled is a growing practice. Source-separation is defined as the setting aside, or division, of solid wastes into recoverable recyclable waste materials and nonrecoverable refuse fractions at their point of generation, such as the home, prior to collection. Source-separation may involve the division of recyclables into two categories, newsprint and other commingled recyclables, including glass, plastic, aluminum, and other metals. Alternatively, further division of the recyclables may be done by separating and storing each type of recyclable. The objectives of source-separation include: aiding in the recovery of recyclable waste, thereby reducing the amount of wastes being landfilled, reducing contamination of these materials, increasing the worth of the waste materials, decreasing processing costs, and allowing control of the types of recyclable wastes collected for processing. Source-separated recyclable materials generally consist of paper, glass, plastic, and cans and other metals.

Source-separation does require more effort and handling on the part of the waste generator by way of removing contaminants from the recyclable material by cleaning or rinsing the remaining residues from the materials and recyclable containers and storing the materials prior to collection. This facet of recycling has been fostered through public education and is expected to continue to become more acceptable and commonplace as recycling programs becomes a more substantial part of solid waste management systems and public educational efforts continue.

The source-separated materials and the refuse materials require pre-collection storage. Pre-collection storage of solid waste may be defined as the temporary holding of these materials in containers prior to either collection at curbside or deposition at community drop-off centers. There are many different types and sizes of pre-collection storage containers, many uses and applications, and advantages and disadvantages for each type of container. The different types of pre-collection storage containers and their use for nonrecyclable wastes were described in the original Walworth County solid waste management plan report and will not be repeated here. Only containers for pre-collection storage of recyclable wastes are considered in this report, inasmuch as there have been major changes in the concepts and use of such containers since preparation of the initial plan.

The most common type of storage container used in the single- and two-family residential curbside recycling programs in Walworth County is the 14- to 18-gallon rigid plastic recycling bin, examples of which are shown in Figure 13. These containers are lightweight, durable, and easily maintained. Each household served by a municipal curbside recycling program is usually supplied with one recycling bin through the program. The use of recycling bins has become general practice in curbside recycling programs in Walworth County and throughout the country. Recyclable materials are usually stored commingled in these containers, with the exception of certain items, such as newspaper, which are segregated by binding or sacking in paper grocery bags. These bins allow easy inspection for contamination and undesigned materials by the collection staff, and also allows them to further separate the recyclable materials by type before loading into compartmentalized collection vehicles if desired, thereby gaining some initial quality control of the recyclable waste stream. There are other residential recycling programs which use multiple smaller recycling bins to provide options for more source-separation at curbside.

Plastic and paper bags are also used in recycling residential wastes. In some communities, special colored or clear plastic bags are used for storage of recyclables, which are then collected separately or at the same time as other nonrecyclable solid wastes. Bags have been used in curbside programs outside Walworth County. However, because of glass breakage, less quality control,

Figure 13

### CURBSIDE COLLECTION OF RECYCLABLES



Source: *MSW Management*, July-August 1992, and *SEWRPC*.

and expensive debagging at processing centers, with the exception of paper-bagged newspaper, they are not given further consideration for Walworth County curbside recycling. Bags are, however, the most common storage container used in Walworth County residential drop-off recycling programs because of their low cost and their convenience for residents. After recyclables have been transported to the drop-off station, they should be debagged by the residents or drop-off center attendant. The recyclables can be separated by type before deposit in the drop-off container and inspected by the attendant, offering a level of initial quality control comparable to curbside programs.

Multi-family residences of two- to four-family units typically use either of the recycling containers described above, depending on the collection system, or they may use a larger, rigid recycling bin, usually covered, and shared by the units. Roll-off type containers, which are designed for receiving both recycled and unrecycled waste, are also used for multi-family units.

As already noted, the types of pre-collection storage containers to be used is dependent on the type of collection system provided and the type of waste generator being serviced. In Walworth County this function is expected to continue to be dominated by the private collector operations, and decisions on the type of system can best be

made by the private operators and at the local level of government, considering costs, labor, and environmental concerns. Thus, specific evaluations of alternative pre-collection storage techniques were not further considered under this study. Rather, the alternatives considered were all assumed to incorporate pre-collection storage similar to the existing systems, including source-separation as dictated by the type of collection and processing system provided for under each alternative.

#### Collection

Collection may be defined as the removal of solid wastes from the pre-collection storage point at either the place of generation or at the drop-off site. The collection operation begins when the collection vehicle leaves its overnight parking location and includes all time spent on the route. The collection operation and the transportation operation, or haul, are directly related. The transport or haul operation begins when the collection vehicle departs for the processing site from the last loading point. It includes the time spent at the processing site and the time spent after leaving the processing site to return to the first container on the next collection route or its overnight parking location. The purpose of these operations is to gather the recyclable solid waste from the pre-collection storage locations and bring it to a site or facility for processing or



disposal. Transportation of recycled waste materials also includes the transportation of these materials to market after processing or after storage at a transfer location or drop-off center.

There are two different types of recyclable collection systems currently being used in Walworth County: the curbside and drop-off recycling collection systems. As discussed in Chapter II, 25 of the 27 local municipalities designated as responsible units for recycling in Walworth County had recycling programs operating in 1992, with 10 communities providing curbside service and 15 communities providing drop-off service. In 1993, all 27 communities had recycling programs, with the Town of Bloomfield providing curbside collection service and the Town of Walworth providing drop-off collection service. Also, one other community, the Village of Genoa City, has converted from a drop-off program to a curbside program, thus bringing the total of communities providing curbside recycling service to 12, or about 53 percent of the County population. Some 15 communities provide drop-off service. For the purpose of describing alternative plans, it was assumed that three more communities, the City of Delavan and the Villages of Fontana and Williams Bay, will convert to curbside collection service early in the planning period. This will mean a total of 15 communities providing curbside recycling service to about 66 percent of the County population, with 12 communities providing drop-off service to the remaining 34 percent of the County population. In addition, it is possible that Walworth County communities may convert to curbside recycling programs in the future in an effort to provide the residents with more convenient collection and meet more stringent governmental solid waste regulations.

**Curbside Collection:** Curbside collection is a method whereby the pre-collected recyclable wastes, stored in the pre-collection containers, are set out at the side of the street or alley by the waste generator and are collected from this point by a collection crew operating a collection vehicle, as shown in Figure 13. The collected recyclables are transported to either a transfer station, processing facility, or directly to market. There are many types of collection vehicles, including some that are automated and have electronic scales for weighing the wastes at each point of collection, while others offer very little

or no automation. The collection vehicles can have multiple compartments for source-separation by recyclable type at curbside, while others have only dual or single compartments. Each type of vehicle has different crew requirements and has advantages and disadvantages, depending on the recycling program being used. The collection vehicles used in Walworth County offer little or no automation, but are often compartmentalized. Curbside collection programs are best suited for use in urban areas and have several advantages, such as convenience to residents, higher resident participation resulting in more waste volume being recovered, better quality control for source-separation and contaminant removal, and higher efficiency. The disadvantages of this type of program include higher costs, less efficiency in rural settings because of the greater distances between stops, and the need for special considerations in the case of the elderly and handicapped.

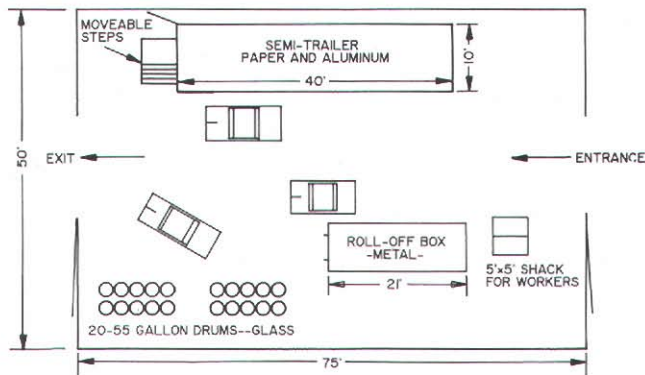
**Drop-Off Collection:** Drop-off collection is a method whereby the waste generator transports the pre-collected recyclable wastes stored in pre-collection containers to drop-off facility, where it is deposited in bulk collection containers for temporary storage. Drop-off facilities may be outdoor, open-air facilities or enclosed within a structure, or a combination of both, as shown in Figure 14. There are different types of bulk collection containers: semitrailers, specialty trailers, metal roll-off containers, "green boxes," holding bins, and 55-gallon drums, as shown in Figure 15, which are used to store the materials until enough material is collected to warrant transportation in bulk to either a transfer station, processing facility, or directly to market. Recyclables are often separated by material type at the drop-off facility and the segregated materials deposited in separate bulk collection containers. Compartmentalized roll-off containers are often used by many of the facilities to facilitate the storage of segregated recyclable materials.

Many facilities are staffed with attendants for better quality control, removal of pre-collection containers, debagging, and offering assistance to residents using the facility. Drop-off collection programs are best suited for use in rural areas and have several advantages: providing rural residents with a recycling program, lowering

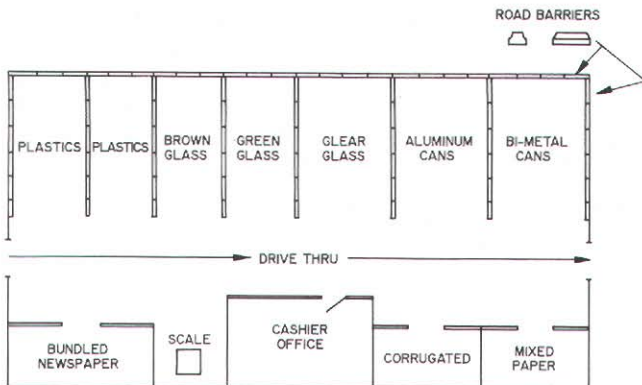
Figure 14

# SCHEMATIC OF RECYCLING DROP-OFF COLLECTION FACILITIES

## OUTSIDE FACILITY



## ENCLOSED FACILITY



## ENCLOSED OUTSIDE FACILITY



Source: Geneva Lake Watershed Environmental Agency; Gershman, Brickner and Bratton, Inc., *Waukesha County, Wisconsin, Recycling Master Plan*, October 16, 1989; and *MSW Management*, October 1993.

program costs because less labor and equipment are needed than for curbside collection, collecting a greater variety of recyclable materials such as waste oil and appliances, and the possibility of staffing the programs with volunteer labor provided by local civic groups. The disadvantages are lower participation and capture rates, resulting in less volume being recovered, less convenience to residents, greater chances for material contamination, and the need to rely on private vehicles for transportation without accounting for energy considerations associated with the operation of those vehicles.

## Transfer

Transfer of recyclable waste material can be defined as the action and facilities used to transfer materials from small collection vehicles or containers to larger vehicles and containers before transporting these materials to a processing facility or directly to market. A transfer station is the location at which the transfer of materials takes place. The purpose of transferring recyclable materials from smaller to larger vehicles and containers is to reduce the cost of the transportation function, generally by not utilizing the collection crew and equipment for transport. Because there are currently active transfer stations used in the County and because the use of these stations can be an effective method of reducing the transportation cost and of improving the marketability of recyclables, the use of such facilities is considered a potentially viable option for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative plans for recyclable materials described in Chapter V.

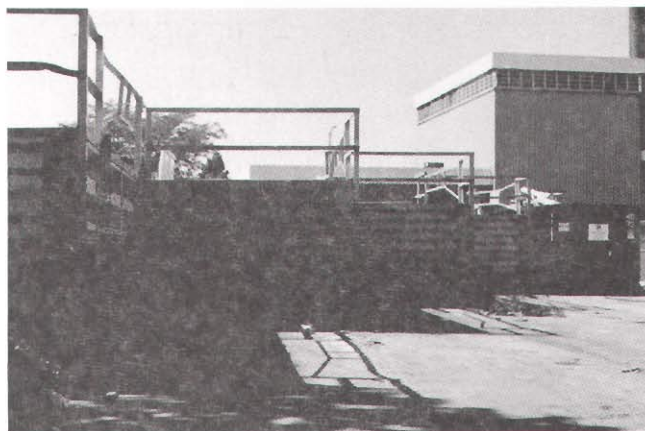
## Transportation

Although transportation of recyclable solid waste occurs both during and following collection, the term is herein defined as the relatively long-distance transport of recyclable waste materials following the time the collection or hauling vehicle leaves the last point of loading bound for a processing facility or material market. The transport operation also includes the time spent at the destination facility and the time to return to the collection route or original location. The purpose of the transportation step is to deliver the recovered recyclable material to the processing facility or material market. The costs associated with the transportation of recyclables is an integral part of any alternative



Figure 15

#### DROP-OFF FACILITY BULK COLLECTION CONTAINERS



Source: SEWRPC.

and has been considered in the design and cost analysis for the detailed alternative plans for material recycling and yard waste recycling described in Chapters V and VI.

#### Processing

Recyclable material processing can be defined as the physical or chemical process used to change the characteristics of solid waste to facilitate recovery, reuse, and deposition. The purposes of processing are to separate the recyclable solid waste stream into material types to improve usefulness, to upgrade the waste material and improve the marketability of waste materials by reducing contamination and processing them to meet market restriction requirements to make them acceptable to market, to improve handling

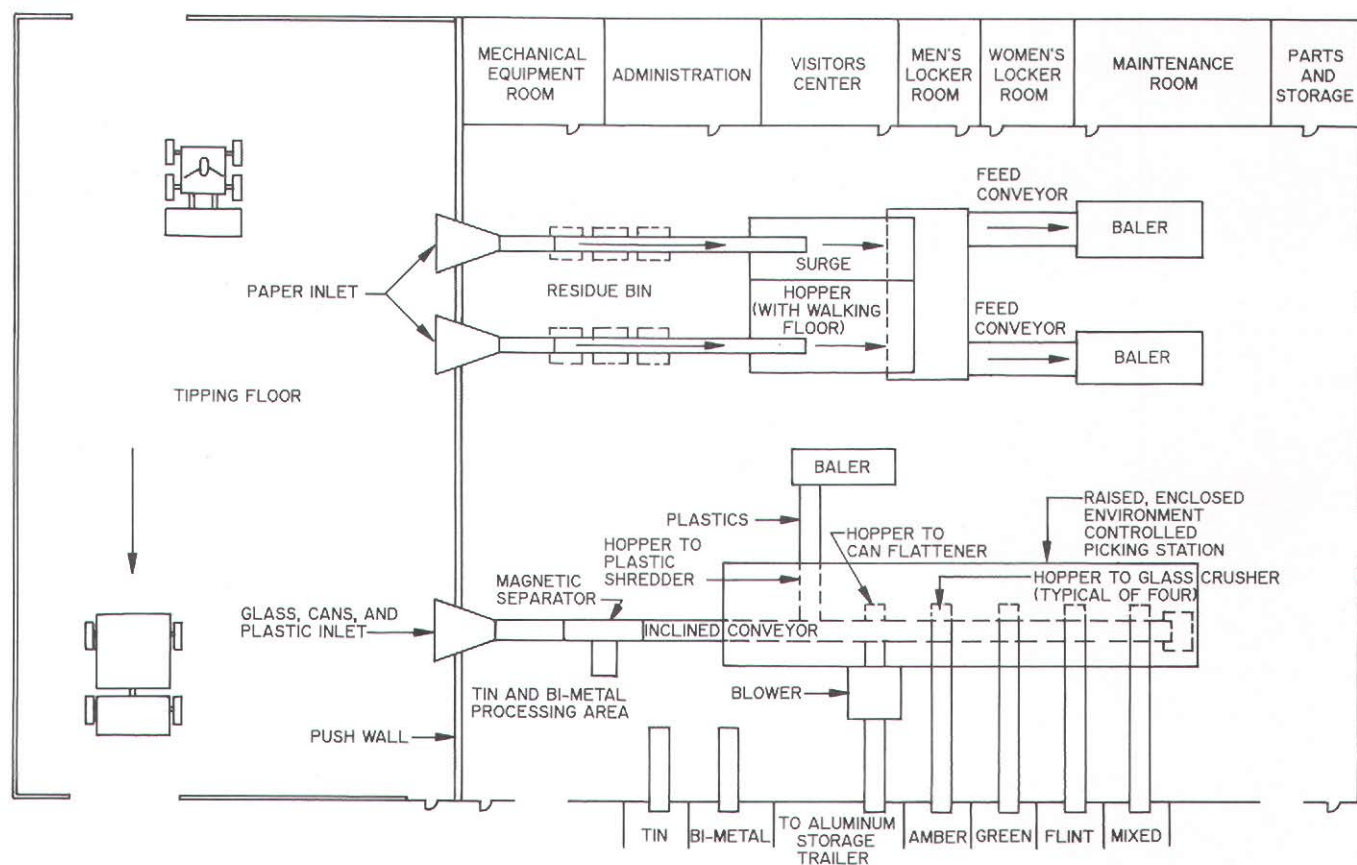
characteristics, to reduce the volume of the material by increasing density, to accumulate larger quantities to transport to market by providing centralized processing and pre-market storage, and to make recyclable end products.

Processing is usually performed at a material recovery facility, examples of which are shown in Figures 16 and 17. Most MRFs process the materials which are first source-separated and collected in two recyclable material incoming fractions, one being paper and one being commingled containers and other recyclables. The facility typically would have raw materials storage for each of the two incoming fractions of recyclable materials, means for separation and processing, storage for finished products,



Figure 16

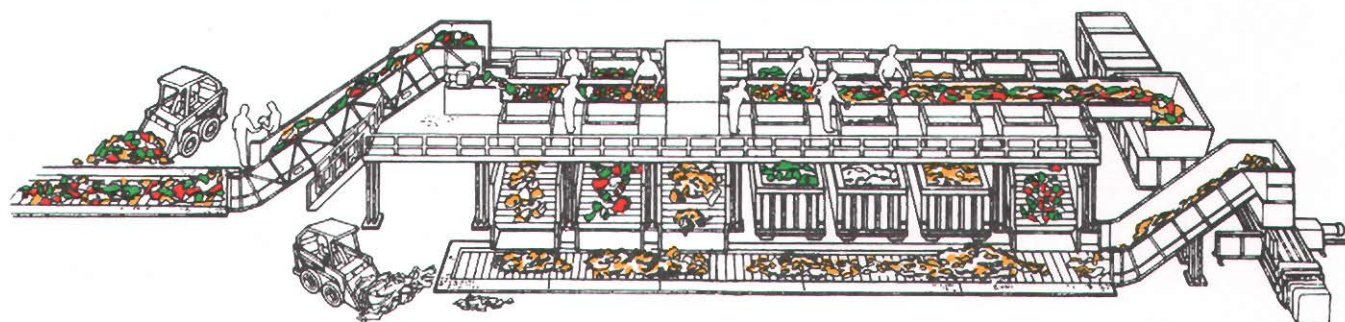
# MATERIAL RECOVERY FACILITY FLOOR PLAN



Source: Gershman, Brickner and Bratton, Inc., *Waukesha County, Wisconsin, Recycling Master Plan*, October 16, 1989.

Figure 17

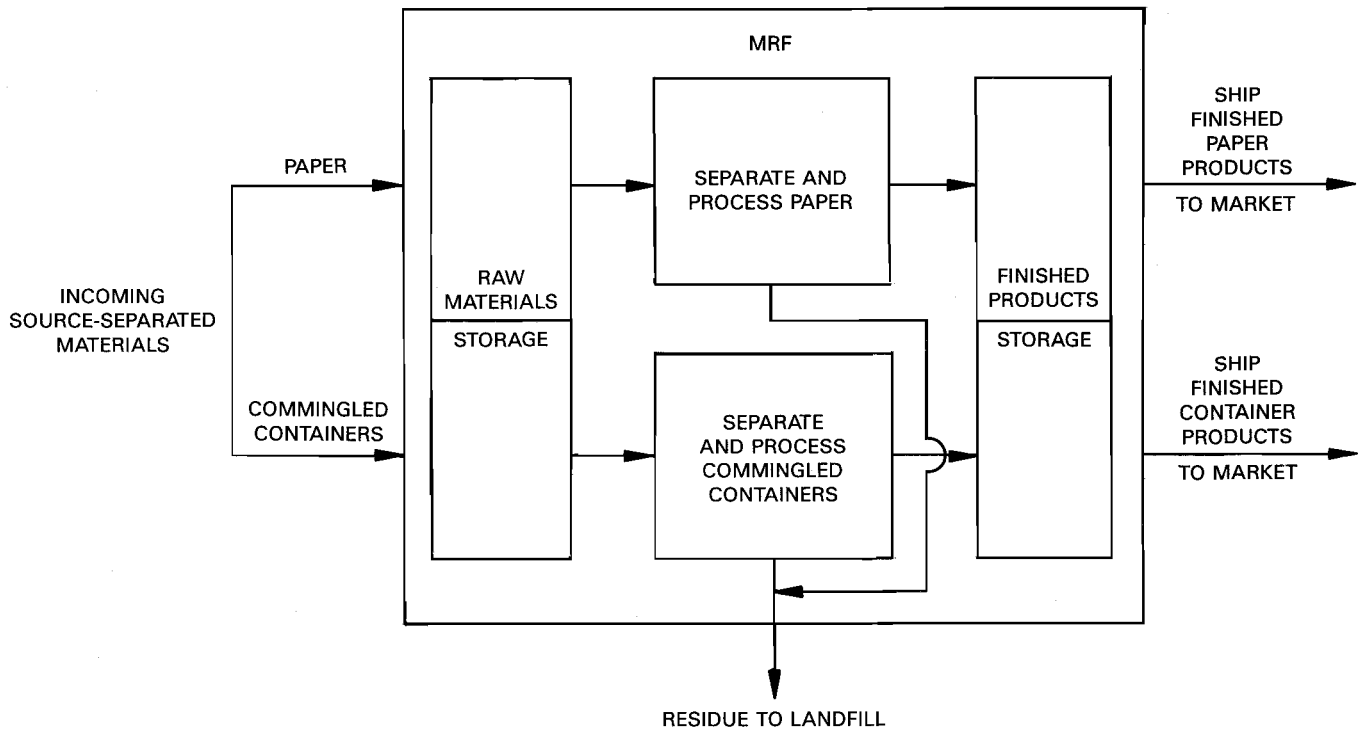
# PROCESSING MATERIALS AT A MATERIAL RECOVERY FACILITY



Source: *Resource Recycling*, March 1982.

Figure 18

MATERIAL RECOVERY FACILITY FLOW CHART



Source: U. S. Environmental Protection Agency, *Material Recovery Facilities for Municipal Solid Waste*, September 1991, and SEWRPC.

and means for shipping the finished products in the most appropriate form. Figure 18 illustrates a generalized flow chart for a typical MRF.

The separation and processing steps required or desired at a MRF are influenced by market requirements, the characteristics of the feedstock, and the economics associated with separation and processing and transportation. The total quantity of materials and the relative percentages of material types and grades or categories will have an effect upon the methods employed for recovery and processing and upon the selection of the equipment to be used to recover and process the various materials. The processing techniques and equipment requirements vary directly with the level to which the recyclable materials are processed. The three levels of processing which are considered in this study are the high, low, and minimal levels of processing.

The level of material recovery is not necessarily higher for high-level processing. In actual

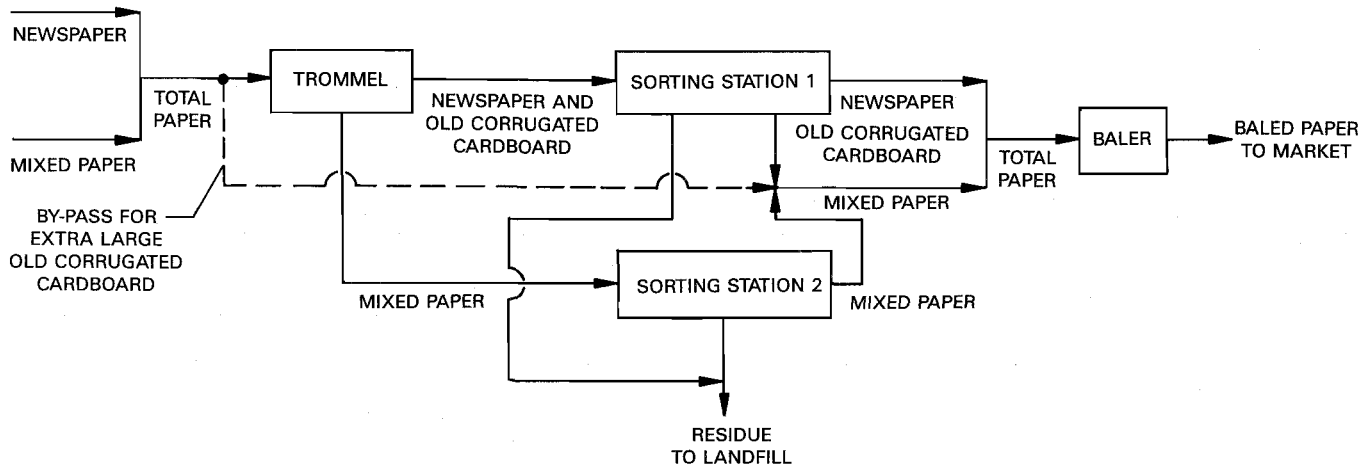
practice, there are many factors which influence the material recovery rate, including market specifications, quality of the incoming material, and type of equipment and facilities. Typical material recovery rates are in the range of 85 to 95 percent of the incoming material.

Even though many of the MRF systems are highly mechanized, there are still many jobs that are best done manually. For example, nearly all the systems presently in use hand-sort glass by color. This approach is still the most reliable way to ensure quality.

**High-Level Processing:** High-level processing includes substantial use of high-tech equipment while minimizing the amount of manual labor to process the materials. A short description of the different types of high-tech processing equipment and their purpose is presented in Table 30. A short description of some of the more common design considerations of high-level systems is presented in Table 31.

Figure 19

FLOW CHART OF PAPER PROCESSING AT A HIGH-TECHNOLOGY MATERIAL RECOVERY FACILITY



Source: U. S. Environmental Protection Agency, *Material Recovery Facilities for Municipal Solid Waste*, September 1991, and SEWRPC.

As previously mentioned, paper is usually handled separately from the other recyclable materials. Large corrugated containers and/or newspaper are separated from mixed paper either manually, or first mechanically with a trommel, which is a negatively inclined rotary cylindrical screen, and then manually. The separated paper containers are then baled and stored for shipment to market. A flow chart of paper processing at a high-level MRF is provided in Figure 19.

Most of the high-tech MRF systems utilize a magnet to separate steel containers from the mixed materials. Once the ferrous material is separated, it can be either shredded or baled, depending upon the market. The remaining fraction then includes the glass, aluminum, and plastics. At this point, mechanical systems can be used to separate the lighter fraction, aluminum and plastics, from the glass. Although research is being done on mechanical separation of glass by color, no mechanical means currently exists to perform this separation properly. Therefore, glass is most often manually separated by color. After the glass is separated, it can be crushed and stored for market. Aluminum cans are normally separated from the mixed materials with such aluminum separating equip-

ment as eddy-current separators. Plastics are normally separated by type manually. These separated materials are then densified and compacted by various types of volume-reduction equipment, and stored for market. A flow chart of commingled container processing at a high-level MRF is provided in Figure 20.

While, theoretically, all the materials coming into a MRF should be recyclable, experience has shown that systems always have some residues. Such residues include contamination mixed with recyclables, some nonrecoverable materials, such as broken, mixed glass in a commingled, source-separated stream, and some materials which cannot be properly recognized by the sorting mechanism used in a MRF. Residues are most often disposed of by landfilling. The amount of residue depends heavily upon the processing efficiency of the facility and is governed in many instances by how well the community has separated its recyclables and by what collection method is used. For example, if residents persist in disposing of nonrecyclable material in the system, then, understandably, the amount of residue increases. Because of the relatively high initial equipment costs and the potential maintenance needs and uncertain reliability associated with the high-tech equip-

Table 30

## RECYCLABLE MATERIALS RECOVERY FACILITY PROCESSING EQUIPMENT

Type of Equipment	Description	Purpose
Infeed Conveyors	Z-shaped moving conveyor belts, which usually start below floor level and elevate materials to a certain height above floor level. Usually of steel, apron-pan construction; may also be either chain-driven rubber belts or rubber slider belts	Move mixed paper and nonpaper material from tipping floor into process area and deposit it onto sorting conveyors or into sorting equipment. Also used to feed sorted materials into the "baler(s)"
Sorting Conveyors	Horizontal moving rubber belts, of either slider or trough-pulley design. Usually mounted on elevated platforms, below which are storage bins, bunkers, or transfer conveyors	Hand-sorters stand on one or both sides of the belt and pull specific materials, which are then dropped/tossed into storage bins or bunkers. Negatively sorted materials are allowed to remain on the belt
Transfer Conveyors	Moving rubber belts, of slider or trough-pulley design	Transport loose, separated materials from the sorting area to processing equipment and processed materials from processing equipment to storage bunkers or trailers
Baling Presses or "Balers"	Machines that compress loose material into dense rectangular blocks or "bales." Typical bale dimensions are 2.5 feet by four feet by five feet. The bale is formed by a moving pressure plate, mounted on a hydraulic cylinder or "ram," which packs the material together inside a closed chamber	Densify recyclables for ease of handling and for more cost-effective shipping
Magnetic Separator	Typically an electromagnet housed in a moving conveyor belt. The device is mounted above a conveyor carrying commingled recyclables. Ferrous metals, e.g., tin cans, are attracted by the magnet and shoveled onto a transfer conveyor by the moving belt	Automatically remove ferrous metals from the commingled materials stream
Eddy-Current Separator	Consists of a short belt conveyor that surrounds the eddy current mechanism. That mechanism contains a rotor with rare earth magnets of alternating polarity. As the rotor spins, it creates a magnetic field, which induces eddy currents in nonferrous metals passing over it. These currents in turn establish a repulsive magnetic force that hurls the metals off the belt at different trajectories from nonmetallics. A splitter-plate divides the two flows	Automatically remove aluminum and nonferrous metals from the commingled materials stream
"Air Classifier" or "Air Knife"	Normally consists of a blower or suction fan and accompanying tubes and chutes. The air jet created by the blower or fan captures or diverts the lighter materials in the stream from the heavier ones	Divide the commingled stream into "lights" (aluminum and plastics) and "heavies" (glass). May also be used to extract paper labels during glass beneficiation processes
Inclined Sorting Table	A proprietary device that consists of an inclined conveyor and a "curtain" of dangling chains that travels along the surface of the conveyor	Used to separate the commingled stream into lights and heavies
Trommel Screen	A cylindrical drum with holes of specific size that rotates about its central axis. "Undersize" material (material smaller in diameter than the holes) falls through the holes and is thus separated from "oversize" material	Most often used to size-classify and remove caps from crushed glass after it is sorted. May also be used to separate lights from heavies, although this application usually results in unacceptably high glass breakage
Vibrating or Oscillating Screen	Flat plates, punched with holes that are mechanically vibrated in one or two dimensions. A similar design is the "finger" screen, which instead of pierced plates employs parallel bars for the screening surface. Undersize materials fall through the holes or between the bars, while oversize material slides across the screening surface	Separates mixed broken glass from the commingled stream. Also sometimes used to size-classify lights for easier sorting or eddy current separation



Table 30 (continued)

Type of Equipment	Description	Purpose
Glass Crusher	Consists of a crushing chamber, with rotating hammers or drums. Many models are sold with attached transfer conveyors and magnetic head pulleys for removal of caps	Increase density of sorted glass by breaking it into small pieces
Can Flattener	Consists of one or two rotating drums or wheels mounted inside a crushing chamber. Most models are equipped with an attached blower and blow-tube, which shoot the crushed cans directly into a waiting trailer	Densify aluminum and/or steel cans for more cost-effective shipping
Can Densifier	Similar in principle to a baler, but produces small, dense blocks called "briquettes." The briquettes are bundled together with steel strapping prior to shipment	Densify aluminum and/or steel cans for more cost-effective shipping
Granulator	Machines which use rotating propeller-like blades to chop plastic bottles into small chips	Densify plastic for more cost-effective shipping, and to prepare it for remanufacturing
Plastic Bottle Perforator	A rotating drum upon which spikes are mounted. The spikes pierce the bottles in multiple locations, thus decreasing their resilience	Make plastic bottles easier to bale. Especially effective on bottles whose caps have been screwed back on

Source: National Solid Wastes Management Association and SEWRPC.

ment for a high-level MRF, such facilities were not considered to be a viable option for use in Walworth County. Accordingly, this option was not used in the design of alternative plans for material recycling described in Chapter V.

**Low-Level Processing:** Low-level processing also includes the use of high-tech equipment; however, the amount of such mechanical equipment is significantly less compared to the high-level MRF discussed above and the amount of manual labor is increased. The amount of mechanical equipment is usually limited to conveyors, a sorting station, and possibly a baler to be used interchangeably for the different material types. A short description of some of the more common design considerations of low-level systems is presented in Table 32.

The paper material processed at a low-level MRF can be moved by an in-feed conveyor to a sorting conveyor and sorting station, or sorting room for separating, or separated manually on the tipping floor. The separated materials can then be moved to a baler and then to storage, or to the transportation system prior to market by using

a transfer conveyor or by rolling stock such as a front-end loader. A flow chart of paper processing at a low-level MRF is provided in Figure 21. Because of the estimated quantity of paper to be processed which is generated by Walworth County and the probable distance between an MRF located in Walworth County and the various recycled paper markets, as well as the relatively low capital and operation cost, the use of a low-tech MRF for paper recyclables is considered a potentially viable option for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans described in Chapter V.

Most of the low-tech MRF systems utilize an in-feed conveyor, a sorting conveyor, and one sorting station for manual separation of commingled containers. Some systems, depending on the quantity of metal cans, employ magnetic separation and two sorting stations. Most low-tech MRFs store separated containers loose in piles, bins, or containers, before shipment to market. A flow chart of commingled container processing at a low-tech MRF is provided in Figure 22. On the basis of the estimated quantity

Table 31

## COMMON DESIGN CONSIDERATIONS OF HIGH-TECHNOLOGY MATERIAL RECOVERY SYSTEMS

Item	Paper	Commingled Containers	Ferrous (bi-metal)	Ferrous (tin cans)	Aluminum	Plastic (PET)	Plastic (HDPE)	Glass
Basic Feedstock	Mixed wet and dry paper, including newsprint and corrugated containers	Tin, bi-metal, and aluminum cans, plastic and glass containers, and contaminants	--	--	--	--	--	--
Tipping Floor or Special Station	Hand-pick old corrugated containers and contaminants assisted by a grapple and/or front-end loader	Hand-pick contaminants	--	--	--	--	--	--
Infeed Conveyor	Grapple or front-end loader	Hand-pick contaminants, magnetic separator for ferrous	--	--	--	--	--	--
Trommel	Separates oversize old corrugated containers and/or newspaper from mixed paper	--	--	--	--	--	--	--
Sorting Conveyor (or room)	Hand-pick remaining old corrugated containers, magazines, high-grade and mixed paper, etc.	--	--	--	--	--	--	--
Interim Storage	Accumulated in bins or bunkers before being selectively conveyed to baler	--	--	--	--	In overhead hoppers	In overhead hoppers	--
Preparation for Shipping	Auto-tie baler	--	--	--	--	--	--	--
Finished Product Storage	Stacks or bales on processing floor or stacked in transport vehicle	--	--	--	--	--	--	--
Screen	--	Broken glass recovered as undersized materials	--	--	--	--	--	--
Traveling Chain Curtain	--	Separate aluminum and plastic from glass	--	--	--	--	--	--
Sort	--	--	Manual separation of tin cans and bi-metal (if required)	Manual separation of tin cans and bi-metal (if required)	--	Manual sort of PET, HDPE, other	Manual sort of PET, HDPE, other	Optical automatic sort or hand sort by color
Bale	--	--	With auto-tie baler	With auto-tie baler	--	--	--	--
Briquette	--	--	With can-densifier and palletize	With can-densifier and palletize	--	--	--	--
Shred	--	--	--	With can-shredder	--	--	--	--

Table 31 (continued)

Item	Paper	Commingled Containers	Ferrous (bi-metal)	Ferrous (tin cans)	Aluminum	Plastic (PET)	Plastic (HDPE)	Glass
Air Classify	--	--	--	To remove labels	--	--	--	--
Store	--	--	In stacks on processing floor, outdoors, or in a transport vehicle	Convey shredded cans to outside transport vehicle, or in bales or briquettes in stacks on processing floor, outdoors, or in a transport vehicle	--	In overhead hopper	In overhead hopper	--
Separate	--	--	--	--	Eddy-current apparatus separates aluminum from plastic	--	--	--
Flatten	--	--	--	--	With can-flattener	--	--	--
Perforate	--	--	--	--	--	Drop from overhead hopper or pneumatically convey to perforator	Drop from overhead hopper or pneumatically convey to perforator	--
Granulate	--	--	--	--	--	--	Granulated in gaylords on processing floor before loading into transport vehicle	--
Crush	--	--	--	--	--	--	--	To meet market specifications
Upgrade	--	--	--	--	--	--	--	Remove paper labels, metal lids, and other contaminants by trommel and/or as classifier
Store	--	--	--	--	Pneumatically convey to outside transport vehicle	--	--	--
Bale	--	--	--	--	With auto-tie baler	Mechanically or pneumatically convey from hopper to auto-tie baler	Mechanically or pneumatically from perforator to auto-tie baler	--
Briquette	--	--	--	--	Compress in densifier and palletize	--	--	--
Store	--	--	--	--	In stacks or bales on processing floor or outdoors in transport vehicle	In stacks or bales on processing floor or outdoors in transport vehicle	In stacks or bales on processing floor or outdoors in transport vehicle	In bunkers for loading by front-end loader or in overhead bins for selectively conveying to transport vehicles

Source: U. S. Environmental Protection Agency and SEWRPC.

### FLOW CHART OF COMMINGLED CONTAINER PROCESSING AT A HIGH-TECHNOLOGY MATERIAL RECOVERY FACILITY



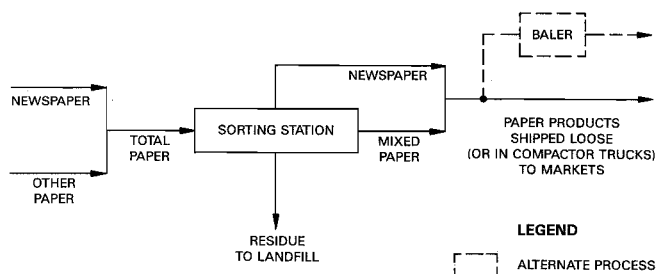
## COMMON DESIGN CONSIDERATIONS OF LOW-TECHNOLOGY MATERIALS RECOVERY SYSTEMS

*Source: U. S. Environmental Protection Agency and SEWRPC.*



Figure 21

### FLOW CHART OF PAPER PROCESSING AT A LOW-TECHNOLOGY MATERIALS RECOVERY FACILITY



Source: U. S. Environmental Protection Agency, *Material Recovery Facilities for Municipal Solid Waste*, September 1991, and SEWRPC.

of commingled containers generated by Walworth County to be processed, as well as the relatively low capital and operation costs, the use of a low-tech MRF for mixed containers is considered a potentially viable option for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans described in Chapter V.

**Minimal-Level Processing:** Minimal-level processing does not include the use of any high-tech mechanical equipment and also minimizes the amount of manual labor used to process the materials. The main purpose of processing at this level is to accumulate larger quantities to transport and provide pre-market storage. The source-separated incoming recyclable materials are unloaded from the compartmentalized vehicles and/or roll-off containers, by material type, into pre-market storage containers, which most often are also used for the transportation of the recyclables to market. Only minor reduction of contamination is performed and volume reduction is rarely done. This level of processing relies heavily on a high degree of source-separation and decontamination by the waste generators, collection crews, and drop-off facility attendants. There is less separation of materials on this level than on the other two levels and many times the materials may be somewhat commingled. For example, glass may not be separated by color and aluminum and metal cans may be stored together. The markets that accept materials from this type of processing must usually further

process the material to meet the material specifications of the end-use markets. Because of the distance between the markets and the recyclable collection points in Walworth County plus the relatively low cost of the minimal-level processing facility, the use of such a facility is considered a potentially viable option for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans described in Chapter V.

### Markets

The existence of adequate markets for all of the materials collected is essential to an effective recycling program. Regional market locations for recyclable materials are described in Appendix B. Many communities have experienced problems in their recycling programs due to the faltering of one or more markets. In these cases, materials separated out have been put into storage, and in some cases landfilled. Successful recycling, therefore, depends, in part, upon market conditions.

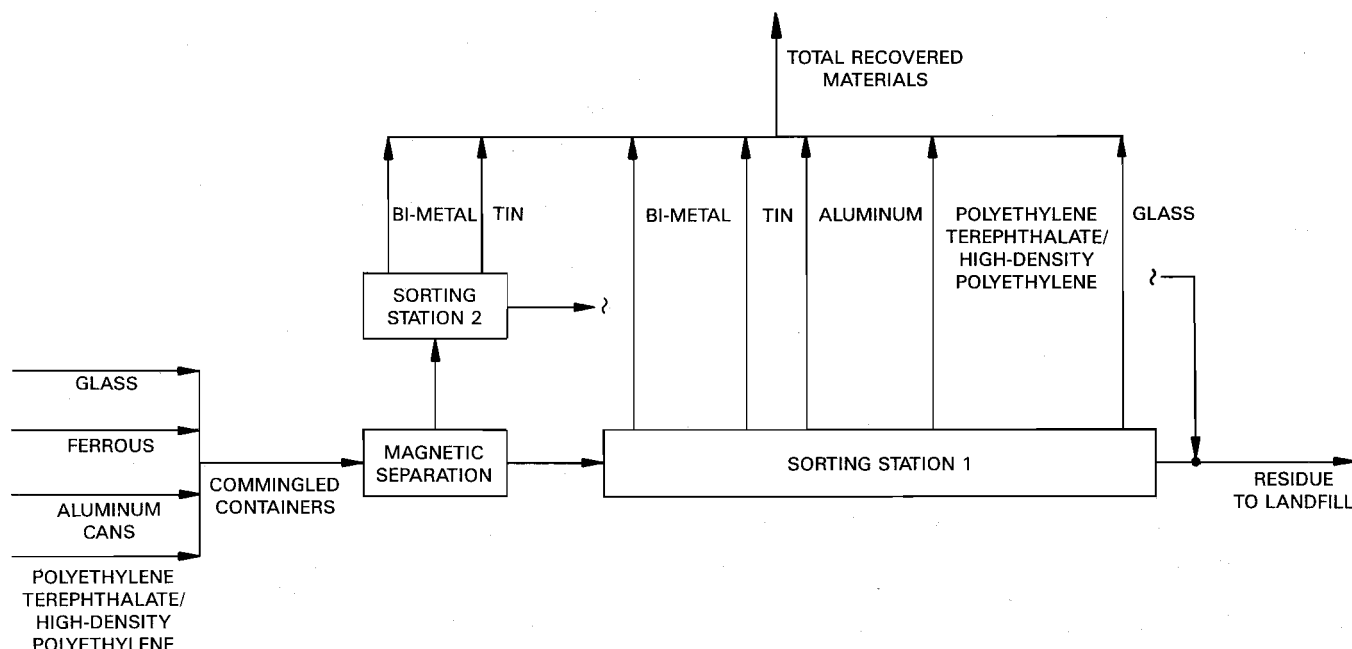
Many material markets for recyclables are well established. However, prices in the marketplace fluctuate because of world events, international economics, national recessions, state-mandated recycling programs, and market development efforts contribute to an ever-changing supply and demand for recyclable materials. The recent history of the average prices paid for recyclables across the nation indicates that there is an oversupply of some materials and an industry preference for virgin materials affecting others. In the midwestern markets available to Wisconsin, and, more specifically, Walworth County, recyclers reflect this national trend as the prices for recyclable materials have generally declined or remained stable. Figure 23 illustrates recent market trends in prices paid for several recyclable material categories.

Prices for old newspaper declined significantly in 1989 and remained low into 1993. The prices paid for newsprint during the first semester of 1993 ranged from \$0 to \$20 per ton. For planning purposes, a value of \$10 per ton is considered reasonable.

Prices for used aluminum beverage cans declined after a peak in late 1990 and early 1991 as virgin aluminum fell on worldwide markets and the supply of secondary aluminum

Figure 22

FLOW CHART OF COMMINGLED CONTAINER PROCESSING  
AT A LOW-TECHNOLOGY MATERIALS RECOVERY FACILITY



Source: U. S. Environmental Protection Agency, *Material Recovery Facilities for Municipal Solid Waste*, September 1991, and SEWRPC.

increased. In 1991, the nationwide price leveled off somewhat and appears to be stabilizing. During the first half of 1993, the range of prices for aluminum was \$500 to \$760 per ton. For planning purposes, a value of \$600 per ton is considered reasonable.

In 1991 and into 1992, green glass was in oversupply because of a steady stream of imported beverages and the fact that some users have refused to take new suppliers or are no longer taking any green glass from the previous suppliers. Prices for clear and brown glass have generally fallen also, but users are still buying the material. Green glass prices in 1991 to 1993 were generally equal to the price of raw materials for the users and may not fall further in the near future. For planning purposes, a value of \$15 per ton for clear and brown glass and \$5.00 per ton for green glass is considered reasonable.

In early 1991, the prices paid for plastics fell. In 1992 prices for plastics have stabilized somewhat, but some end-users are no longer willing to pay for transportation, effectively lowering

prices further. Increased supplies of all plastics may continue to lower prices, although market development for plastics recycling may offset the added supply. For planning purposes, mixed plastics were assumed to have a cost of \$10 per ton for recycling, while high-density polyethylene (HDPE) and polyethylene terephthalate (PET) plastics were assumed to have a value of \$80 per ton.

Another important component of a successful recycling program is understanding what the recycling program has to produce in order to market the material. An understanding of exactly what materials are to be collected and separated, the condition they must be in, and the contaminants that are not allowed must be acquired by people from the program manager all the way down to the waste generating residents. In the past, clean recyclables brought a higher price; contaminated recyclables, or what could be called less-than-quality material, brought a lower price. End-users in the market for low-quality recyclables paid the lower price and loads were rarely completely rejected. The nature of secondary-

material markets has changed. With the supply of all recyclable materials increasing, end-users are now able to demand the highest quality materials available and reject material with contaminant levels they once accepted. Also, markets have requirements for the form in which they receive materials, such as baled or loose, and many markets have minimum quantities which will be accepted. These requirements can dictate the types of processing equipment that recyclers must use. Therefore, a clear understanding of market specifications must be acquired and constantly renewed.

There are several different types or levels of recyclable material markets. Generally a recycling, or secondary-materials, market is created by businesses which purchase or accept a recyclable commodity and remanufacture that material into a recycled product. This type of "buyer" is often referred to as an end-use market, or manufacturer. There are four types of businesses which perform intermediate services to collect, process, and ultimately sell recyclables to end-use markets. These are commonly categorized as collectors or refuse haulers, processors, brokers, and converters.

Collectors, or refuse haulers, typically run businesses that have expanded their solid waste collection activities to collect recyclable material from residents and/or businesses as well. Refuse haulers typically charge a fee for their recyclable collection service. The charge may be lower or eliminated if recyclables are sorted or separated. Most will accept unprocessed recyclables, either source-separated or commingled. These materials are marketed to an intermediate material handler or an end-user market. Since collectors or haulers generally do most of their business locally, they may be the market of choice, especially for small communities that do not produce large quantities of recyclable waste materials. Small haulers may participate in a cooperative marketing organization because of their relatively small volumes.

Processors generally accept and process recyclables from residential or business sources. This category includes private buy-back centers and privately or publicly operated material processing facilities. Revenues available from processors are generally low and often a tipping fee is charged. Specific processing of recyclables delivered to processors is usually not required, as

they in turn process the recyclable material. These markets sell to other intermediate markets or end-use markets.

Brokers buy and sell recyclable materials, often arranging to have them shipped from one location to another by waste haulers or processors. Depending on the situation, some brokers provide processing service, while others will purchase only processed recyclable material. Brokers generally sell to converters or to end-use markets and are often able to provide better revenues because they accumulate and sell large quantities of materials. Brokers most often prefer to purchase semitrailer loads of recyclables.

Converters are companies which take recyclable materials, in raw form, and alter the form of that material so it is readily usable by a manufacturer. An example of a converter is a company which produces pulp from wastepaper for use by a paper mill.

End-users, or manufacturers, are companies which purchase recyclable materials from a number of sources and remanufacture those materials into new products. They generally only deal in semitrailer loads, and most often purchase material from regular suppliers, those recyclers able to produce numerous semitrailer loads monthly. However, some specialized end-users, such as animal bedding manufactures, often accept smaller quantities. End-users typically pay a premium price for recyclable materials unless they have to clean or process them.

On the basis of the foregoing description of the recyclable market business, certain market conditions must be considered for any recycling program. Preparation and separation requirements are usually the most flexible with waste haulers and become increasingly more stringent with processors, brokers, converters, and manufacturers. Accordingly, revenues offered are generally lowest from waste haulers and increase for processors, brokers, converters, and manufacturers. Costs for preparing the recyclables, contrariwise, usually decrease in that same order.

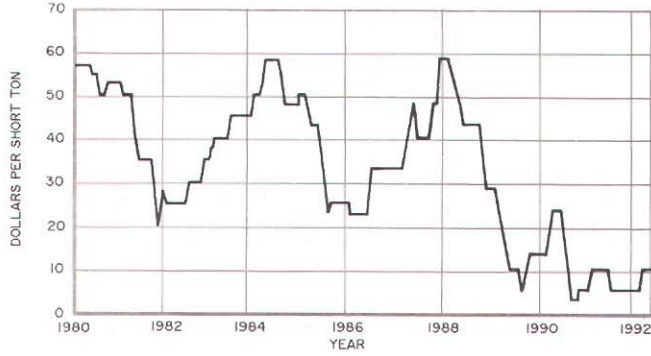
## YARD WASTE RECYCLING

Yard waste recycling is usually achieved by two distinct programs: composting of most small organic materials and chipping and/or mulching most large organic materials such as tree

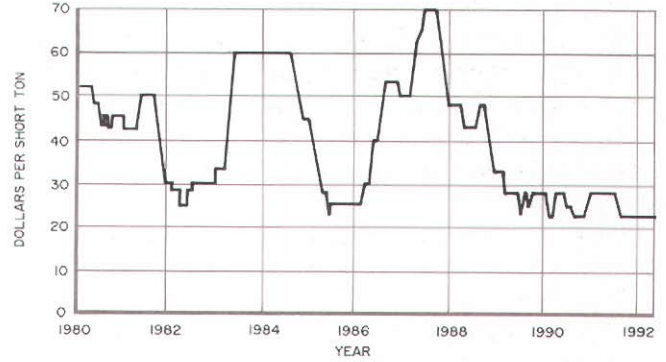
Figure 23

TRENDS IN MARKET PRICES PAID FOR SELECTED RECYCLABLE MATERIALS

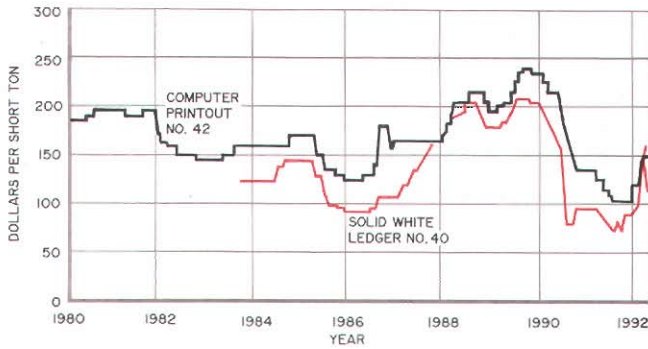
#6 NEWS BUYING PRICE, CHICAGO AREA  
F.O.B. SELLER'S DOCK



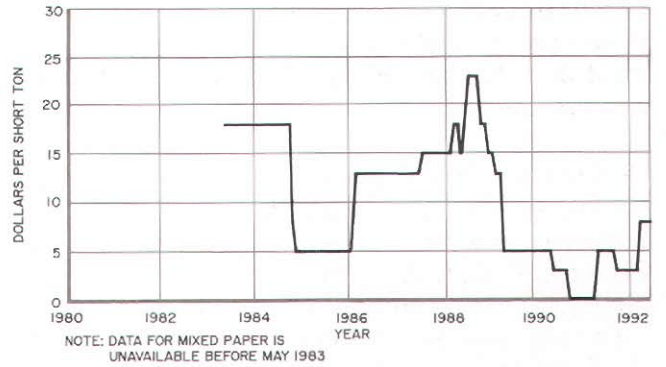
#11 CORRUGATED CONTAINER BUYING PRICE, CHICAGO AREA  
F.O.B. SELLER'S DOCK



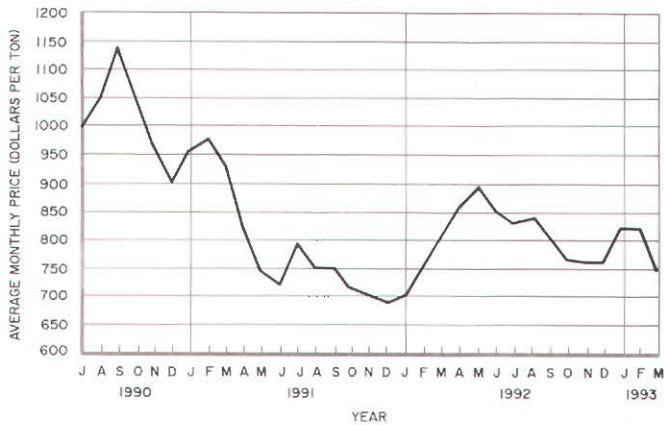
OFFICE PAPER BUYING PRICE, CHICAGO AREA  
F.O.B. SELLER'S DOCK



MIXED PAPER BUYING PRICE, CHICAGO AREA  
F.O.B. SELLER'S DOCK



RECYCLED ALUMINUM CAN END-USER BUYING PRICE, U. S.  
F.O.B. BUYER'S DOCK



RECYCLED STEEL CAN END-USER  
BUYING PRICE, EAST CENTRAL U. S.  
F.O.B. BUYER'S DOCK

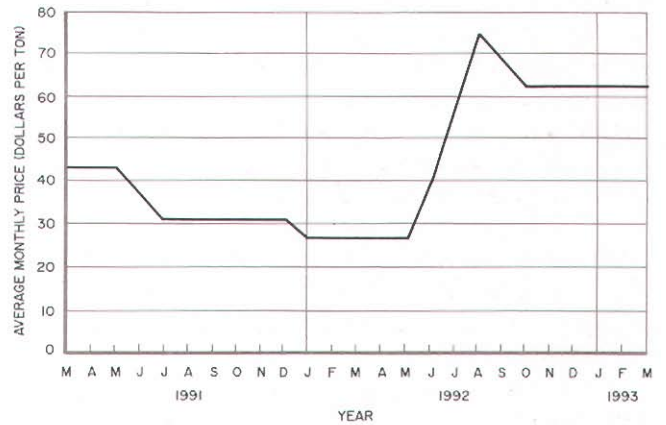
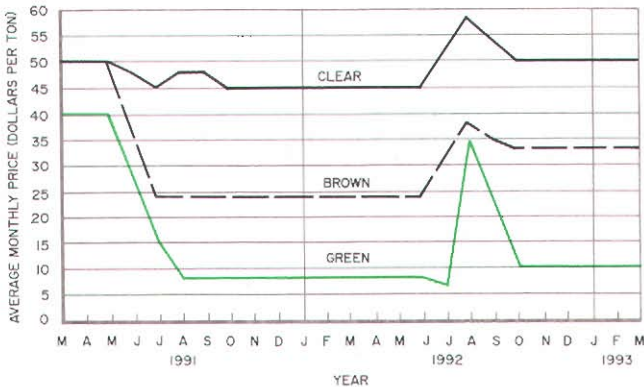


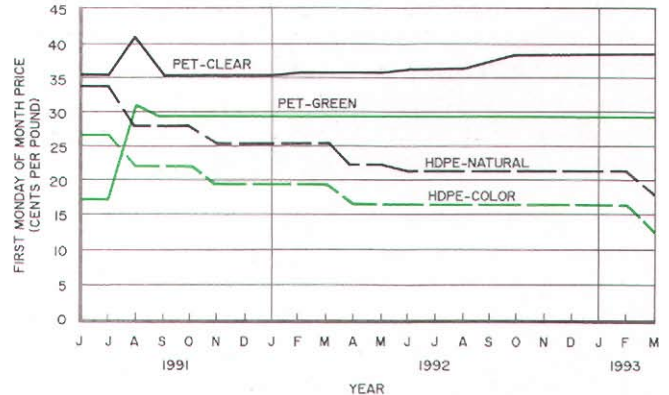


Figure 23 (continued)

RECYCLED GLASS END-USER BUYING PRICE, EAST CENTRAL U. S.  
F.O.B. BUYER'S DOCK



RECYCLED PLASTIC CLEAN FLAKE BUYING PRICE, U. S.  
F.O.B. BUYER'S DOCK



Source: Ms. Mary G. Kohrell, Recycling Markets Specialist, University of Wisconsin-Extension, University of Wisconsin-Green Bay; *Pulp and Paper Week*, *Recycling Times*, *Plastic News*, and *American Metal Market*; and SEWRPC.

and brush. A third, highly desirable, type of program involves leaving as much material, such as grass clippings, on site, if practical. As discussed in Chapter II, several Walworth County communities have already established either or both types of programs. Many of the methods and techniques used for each program are very similar, except processing, which will be discussed separately for each type of program.

#### Pre-Collection/Source-Separation

As previously mentioned, the source-separation of waste products is a growing practice. Source-separation is defined as setting aside, or dividing solid wastes into recoverable, recyclable waste materials and nonrecoverable refuse fractions at their point of generation, such as the home, before collection. In addition to the previously discussed recyclables which are recoverable, yard waste material is also recoverable. Residential source-separated yard waste generally consists of the following types of landscape waste: grass clippings, leaves, weeds, home gardening wastes, prunings, and tree and shrub branches and limbs.

Residential yard waste source-separation procedures are very similar to those discussed in the previous section, except that the yard waste material is not typically stored in pre-collection containers. The material is rather placed into loose piles at curbside for collection in some

Walworth County communities that collect leaves and tree and brush. Yard waste can also be placed into home composting bins by homeowners and never collected. In the majority of cases, yard waste is placed into pre-collection containers, usually plastic bags, and transported to a municipal composting drop-off site by the generator.

As discussed above, decisions on the type of pre-collection storage and collection systems to be used can best be made at the local level, considering costs, labor, and environmental concerns. Thus, specific evaluations of alternative pre-collection storage techniques were not further considered under this study. Rather, the alternatives considered were all assumed to incorporate pre-collection storage similar to the existing systems, including source-separation as dictated by the type of collection and processing system provided for under each alternative.

#### Collection

Collection of yard wastes is different from collection of recyclable materials in that curbside collection is rarely used, while drop-off collection is extensively used. Another difference is that some wastes are not municipally collected but rather managed onsite by the homeowner. The yard waste curbside collection programs that do exist in Walworth County are not weekly, but are on a request basis, as in the case of tree and



brush pick-up, or seasonally performed for a limited period of time, as in the case of leaf collection in autumn. Curbside collected tree and brush materials are often processed at the point of collection prior to being transported to a storage area, while curbside collected leaves are usually transported directly to a composting site. Like material recycling collection equipment, there are many types of yard waste vehicles and equipment, such as vacuum trucks and trucks equipped with such attachments as grappling arms, wood chippers, and wood mulchers.

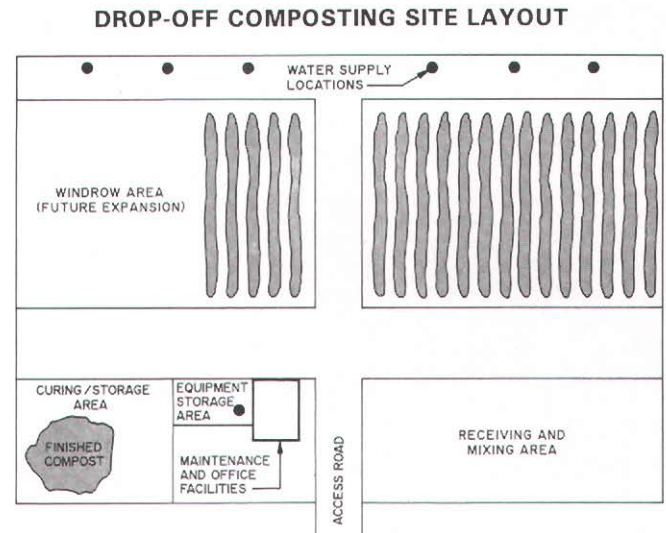
Yard waste drop-off collection is a method whereby the waste generator transports the pre-collected yard wastes stored in pre-collection containers, usually plastic bags or bushel baskets, to a drop-off composting site, an example of which is shown in Figure 24. The yard waste is then removed from the pre-collection containers and deposited in piles to be processed at the compost site. The pre-collection containers can then be reused by the waste generators. Several composting facilities are also staffed with attendants for better quality control, removal of pre-collection containers, or debagging, and to offer assistance to County residents using the facility. Yard waste drop-off collection programs are best suited for use in rural areas. As mentioned above, drop-off collection is the most widely used yard waste collection method in Walworth County; it is expected to remain so.

Household management of yard waste is gaining acceptance and popularity. Through this type of management the yard wastes are processed at the point of generation, rather than being transported to a different location for processing. Processing at the point of generation is a low-cost program because all municipal collection, processing, and distribution costs are avoided. Household management programs consist of mulching and leaving grass clippings in place, home composting of yard waste, and home mulching of wood materials. Because of their current and generally accepted use, the use of drop-off centers and the household management of yard wastes are both considered viable options for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans described in Chapter VI.

#### Processing Yard Waste Compost

Composting is the process which controls the biological degradation by which organic mate-

Figure 24



Source: Gershman, Brickner and Bratton, Inc., *Waukesha County, Wisconsin, Recycling Master Plan*, October 16, 1989.

rials decompose. It provides an optimal environment for the microorganisms needed for decomposition to take place. When biodegradable organic materials containing sufficient moisture and nutrients are placed in a long pile or windrow, a natural process of decomposition will occur. Microorganisms, mainly bacteria and fungi, begin to grow rapidly on the organics, using them as a food source and decomposing them. Because the microbes are not 100 percent efficient, some of the chemical energy stored in the organics is wasted and released as heat. Thus, the organic material heats up through the intense metabolic activity of the microorganisms. A large enough windrow will act as an insulator, retaining heat and leading to an increased temperature. As the biodegradable food supply is exhausted, decomposition is mostly completed, growth and heat generation slow, and the windrow cools, leaving a useful, dark, humus-like material.

Four different methods for yard waste composting at a centralized location may be considered in addition to home composting. The particular method which is most appropriate for a given application will depend mainly on the site selected, although the equipment and labor available, as well as program costs, are also factors. As shown in Table 33, the lower the level

Table 33

## COMPARISON OF METHODS OF COMPOSTING YARD WASTE

Method	Buffer Zone	Time	Total Space	Cost
"No-Tech" . . . . .	Wide	60+ months	Abundant	Very Low
Turned Windrows . . . . .	Moderate	12 to 24 months	Moderate <sup>a</sup>	Low
Static Piles with Forced Aeration . . . .	Moderate	6 to 10 months	Moderate	Moderate
In-Vessel . . . . .	Little	4 to 6 weeks	Little <sup>b</sup>	High

<sup>a</sup>Approximately one acre per 3,000 to 4,000 cubic yards.

<sup>b</sup>Approximately one acre per 30,000 cubic yards.

Source: Wisconsin Department of Natural Resources, Dane County Department of Public Works, and SEWRPC.

of technology used, the greater the requirements for available space, buffer size, and composting time, but the lower the costs.

**Home Composting:** Also called backyard or household composting, this is a method whereby the yard waste generated by a household are left in place to decompose, or collected by the household and formed into static piles, or placed in a composting bin for decomposition. The finished compost is used by the household as a soil additive/conditioner for home gardening or as decorative mulch. The typical waste types managed through household composting include grass clippings, leaves, weeds, vegetable scraps, sawdust, and wood ash. To avoid attracting animals, materials such as meat scraps, bones, and fats are not used. Likewise, any material that may endanger human health should be avoided, such as dog and cat droppings.

In urban areas, special care is needed in locating a compost pile or bin to prevent a nuisance for neighbors. The pile should generally be secluded and should not be exposed to direct sunlight and high winds, if at all possible. Enclosures or bins made of wire, wood, brick, or plastic are recommended to keep materials contained during periods of high wind and also to keep animals out. There are many varieties which can be purchased or built. The type of enclosure or bin used depends upon personal taste, appearance, materials on hand, and the amount of labor a person wants to invest.

Household yard waste materials may be composted by using the no-tech method described

above or the materials may be turned and shredded to decrease processing time. Sometimes two separate composting piles or bins are used at the same time, one for adding materials to and the other for allowing previously collected materials decompose. Beside the home composting bins commercially available, there are also different types of equipment, such as leaf shredders and limb mulchers, that may speed up the process but are not necessary.

While grass clippings can be composted, one alternative is not to collect them at all. Turf specialists recommend lawn mowing frequently enough so that short clippings can be left in place to filter through the growing grass and return their nutrients to the soil. This practice does not contribute to thatch, but rather acts as a lawn conditioner.

Informational pamphlets on home composting and recycling grass clippings developed by the Wisconsin Department of Natural Resources and the University of Wisconsin Extension are readily available. Because it is generally accepted as a sound practice, the alternatives of home composting and retaining grass clippings in place is considered a potentially viable option for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans described in Chapter VI.

**No-Tech Composting:** This is a method whereby yard wastes can be deposited after removal from bags into uniform piles, where it will slowly decompose over many years. This method is not

actually processing, since the rate of decomposition is not controlled. However, it is an alternative to consider if land is available which is remote, well-drained, and meets the locational standards of the Wisconsin Department of Natural Resources. Although this method does not process the yard wastes, it must still be conducted in a nuisance-free manner so that no runoff or odor problems occur. It is also important to monitor incoming loads to ensure that the area does not become a dumping ground for other wastes. Because of space limitations, possible nuisance problems, and low public acceptance and participation, this method is not considered to be one of the viable options for use in Walworth County. Accordingly, this option is not considered further as a component of the detailed alternative solid waste management plans.

**Windrow Composting:** This is composting by forming yard wastes into windrows, usually six to eight feet high and 12 to 14 feet wide, which are periodically turned with a front-end loader or specialized compost turning equipment to promote faster decomposition, then combined with other windrows for final decomposition. This method does not require a significant amount of processing, produces a finished product in a timely manner, is relatively inexpensive, and is currently being used by most of the composting programs in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans as described in Chapter VI.

The components of a windrow composting system are generally described in the following paragraphs:

- **Receiving and Sorting Material**

A staging area is often set up to receive and sort yard wastes from county residents at the drop-off site which also functions as the composting site. Two separate areas might be used if materials from curbside collections, usually delivered by the truckload, are also accepted. Residents can unload the yard waste materials and remove them from their pre-collection containers, which can then be taken back home and used again. This operation is often assisted by an attendant, who also sorts out unwanted materials such as plastic, metal, glass, large stones, rope, and wire to minimize contamination which degrades the quality of the end product and

may damage composting equipment. These unwanted materials are often given back to residents with an explanation which not only prevents contamination at this point, but will instill more quality control to be performed by the individual residential generators in the future. Wastes brought in by the truckload may be sorted for material contamination with the use of an end loader and hand sorting.

Wood and brush should also be removed from incoming loads because it decomposes very slowly and the presence of undecomposed wood is unacceptable for most compost uses, although small amounts of incidentally included branches and twigs pose little problem. Large pieces of wood can be diverted to another location of the compost site for processing by other means than composting.

- **Forming Windrows**

Once the yard wastes have been unloaded in the staging area, a front-end loader can break apart and spread compacted materials to facilitate wetting. Alternatively, shredders, tub grinders, and trommels can be used to process the material, as shown in Figure 25, creating more surface area for more rapid processing and a higher quality end product. Some shredders can also be used to form windrows; however, front-end loaders are usually used to place the material in windrows. Windrows should be loosely formed to maintain adequate air penetration into them.

The windrows initially can be six to eight feet high by 12 to 14 feet wide, unless compost turning equipment is used that has dimensional restrictions. Any convenient length can be used. Windrows that will not be processed or that will be left over winter should be 10 to 12 feet high and 30 to 40 feet wide to prevent freezing in Wisconsin's cold climate. Two windrows can be formed side by side, with only one to two feet between, to conserve space if necessary; however, sufficient aisle space between windrow pairs of at least 12 to 16 feet should be provided to allow for better equipment operation.

Neatly formed windrows with well-maintained aisles give a professional appearance



Figure 25

## EQUIPMENT FOR COMPOSTING YARD WASTE

### SHREDDER



### TUB GRINDER



### TROMMEL SCREEN



Source: *World Wastes*, January 1994, and *MSW Management*, September-October 1993.

to the facility and may increase public participation, while messy windrows give the impression of a "leaf dump." Care should be taken that equipment does not ride up on the windrows, compacting them.

- Monitoring Decomposition

Compost windrows should be monitored to ensure that decomposition proceeds properly and does not cause a nuisance. Monitoring

should consist of biweekly inspections for moisture content, temperature, physical appearance, and internal windrow odors. Sharp drops in temperature, for example, may indicate decreasing moisture content or the onset of anaerobic conditions. Failure of temperatures to rise to 120 to 160°F shortly after windrow construction may indicate a poor carbon/nitrogen ratio or improper moisture content. Some of the common problems encountered at yard waste composting sites and recommended solutions are presented in Table 34.

- Combining

After about one month, much of the initial oxygen demand of the composting material has been exerted and the windrows have been reduced to about half their original size through decomposition and self-compaction. At this point, two windrows can be combined into one of about the same size. Combining windrows will help conserve heat during cold weather. Combining should be done by moving and turning both windrows, not by placing one on top of the other.

- Turning

If left over winter, each windrow should be turned as early in spring as practical, usually in March or April. Turning mixes the material, redistributes the moisture, re-oxygenates the interior, and exposes the formerly cool edges to the hotter internal temperatures. The result is an increased rate of decomposition and improved destruction of any pathogens and weed seeds. Turning can be done with an end-loader; however, best results are obtained with the use of a windrow turner, as shown in Figure 26, or a shredder. At this time, additional water may be added if the material is too dry; however, every effort should be made to provide sufficient water initially. As grass clippings and green weeds from home gardening are dropped off during the summer months, they can be incorporated into the compost windrows. By providing needed nitrogen, this results in a higher quality compost product which is ready in a shorter time. It is desirable that grass clippings be incorporated into the windrows before the end of the day of delivery because

Table 34

## COMMON PROBLEMS AND SOLUTIONS FOR COMPOSTING YARD WASTE

Problem	Causes	Recommendations
Odor	Anaerobic conditions	Turn large windrows more frequently
	Windrows too large	Smaller initial windrows will allow better aeration
	Windrow not formed immediately	Allow no more than one to two days between collection of leaves and formation of windrows. Grass should be mixed into windrows on same day as collection
	Leachate ponding	Eliminate ponding, add lime
Leachate Ponding	Inadequate slope, poor grading	Grade site properly
	Improper windrow alignment	Run windrow down slope, not across
Pollution of Surface Waters	Leachate discharge	Treat leachate before it leaves site by passing it through soil or sand
Inadequate Composting Rate	Material too dry	Add water initially, or as corrective measure during turning. Mix grass clippings into windrow
	Windrow too large, leading to acid anaerobic conditions	Make windrows smaller, adding limestone if necessary to raise pH and control odors

Source: Wisconsin Department of Natural Resources, Dane County Department of Public Works, and SEWRPC.

they are often highly odorous by the time they are delivered to a composting site. A 50:50 ratio of leaves to grass provides an optimum carbon-to-nitrogen ratio, although starting out with a higher ratio of leaves could lessen odor problems. Additional turning throughout the year, perhaps once a month, will further enhance the composting rate and product quality, but these turnings are optional.

- **Curing**

By the end of summer, much of the material may not be completely stabilized, yet the composting area may have to be cleared to allow for the site preparation for the autumn leaves. At this time, therefore, the material can be moved and formed into a large curing pile around the perimeter of the site. The curing pile may be as large as desired to conserve space, but should not be compacted when formed. Moving the material also provides additional turning and mixing and exposes a relatively small surface area to drying and freezing conditions.

- **Screening and Shredding**

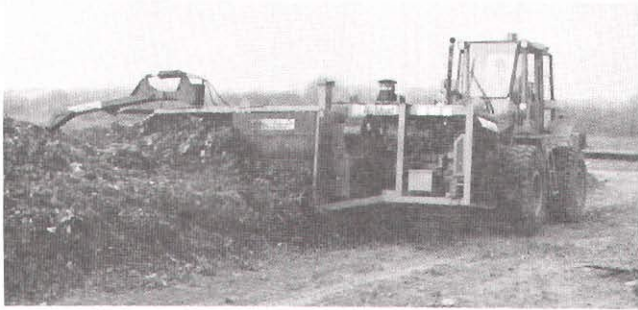
Once composting is completed, screening and shredding is a final optional step to improve the physical quality and appearance of the finished compost, making it more acceptable for many uses. Screening and shredding equipment is shown in Figure 25. Screening and shredding the composted material breaks up clumps and separates out rejects which will be minimized or almost eliminated if shredding has been used throughout the composting process. Shredding yields a more uniform and debris-free final product and can also be used to mix finished compost with soil.

**Static Piles with Forced Aeration:** This requires a higher degree of technology than the two previously discussed composting methods, but usually requires less space. This method may also use windrows or static piles, although rather than turning windrows, air is blown or drawn through the piles through perforated pipes. These are sometimes partially encased in concrete and are usually positioned in a layer of



Figure 26

#### COMPOST WINDROW-TURNING EQUIPMENT



Source: *MSW Management*, July-August 1992, September-October 1993, and January-February 1994.

wood chips to provide a porous foundation, and either a forced-draft fan (blowers) or an induced-draft fan (exhaust fan) aerates the piles. Forced-air systems require careful initial processing to ensure that materials are properly mixed and have a suitable moisture content and porosity. Careful site preparation is also necessary, which sometimes might include system

design and construction. The windrows or piles are also typically covered with a layer of finished compost to reduce evaporation and to ensure that all of the compost reaches adequate temperatures. While this composting method may use less space, have less odor problems, and usually provides a more rapid rate of decomposition, the disadvantages are higher capital and operation costs and the higher degree of processing required. Because of these disadvantages, this method is not considered further as a component of the detailed alternative solid waste management plans described in Chapter VI.

**In-Vessel Composting:** These systems have been successfully used for composting sewage sludge and municipal solid waste, but this technology has not been applied directly to yard waste composting. For in-vessel composting, incoming material is often shredded, then mixed with a bulking agent or nitrogen source, regularly turned in a digester designed to foster rapid growth of microorganisms, and then windrowed to finish decomposing for a short period, usually a few weeks. Although this method greatly reduces the space requirements and composting time, because of the high capital equipment needs and operating expenses, this method is not considered to be one of the most viable options for use in Walworth County. Accordingly, this option is not considered further as a component of the detailed alternative solid waste management plans.

**Tree and Brush Yard Waste Processing:** Wood tends to decompose very slowly and lowers the quality of the final compost product, making composting of woody materials impractical in most cases. Thus, woody products should not be intentionally incorporated in composting windrows and must be processed in another method. However, as previously mentioned, a portion of a composting site could be designated for tree and brush processing.

Tree trunks and large branches can be cut into reasonable lengths for firewood and stored at a compost site. Smaller branches and twigs may be chipped and mulched to produce a useful mulch end product. Chipping equipment, often referred to as "chippers," can be used to chip brush, limbs, and other woody debris, as shown in Figure 27. Chippers are available for purchase for residential use; however, to date their uses are mostly municipal. Chippers used for typical



Figure 27

MUNICIPAL AND RESIDENTIAL TREE- AND BRUSH-CHIPPING EQUIPMENT

MUNICIPAL CHIPPER



RESIDENTIAL CHIPPER



Source: Vermeer Manufacturing Company and Simplicity Manufacturing, Inc.

municipal applications are usually hand fed. Some models are equipped with heavy-duty blades which handle small pieces of metal and reject large foreign objects without damaging the machine.

Chippers are often used during curbside collections of trees and brush, with the wood mulch initially stored in a trailer to be unloaded at a municipal composting site. Trees and brush may also be brought directly to a compost site for chipping. Some compost shredders may also be used to process tree and brush into wood mulch. Tub grinders are also equipment that can be used. Storing wood mulch in piles or stockpiles need not be done in any particular fashion and does not present any significant problems. Chipping is a well accepted means of processing trees and brush, or woody yard waste, and is considered a potentially viable option for use in Walworth County. Thus, this option was considered further as a component of the detailed alternative solid waste management plans.

#### Markets

The yard waste recycling programs discussed above produce two distinct products to be marketed: compost and wood mulch. For most Wisconsin communities, especially in rural and agricultural areas, it is unrealistic to expect to make any profit from the sale of composted yard waste; however, some revenue may be generated from the sale of wood mulch to private businesses. In either case, it is necessary that the processed yard waste materials be marketed to facilitate their removal from the processing site to provide room for continued processing of newly received yard waste materials.

As in the case in other recycling, understanding what the recycling program has to produce in order to market the material is very important. For both types of product the quality of the product is important. Product quality involves such things as appearance, uniform consistency, low levels of impurities, and chemical composi-



tion. The closer the finished product approaches the quality, uniformity, and consistency of its competition, such as black dirt and peat in the case of compost material, the higher its relative value.

The products of yard waste recycling are different from other recycled products in that the yard waste is processed to the point of readiness for the end user. There are several different types of markets for recycled yard waste. These markets are the general public, municipalities, and private business.

Giveaway programs are usually directed to the general public and require the public to go to composting sites to pick up the finished product. Residents are usually required to bring their own containers and equipment for loading the finished products. Common public product uses include use as compost, as a valuable soil conditioner, as firewood, and as ornamental mulch for garden areas. These programs reward residents for their participation in the program, thus often increasing the rate of participation.

Utilization of finished yard wastes products in municipal applications will result in savings to offset some of the expenses of collecting and processing the materials. Some specific municipal applications are as topdressing for lawns in park land, on athletic fields, golf courses, and municipal grounds; for erosion prevention and other roadside maintenance; as a buffering agent with fertilizers; and as ornamental mulch for garden areas. Wood mulch may be used for park pathways, on school playgrounds, or to form all-weather roads at the composting site or to create a base for windrows.

The demand for wood mulch by Walworth County businesses often exceeds supply; businesses may, at some time, be asked to pay for this product more often than for finished compost. Potential private-business markets for recycled yard waste products include: greenhouses, nurseries, golf courses, landscape contractors, sod farmers, industrial park grounds, cemeteries, topsoil suppliers, crop and dairy farmers. Even landfills may use the wood mulch as cover and in land reclamation.

## HOUSEHOLD TOXIC AND HAZARDOUS WASTE MANAGEMENT

Toxic and hazardous wastes generated by households represent disposal problems for Walworth County communities because there is no program in place to ensure the safe disposal of these materials on a continuing basis. These wastes come in various forms, contain many chemicals, and are usually generated in relatively small amounts. Typically, household hazardous wastes include pesticides and herbicides, pool chemicals, solvents, paints and thinners, household cleaners, used oil, anti-freeze, and batteries. A list of hazardous compounds present in common household products is presented in Table 35. These conditions make proper collection and disposal of this class of wastes highly desirable but also logistically difficult and costly.

When local governments attempt to collect and dispose of household hazardous wastes, they become small-quantity hazardous waste generators and therefore must satisfy State and U. S. Environmental Protection Agency (EPA) guidelines that govern the collection, transport, storage, and disposal of hazardous materials. These requirements tend to make most types of collection and disposal efforts prohibitively expensive for local units of government to undertake without outside funding. The State of Wisconsin does provide grants to local units of government for household hazardous waste management; a growing number of communities have initiated programs to foster public awareness and promote collection and proper disposal of household hazardous wastes. Most of these efforts focus on one-day collection programs, often called "Clean Sweep" programs. Such programs can be directed toward urban household wastes or rural agricultural-related wastes, or both.

Walworth County held its first Clean Sweep Household Hazardous Waste Collection Program on Saturday, August 8, 1992, at two disposal sites, at the County's Lakeland Complex near Elkhorn and in the City of Whitewater. The program was organized by the Walworth County Solid Waste Management Department and was designed to accept unwanted household chemicals from Walworth County residents. The purpose of the program was to provide a safer disposal alternative for household hazardous

Table 35

## SELECTED HAZARDOUS COMPOUNDS PRESENT IN COMMON HOUSEHOLD PRODUCTS

Compound	Product
Lead .....	Paints, dyes, batteries, oil, stain varnish, solder
Nickel .....	Batteries, plated metals, paints
Cadmium .....	Batteries, paints, solder
Mercury .....	Batteries, thermometers, paints, flood lights, switches
Chlorinated Phenols .....	Toilet bowl cleaner, wood preservatives, floor cleaners, glue, antiseptics, perfumes
Methylene Chloride .....	General-purpose cleaners, engine additives, paints, sealants, varnishes, stains, glue, cosmetics, waxes, spray deodorants
TCE <sup>a</sup> .....	Drain opener, toilet bowl cleaner, bleach, general-purpose cleaners, furniture and floor polish, caulk, automotive additives, cosmetics, stain remover
Benzene .....	Stain, varnish, sealant, glue, caulk, medicines, oven cleaners, deodorants, solvents and thinners, gasoline
Naphthalene .....	Pesticides, insecticides, air fresheners, detergents, rug and upholstery cleaners
Xylene .....	Ammonia-based cleaners, automotive additives, paints, pesticides, some cosmetics, gasoline
Toluene .....	Cosmetics, adhesives, degreasers, automotive additives, paints, thinners and strippers, caulk, tar, gasoline
Organophosphates .....	Pesticides, pet maintenance products
Chloroform .....	Liniments, degreasers, medicines, cosmetics, bleach
Chlordane .....	Pesticides, pet maintenance products
Ketones .....	Thinners and strippers, stain remover, glue, sealants
Phthalates .....	Lubricants, insect repellents, fragrances, cosmetics, gasoline
Concentrated Acids .....	Toilet bowl cleaner, drain opener, batteries, polishes (wood, metal, vinyl), pool chemicals, oven cleaners
Dioxin .....	Silvex, ketone, 2-4-5-T

<sup>a</sup>Includes a large family of chlorinated organic solvents, such as trichloroethane, trichloroethylene, and tetrachloroethylene.

Source: S. Ridgely, *Hazardous Waste from Minnesota Households: The Final Report of the Household Hazardous Waste Pilot Collection Project*, 1987; W. L. Rathje et al., *Characterization of Household Hazardous Waste from Marin County, California, and New Orleans, Louisiana*, 1987; and U. S. Environmental Protection Agency, *A Survey of Household Hazardous Wastes and Related Collection Programs*, 1986.

waste and to educate the Walworth County residents regarding the dangers of hazardous materials. This program was relatively successful for a first-time collection, with a participation rate of about 1.2 percent of the Walworth County households, which is well above the State average of 0.76 percent participation for over 50 Clean Sweep programs held in Wisconsin during the last eight years. The Walworth County Solid Waste Management Department also conducted

an Agricultural Clean Sweep program in April of 1993, to collect banned, damaged, or unwanted agricultural chemicals from farmers in Walworth County.

#### Pre-Collection/Source-Separation

Household hazardous wastes generally have been source-separated from other forms of solid waste and are temporarily stored. Some household hazardous wastes, however, are mixed in

with the daily refuse and are collected and disposed of in landfills. This practice is decreasing and will decrease further as the public becomes more educated and aware of the detrimental effects of this practice and the options for proper disposal.

Household hazardous wastes can be collected in several different ways, such as through temporary drop-off at sites during a designated day or days, as is typically done in clean sweep programs, curbside programs, drop-off at fixed drop-off sites, through mobile collection efforts, and at retail establishments. Curbside and mobile collection programs are not considered further in this report because of prohibitively high cost, degree of regulatory requirements, and limited information and experience in existing programs of this type. Other options have been considered further in Chapter VII of this report.

Temporary Drop-Off Clean Sweep Programs: These programs are typically highly publicized, one-day collection efforts intended to afford households the opportunity to drop off small volumes of hazardous materials. The actual collection day is usually preceded by several weeks of publicity designed to encourage households to identify their hazardous wastes and bring them to a collection site during the one-day drop-off period. The hazardous wastes that are brought in are usually handled by a licensed hazardous waste contractor, who identifies and manifests the materials, provides onsite technical support, as well as packaging, transportation, and disposal. County personnel, and usually personnel from a local fire department, as well as volunteers from local organizations and environmental groups assist in the program. These programs are usually held at municipal buildings or on municipal grounds. These programs are typically held once or twice a year, usually in mid-spring and in early fall to coincide with times when housecleaning activities and housing turnover are at a maximum. An option in clean sweep programs is to make more than one drop-off site available to households, which increases program participation by increasing the convenience to residents; however, this also increases the costs of these programs.

Fixed Drop-Off Site: These programs are an expansion of the temporary clean sweep drop-off concept, except that sites are made available more frequently than once or twice a year. This

type of collection is currently being practiced by some of the communities in Walworth County. However, the types of materials collected are very limited, most often to used oil collection only. Fixed-site drop-off collection programs which collect a variety of household hazardous waste materials are staffed by trained municipal personnel with or without additional staff provided by the hazardous waste contractor. These types of programs usually have a licensed hazardous waste contractor come to the facility to handle the disposal of the accumulated wastes every 180 days, which is the maximum storage period permitted for small-quantity generators under the State hazardous waste code. These types of programs may be monthly, weekly, or daily, and may allow collection by appointment only. Fixed-site drop-off collection programs usually generate a consistently greater overall participation rate and may reduce contractor costs on a per unit basis. However, the overall cost is much higher than the one- or two-day per year operations. A fixed-site operation was being planned by Milwaukee County during 1994.

Collection at Retail Establishments: In this method retail establishments collect used hazardous waste products when similar new products are purchased, such as batteries, antifreeze, motor oil, and tires. Some establishments such as service stations accept these types of waste whether new products are purchased or not.

#### Transfer, Transportation, Processing, and Marketing

There are many regulations, requirements, and procedures that need to be followed to transfer, transport, process, and dispose of household hazardous waste materials. There are also markets that recycle and process such materials as used oil, anti-freeze, paint, and tires. The materials are most often handled by the hazardous waste contractor or processor and are not evaluated further in this study.

## PUBLIC EDUCATION

One important element of successful solid waste management is active public participation. This participation depends, in part, on increased education and awareness about recycling and other management system components as viable alternatives to landfill disposal. Public education relating solid waste management and

Table 36

## OPTIONS COMMONLY CONSIDERED FOR USE IN PUBLIC EDUCATIONAL EFFORTS

Low-Cost	Medium-Cost	High-Cost
News Releases News Advisories Public Service Announcements Community Calendar Announcements Letters to the Editor News Articles Newsletter Articles Speeches Guest Spots on Radio, TV Poster Contests Church Bulletin Notices	Flyers Posters Fact Sheets Briefing Papers Brochures Media Events Slide Shows Tokens and Giveaways Special Events Demonstration Projects and Workshops	Commercials, TV, Radio Billboards Media Events Calendars Advertisements Public Relations Firms

Source: SEWRPC.

recycling in particular should: 1) inform people about the need for recycling, 2) communicate the specifics of participating in the programs, and 3) motivate people to act on the supplied information, thereby changing their existing methods of waste disposal.

Table 36 lists several means of communication, divided into three cost categories, commonly used in public educational programs. Low-cost activities require only the expenses of photocopying and mailing. Medium-cost methods may require the work of a graphic artist or printer or may involve duplicating several thousand copies. High-cost methods require a large expenditure. Methods of communication can also be divided into two categories, those that use the media and those that do not. A short description of some the means that may be used is given below.

Media-related methods of education include news releases, used to inform the media about a given project. These provide basic information on the project. News advisories are used to alert the press to an upcoming event. A news advisory is not a news release, but gives details about the event. Public service announcements are written statements sent to television and radio stations. In the past, stations were required to air a certain number of public service announcements; however, this is no longer true and announcements are aired at the station's discretion. Community calendar announcements are announcements about special events. These are aired on both television and radio stations which carry a community calendar feature.

Nonmedia methods of education include the following: flyers, simple photocopies, or printed brochures. These are most often distributed door-to-door. Posters are most useful as reminders. Fact sheets are useful tools to answer questions on recycling topics and provide interesting information that elicits thinking about recycling topics.

Briefing papers are similar to fact sheets, but provide more specific information about a program. Brochures are similar to fact sheets and briefing papers, but also provide more information regarding why to recycle and the who, what, when, where, and how of a particular program. They often provide a recycling hotline phone number that residents can call to have questions answered. Brochures inform residents how their local program can be most effectively used. These brochures should be distributed at one per household and may be included in local tax assessment mailings.

Letters to the editor are used to explain different view points on the subject. City newsletters may be used to discuss programs, usually monthly or quarterly. Other newsletters are published by many organizations and may include articles on themes and activities of interest. Tokens and giveaways are promotional items such as bumper stickers, coloring books, and T-shirts that are used as tokens, rewards, and giveaways at promotional events. They are intended to increase exposure of the County's recycling activities and foster participant enthusiasm for existing programs.



Such special events as fairs, carnivals, and parades can be used for enhancing public education for recycling. Booths can be set up at local fairs where recycling information can be discussed and written information handed out. Carnival and fair contests such as "Guess the number of aluminum cans in this bin" can be used to draw attention to recycling topics. Recycling mascots such as Waukesha County's Recycle Raccoon can be developed to appear at special events to hand out materials and draw attention to recycling programs. Additional special events include Earth Day and Arbor Day.

Presentations and slide shows by qualified speakers can be given to civic and community organizations and schools in the area to enhance public awareness and understanding of recycling. These presentations may be given in conjunction with a slide show, or a tape may be made to narrate a slide show to be used at various activities.

Demonstration projects and workshops can be used to further public recycling education. Workshops on home composting and other recycling topics geared towards residents can be held at local parks. An example of a demonstration project is the Waukesha County home compost project at the Retzer Nature Center, where eight different backyard composting systems are displayed and plans for constructing these systems are distributed.

A large amount of educational information on materials and yard waste recycling have been prepared by, and are available from, agencies such as the Wisconsin Department of Natural Resources and the University of Wisconsin Extension Service.

Many schools provide children with a great deal of recycling information which they can put to use in school and at home. Public educational efforts by use of the broadcast and printed media need to continue and increase in order to increase public participation and awareness. The public education objective is discussed in further detail later in this report.

## SUMMARY

This section of the report summarizes the solid waste management techniques and options which are considered potentially viable for use in

Walworth County. The selection of these options was based on consideration of the existing solid waste management systems operating in the County, State regulations governing solid waste management, the solid waste management objectives established under the study, and the evaluation of the techniques outlined in the previous sections. More detailed descriptions and analyses of the alternative plans which have been developed using these techniques and options, including both monetary and environmental cost, are provided in Chapters V, VI, and VII.

The following techniques were found to be potentially viable for use in developing alternatives for material recycling:

- Pre-collection source-separation and storage systems in a manner similar to the existing practices incorporating rigid plastic recycling bins and bags.
- Collection systems similar to existing practices, relying principally on private collection operations and incorporating both curbside and drop-off collection methods.
- Transfer stations, where recyclable materials are transferred from smaller collection vehicles or containers to larger vehicles or containers before transport of materials to a processing facility or market.
- Processing facilities, including the use of low-level and minimal-level material recovery facilities.
- Marketing, including selected marketing strategies.

The following techniques were found to be potentially viable for use in developing alternatives for yard waste recycling:

- Pre-collection separation and storage of materials in a manner similar to the existing practices incorporating cans, bags, and rigid containers.
- Collection systems considering both drop-off collection and selected curbside collection of materials and including the household management of yard waste where the yard waste is not collected but rather is processed at the point of generation.

- Yard waste processing utilizing home composting and centralized windrow composting systems.
- Processing of woody yard wastes by chipping.
- Selected marketing strategies

The following techniques were found to be potentially viable for use in developing alternatives for management of household toxic and hazardous wastes.

- Temporary drop-off "Clean Sweep" programs.
- Fixed drop-off programs.
- Collection at retail establishments.

A number of measures which can be used to develop an effective public education program are also considered to be viable for use in Walworth County and will be considered further.

## Chapter V

### EVALUATION OF ALTERNATIVE RESIDENTIAL RECYCLABLE MATERIAL MANAGEMENT SYSTEMS

#### INTRODUCTION

This chapter describes and evaluates alternative residential recyclable solid waste management systems to be considered for Walworth County. The selection of the alternatives to be considered for use in Walworth County was based on the consideration of the existing solid waste management systems operating in the County, State regulations governing solid waste management, the solid waste management objectives established under this study, and an understanding of the available recycled solid waste management practices. In Chapter IV, the solid waste management techniques which can be utilized for recycling were described and screened for their applicability for use in Walworth County. Six alternative recyclable material management plans, consisting of various combinations of applicable techniques for residential recycling, were determined to warrant more detailed evaluation. Six alternative residential recyclable solid waste management systems were considered and evaluated in this study:

1. Continued use of the existing recyclable solid waste management systems, including continued use of the existing collection system and transportation of recyclables to various existing transfer stations, processing facilities, and markets.
2. Continued use of the existing curbside residential recycling programs, including collection and transportation of recyclables to transfer stations, processing facilities, or markets. Continued use of the existing drop-off recycling collection systems, with transportation of recyclables from the drop-off centers to a single materials transfer station and sorting facility, then transportation of the recovered materials to markets. The transfer station and sorting facility proposed under this alternative is to incorporate a minimal degree of mechanized technology.
- 3A. Continued use of the existing residential recycling collection systems, with a direct haul to a single materials recovery facility

(MRF) for processing recyclables, with transportation of the recovered materials to market and the residual materials to landfills for disposal. The MRF proposed under this alternative is to incorporate a low degree of technology and mechanization.

- 3B. Same as Alternative 3A except that two existing MRF operations serving the County would continue to serve the areas currently served.
- 4A. Continued use of the existing residential recycling collection systems, with a direct haul to a single materials recovery facility (MRF) for processing recyclables, transporting the recovered materials to market, and the residual materials to landfills for disposal. The MRF proposed under this alternative is to incorporate a medium degree of technology and mechanization.
- 4B. The same as alternative 4A except that the two existing MRFs serving the County would continue to serve areas currently served.

This chapter provides a description of these six alternatives and estimates of the capital and operating costs associated with each of these alternative plans, including costs associated with all such post-collection functions as transportation, processing, marketing, revenues, and disposal. The costs of land acquisition, engineering design, and construction, as well as of operation and maintenance, are estimated for each alternative as applicable. While these costs are an important consideration in the evaluation of the alternative plans considered, it must be recognized that the selection of a recommended recyclable waste management plan cannot be based upon economic considerations alone, but must consider such additional factors as implementability, the effect on existing businesses, and environmental impacts.

The first portion of this chapter following this introductory section sets forth a description of the types and quantities of materials to be considered under each alternative. Following the

section on materials consideration is a description of the alternatives in terms of their physical systems. The numerous options regarding the institutional aspects of ownership and operation of each alternative must also be considered. Options such as private, public, or private-public partnership can be considered for both ownership and operation. Likewise, any public involvement would have to consider such options as ownership and operation under County, individual municipality, or multi-municipal arrangements. In order to limit the number of alternatives being considered, this chapter first describes and evaluates the physical system alternatives. The last section of the chapter describes the institutional ownership and operation options which can be considered for the preferred physical system alternative.

## MATERIALS

Before a detailed description and analysis of the alternatives can be presented, the types and quantities of the materials estimated to be collected and processed under the alternative recyclable solid waste management systems are described. Four general categories of materials are being considered in this study. These four categories are: paper, metal, plastic, and glass. These four general categories are further broken down into different material types. This breakdown and commonly found examples of each material type are shown below.

### Paper

Recyclable paper can be classified in a number of ways, but generally includes at least the following five categories:

- Newspaper (ONP): Includes used newspaper but also includes all newsprint distributed with daily and suburban newspapers, such as commercially printed advertisements, shoppers, and newsprint inserts.
- Corrugated Containers (OCC): Include corrugated and cardboard boxes.
- Magazines (OMG): Include glossy or coated groundwood paper stock, including both magazines and catalogs.
- Office Waste Paper (OWP): Includes uncoated white printing and writing papers, copy paper, and computer paper.

- Mixed Waste Paper (MP): Includes books, commercial printing, calendars, tissue paper and towels, paper plates and cups, milk cartons, folding cartons and other paperboard packaging, paper bags, wrapping paper, and other paper packaging.

### Metal Containers

Metal containers are generally categorized in two groups:

- Aluminum Cans: Include beer and soft drink containers; however, approximately 2 percent of all aluminum cans are nonbeverage.
- Steel or Bi-Metal Cans: Include food cans, sometimes called "tin cans" because of the very thin coating used to prevent corrosion of the steel. Bi-metal cans which consist of steel body and aluminum lid are also included in this category; however, it appears that no more than 1 percent of beverage cans used in Wisconsin are bi-metal.

### Plastic Containers

Plastic containers are generally identified by resin type, numbered 1 through 7.

- No. 1 (PET) Polyethylene Terephthalate: Includes one- and two-liter soft drink bottles and some jars.
- No. 2 (HDPE) High-Density Polyethylene: Includes milk jugs and household soap bottles.
- No. 3 (PVC) Polyvinyl Chloride: Includes salad oil containers and clear film for packaging meat.
- No. 4 (LDPE) Low-Density Polyethylene: Includes food packaging, shrink wrap, and some plastic bags.
- No. 5 (PP) Polypropylene: Includes butter and margarine tubs, yogurt containers, screw-on caps and lids, and drinking straws.
- No. 6 (PS) Polystyrene Foam, also called "styrofoam": Includes cups and plates, egg cartons, meat packaging trays, and plastic forks, spoons, and knives.
- No. 7 Other: Includes products which contain all other plastics, mixed and multi-resin plastics, and multi-layer materials.



### Glass Containers

Glass containers are generally divided into four categories on the basis of color and generally include beverage containers for soft drinks, beer, wine, and liquor, and food containers. Included are:

- Clear Glass
- Green Glass
- Amber Glass
- Mixed Glass

The recyclable waste material described above includes all the materials requiring recycling under proposed State regulation except yard waste and special solid waste items. While the proposed regulations require recycling of all types of plastic, only plastic resins No. 1 (PET) and No. 2 (HDPE) are being specifically considered here for recycling by the year 2000 because they are readily recyclable and marketable, while plastic resins Nos. 3 through 7 are not, nor is it presently common practice to recycle these materials. As recycling technologies and markets increase, it is anticipated that all plastics may be efficiently recycled; therefore, plastic resins Nos. 3 through 7 are assumed to be included for recycling by the year 2010.

An estimate of the quantities of each of the described material types was made so that the proposed facilities could be properly sized and that proper estimates of the capital and operating costs associated with the alternatives could be accurately made. The quantity of materials was estimated for the years 1992, 2000, 2010. Material recovery percentages were applied to the generation quantities developed in Chapter III of this study to estimate the quantity of materials anticipated to be recovered and recycled. The material recovery percentages used for the 1992 quantities were based on information obtained through the 1992 inventory procedure, while the material recovery percentages used for years 2000 and 2010 were based on data obtained from effective ongoing programs in other areas and from information obtained from four supply-and-demand studies prepared for the Wisconsin Department of Natural Resources.<sup>1</sup> The estimates of quantity of materials anticipated to be recovered and recycled by curbside recycling programs in the Walworth County study area are shown in Table 37. The portions

of the materials anticipated to be recovered and recycled by the drop-off recycling programs in the Walworth County study area are shown in Table 38.

The total quantity of residential recyclable solid waste material which the material recycling alternatives is intended to manage is estimated to be 12,400 tons per year, or about 34 tons per day, in the year 2010. The average annual loading, or the average annual amount of the recyclable residential solid waste expected to be recovered for material recycling over the plan design period of 1992 through the year 2010, was estimated to be 10,900 tons per year, or about 30 tons per day. These quantities do not include any commercially or industrially generated solid waste, nor do they include any residentially generated nonrecyclable solid waste, yard waste, special waste, or household toxic and hazardous wastes. It is expected that refinements in the sizing of the recommended facilities would be considered as part of subsequent implementation steps to accommodate selected institutional, commercial, and industrial recyclable wastes with characteristics similar to residential recyclable wastes. One nonresidential source of such recyclable materials which could be considered is the County's own facilities, described in detail in Chapter IX.

### **ALTERNATIVE MANAGEMENT PLANS FOR RECYCLING RESIDENTIAL RECYCLABLE SOLID WASTE**

The principal features and costs of the six alternative plans dealing with the residentially generated recyclable solid waste material are summarized in Table 39. Each alternative is described below. The detailed data utilized in the development of the cost estimate for each alternative are provided in Appendix C. All costs

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<sup>1</sup>*Franklin Associates, Ltd., Generation and Demand for Selected Postconsumer Papers in Wisconsin, 1990 to 2001, February 1993; Resource Recycling Systems, Inc., Supply and Demand Study for Recyclable Metal Cans, February 1992; Resource Recycling Systems, Inc., Supply and Demand Study: Recyclable Plastics, July 1992; and Resource Management Associates, Glass Container Markets in Wisconsin, July 1992.*

Table 37

**ESTIMATED ANNUAL QUANTITY OF RECOVERED RECYCLABLE RESIDENTIAL  
SOLID WASTE MATERIALS ANTICIPATED TO BE MANAGED THROUGH CURBSIDE  
RECYCLING IN THE WALWORTH COUNTY STUDY AREA: 1992-2010**

Product Category	Existing 1992				Intermediate-Growth Centralized Scenario: 2000			
	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream
<b>Paper</b>								
Newspaper .....	3,172	41	1,308	61	3,386	65	2,219	31
Corrugated Containers .....	427	18	75	3	559	70	394	6
Magazines .....	654	0	0	0	827	55	458	6
Office Wastepaper .....	129	0	0	0	211	55	116	2
Mixed Wastepaper .....	4,218	0	0	0	5,156	10	519	7
Subtotal	8,600	16	1,383	64	10,139	36	3,706	52
<b>Metal Containers</b>								
Aluminum Cans .....	398	8	34	2	550	90	498	7
Steel or Tin Cans .....	683	15	93	4	635	50	320	4
Subtotal	1,081	12	127	6	1,185	69	818	11
<b>Plastic Containers</b>								
No. 1 (PET) .....	341	10	34	1.4	389	67	261	3.5
No. 2 (HDPE) .....	634	9	59	2.6	751	63	477	6.5
No. 3 (PVC) .....	52	0	0	0	65	0	0	0
No. 4 (LDPE) .....	21	0	0	0	25	0	0	0
No. 5 (PP) .....	73	0	0	0	90	0	0	0
No. 6 (PS) .....	416	0	0	0	510	0	0	0
No. 7 Other (mixed or multi-layered) .....	7	0	0	0	9	0	0	0
Miscellaneous Recycled Plastic .....	0	0	0	0	0	0	0	0
Subtotal	1,544	6	93	4	1,839	40	738	10
<b>Glass Containers</b>								
Clear .....	1,542	25	380	19	1,523	75	1,150	16
Green .....	556	17	90	4	523	75	395	6
Amber .....	488	16	75	3	444	75	339	5
Subtotal	2,586	22	545	26	2,490	75	1,884	27
<b>Total</b>	<b>13,811</b>	<b>16</b>	<b>2,148</b>	<b>100</b>	<b>15,653</b>	<b>45</b>	<b>7,146</b>	<b>100</b>

Product Category	Intermediate-Growth Centralized Scenario: 2010				High-Growth Decentralized Scenario: 2010			
	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream
<b>Paper</b>								
Newspaper .....	3,654	65	2,369	29	5,853	65	3,799	29
Corrugated Containers .....	757	70	530	6	1,213	70	850	6
Magazines .....	1,021	55	562	7	1,634	55	900	7
Office Wastepaper .....	296	55	163	2	475	55	262	2
Mixed Wastepaper .....	6,255	10	626	8	10,019	10	1,003	8
Subtotal	11,983	35	4,250	52	19,194	35	6,814	52
<b>Metal Containers</b>								
Aluminum Cans .....	691	90	622	8	1,107	90	998	8
Steel or Tin Cans .....	626	50	313	4	1,002	50	502	4
Subtotal	1,317	71	935	12	2,109	71	1,500	12
<b>Plastic Containers</b>								
No. 1 (PET) .....	472	67	317	4	757	67	508	4
No. 2 (HDPE) .....	915	63	577	7	1,465	63	924	7
No. 3 (PVC) .....	80	52	41	0.5	128	52	67	0.5
No. 4 (LDPE) .....	30	52	16	0.2	48	52	25	0.2
No. 5 (PP) .....	110	52	57	0.7	175	52	91	0.7
No. 6 (PS) .....	621	17	106	1.3	994	17	170	1.3
No. 7 Other (mixed or multi-layered) .....	10	52	5	0.1	17	52	9	0.1
Miscellaneous Recycled Plastic .....	31	52	16	0.2	50	52	26	0.2
Subtotal	2,269	50	1,135	14	3,634	50	1,820	14
<b>Glass Containers</b>								
Clear .....	1,466	75	1,100	13	2,348	75	1,761	13
Green .....	505	75	379	5	808	75	606	5
Amber .....	433	75	325	4	693	75	520	4
Subtotal	2,404	75	1,804	22	3,849	75	2,887	22
<b>Total</b>	<b>17,973</b>	<b>45</b>	<b>8,124</b>	<b>100</b>	<b>28,786</b>	<b>45</b>	<b>13,021</b>	<b>100</b>

NOTE: The following abbreviations are used in this table: HDPE = High-Density Polyethylene; LDPE = Low-Density Polyethylene; PET = Polyethylene Terephthalate; PP = Polypropylene; PS = Polystyrene Foam; and PVC = Polyvinyl Chloride.

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Department, and SEWRPC.

Table 38

**ESTIMATED ANNUAL QUANTITY OF RECOVERED RECYCLABLE RESIDENTIAL  
SOLID WASTE MATERIALS ANTICIPATED TO BE MANAGED THROUGH DROP-OFF  
RECYCLING IN THE WALWORTH COUNTY STUDY AREA: 1992-2010**

Product Category	Existing 1992				Intermediate-Growth Centralized Scenario: 2000			
	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream
<b>Paper</b>								
Newspaper .....	1,708	41	707	61	1,808	65	1,175	31
Corrugated Containers .....	190	18	35	3	298	70	209	6
Magazines .....	379	0	0	0	441	55	243	6
Office Wastepaper .....	90	0	0	0	112	55	62	2
Mixed Wastepaper .....	2,360	0	0	0	2,750	10	275	7
Subtotal	4,727	16	742	64	5,409	36	1,964	52
<b>Metal Containers</b>								
Aluminum Cans .....	274	8	23	2	293	90	264	7
Steel or Tin Cans .....	305	15	47	4	339	50	170	4
Subtotal	579	12	70	6	632	69	434	11
<b>Plastic Containers</b>								
No. 1 (PET) .....	154	10	16	1.4	207	67	139	3.5
No. 2 (HDPE) .....	319	9	30	2.6	400	63	252	6.5
No. 3 (PVC) .....	30	0	0	0	35	0	0	0
No. 4 (LDPE) .....	11	0	0	0	13	0	0	0
No. 5 (PP) .....	41	0	0	0	48	0	0	0
No. 6 (PS) .....	231	0	0	0	272	0	0	0
No. 7 Other (mixed or multi-layered) .....	4	0	0	0	4	0	0	0
Miscellaneous Recycled Plastic .....	0	0	0	0	0	0	0	0
Subtotal	790	6	46	4	979	40	391	10
<b>Glass Containers</b>								
Clear .....	866	25	220	19	811	75	608	16
Green .....	270	17	47	4	279	75	210	6
Amber .....	213	16	35	3	240	75	180	5
Subtotal	1,349	22	302	26	1,330	75	998	27
<b>Total</b>	<b>7,445</b>	<b>16</b>	<b>1,160</b>	<b>100</b>	<b>8,350</b>	<b>45</b>	<b>3,787</b>	<b>100</b>

Product Category	Intermediate-Growth Centralized Scenario: 2010				High-Growth Decentralized Scenario: 2010			
	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream	Quantity Generated (tons)	Percent Recovered and Recycled	Quantity Recovered and Recycled (tons)	Percent of Recycled Waste Stream
<b>Paper</b>								
Newspaper .....	1,935	65	1,258	29	3,100	65	2,019	29
Corrugated Containers .....	401	70	281	6	642	70	452	6
Magazines .....	540	55	297	7	866	55	478	7
Office Wastepaper .....	157	55	86	2	251	55	139	2
Mixed Wastepaper .....	3,312	10	331	8	5,306	10	533	8
Subtotal	6,345	36	2,253	52	10,165	36	3,621	52
<b>Metal Containers</b>								
Aluminum Cans .....	366	90	329	8	587	90	530	8
Steel or Tin Cans .....	331	50	166	4	530	50	267	4
Subtotal	697	71	495	12	1,117	71	797	12
<b>Plastic Containers</b>								
No. 1 (PET) .....	250	67	167	4	401	67	270	4
No. 2 (HDPE) .....	485	63	305	7	776	63	491	7
No. 3 (PVC) .....	42	52	22	0.5	68	52	35	0.5
No. 4 (LDPE) .....	16	52	8	0.2	26	52	14	0.2
No. 5 (PP) .....	58	52	30	0.7	93	52	49	0.7
No. 6 (PS) .....	329	17	56	1.3	527	17	92	1.3
No. 7 Other (mixed or multi-layered) .....	5	52	3	0.1	9	52	5	0.1
Miscellaneous Recycled Plastic .....	17	52	9	0.2	27	52	14	0.2
Subtotal	1,202	50	600	14	1,927	51	970	14
<b>Glass Containers</b>								
Clear .....	776	75	582	13	1,244	75	935	13
Green .....	267	75	200	5	428	75	323	5
Amber .....	229	75	172	4	367	75	277	4
Subtotal	1,272	75	954	22	2,039	75	1,535	22
<b>Total</b>	<b>9,516</b>	<b>45</b>	<b>4,302</b>	<b>100</b>	<b>15,248</b>	<b>45</b>	<b>6,923</b>	<b>100</b>

NOTE: The following abbreviations are used in this table: HDPE = High-Density Polyethylene; LDPE = Low-Density Polyethylene; PET = Polyethylene Terephthalate; PP = Polypropylene; PS = Polystyrene Foam; and PVC = Polyvinyl Chloride.

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Department, and SEWRPC.

Table 39

**SELECTED COST ANALYSIS DATA FOR RESIDENTIAL  
ALTERNATIVE RECYCLING PLANS IN WALWORTH COUNTY**

Alternative Plan	Initial Capital Cost	Average Annual Operation and Maintenance Cost	Total Cost of Capital Operation and Maintenance	
			Total Annual Cost <sup>a</sup>	Cost per Ton of Recycled Material
No. 1: Continued Use of Existing Recyclable Waste Management Systems	- -	\$586,000	\$586,000	\$54
No. 2: Processing the Drop-Off Collected Portion of Recyclable Waste at a Transfer Station and Sorting Facility, Minimal Degree of Technology	\$ 458,000	608,000	648,000	59
No. 3A: Processing All Collected Recyclable Waste at a Processing Facility, Low Degree of Technology	1,980,000	522,000	694,000	64
No. 3B: Continued Use of Two Material Recovery Facilities Currently Serving the County; All Other Material Processed at Processing Facility, Low Degree of Technology	1,510,000	540,000	671,000	61
No. 4A: Processing All Collected Recyclable Waste at a Processing Facility, Moderate Degree of Technology	2,400,000	510,000	719,000	66
No. 4B: Continued Use of Two Material Recovery Facilities Currently Serving the County; All Other Material Processed at the Processing Facility, Low Degree of Technology	1,800,000	530,000	687,000	63

<sup>a</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 20-year period.

Source: SEWRPC.

are expressed in 1993 dollars. The alternative management plans consider the management of the recyclable wastes from post-collection to market, generally assuming that the existing collection systems will continue to be used with some refinement to be developed by the local communities and private haulers on a community-by-community basis and considering local cost, labor, and environmental concerns. For the purpose of describing alternative plans, it was assumed that three communities, the City of Delavan, and the Villages of Fontana and Williams Bay, will convert to curbside collection service early in the planning period, bringing

the total count to 15 communities providing such recycling service and 12 communities providing drop-off service.

For cost-estimating purposes, it was assumed that the recyclable materials will be transported to a secondary material market, which will subsequently provide the market transport containers and vehicles and will arrange for the transportation of the processed recycled waste resource material product to final market. Marketing the material product to higher-level markets can generate higher revenues. However, these higher revenues are generally often offset



by the higher capital and operation costs of supplying the transport vehicles and transporting the material products to market.

#### Alternative Plan No. 1

##### Continued Use of Existing

##### Recyclable Waste Management Systems

Under Alternative Plan No. 1, the residential recyclable solid waste generated in the study area would be managed in the same manner as the existing recycled waste management system manages them. The principal components of this alternative management plan are: 1) transport of collected, source-separated, recyclable waste material to the various existing transfer stations, processing facilities, and markets, 2) processing the recyclable waste material into recycled waste resource material at the facilities currently used, 3) transportation and marketing the recycled waste resource materials, and 4) transport and disposal of the processing residue waste material at a landfill. The major facilities to be included under Alternative Plan No. 1 are shown on Map 12.

The post-collection recyclable solid waste transportation system in the study area would, under this alternative, be similar to the existing system of curbside and drop-off programs, in which the post-collected wastes are transported to the various existing privately owned and operated transfer stations, processing facilities, and markets, as shown on Map 12.

Under this alternative, the costs of processing and transporting the recycled waste resource material products and the costs and revenues resulting from the sale of the material products are all estimated to be part of a contractual charge to be paid to a private contractor who becomes the owner of the recyclables once they are transported to the processing and sorting facilities. Capital costs for facility expansion and upgrading are assumed to be made incrementally over the planning period and are included in the annual costs. The process residue and contaminants generated and collected during processing are transported to a landfill in the County for disposal.

The total estimated average annual cost for continuing contractual arrangements similar to those of the existing recycling systems as proposed under Alternative Plan No. 1 is \$586,000, including an estimated annual net cost of \$70,000 based upon estimated contract costs

for the pickup, transport, and sale of the recycled material products delivered to the drop-off centers. The total average annual capital and operation and maintenance cost is \$586,000, or about \$54 per ton of recyclable material.

#### Alternative Plan No. 2: Processing the Portion of Recyclable Waste Collected by Drop-Off at a Countywide Transfer Station and Sorting Facility, Incorporating a Minimal Degree of Technology

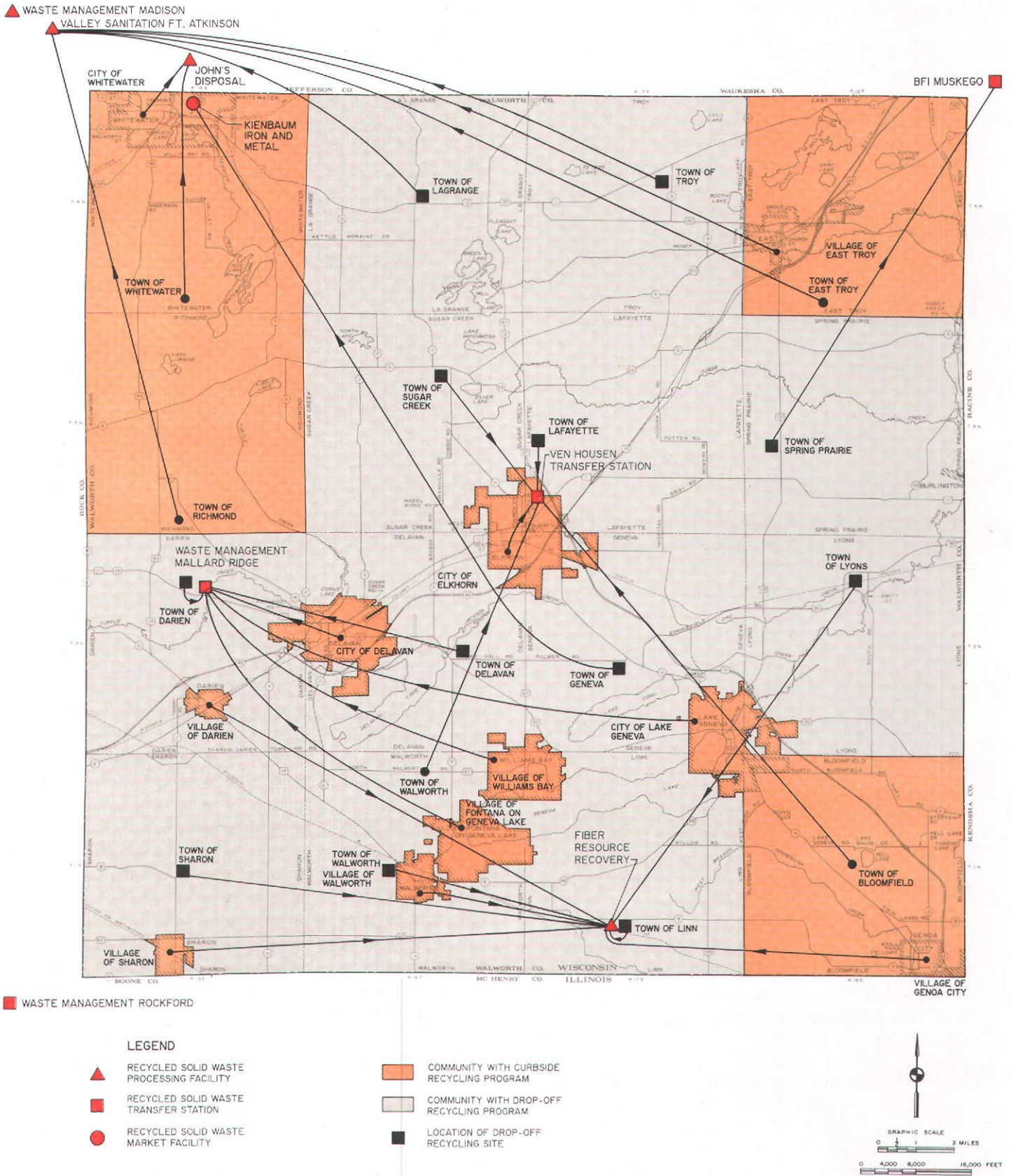
Under Alternative Plan No. 2, the recyclable solid waste generated in the study area would continue to be collected in the same manner as under the existing recycled waste management system, with the same refinements described above under Alternative Plan No. 1. The curbside residential recycling programs, including collection and transportation of recyclables to existing transfer stations, processing facilities, or markets, would continue. However, the materials collected at the drop-off recycling collection centers would be transported to a single, centrally located materials transfer station and sorting facility. The transfer station and sorting facility proposed under this alternative is to incorporate a minimal degree of technology and mechanization, designed to handle only those materials collected by drop-off programs.

The principal components of this alternative management plan are: 1) transportation of curbside-collected, source-separated, recyclable waste material by private hauler, to the existing transfer stations, processing facilities, and markets, 2) transportation of the drop-off recycling center, source-separated, recyclable waste material to the proposed transfer station and sorting facility, 3) processing the recyclable waste material into recycled waste resource material at the proposed transfer station and sorting facility for the materials received at the drop-off centers and at the facilities that are currently serving the curbside collection programs, 4) transportation and marketing of the recycled waste resource materials, and 5) transport and disposal of the processing residue waste material at a landfill. The major facilities to be included under Alternative Plan No. 2 are shown on Map 13.

Under this alternative, the transfer and sorting facility would be centrally located within the County in the vicinity of the County Lakeland Complex, near the City of Elkhorn. Alterna-

Map 12

ALTERNATIVE PLAN NO. 1: CONTINUED USE OF EXISTING RECYCLABLE WASTE MANAGEMENT SYSTEMS

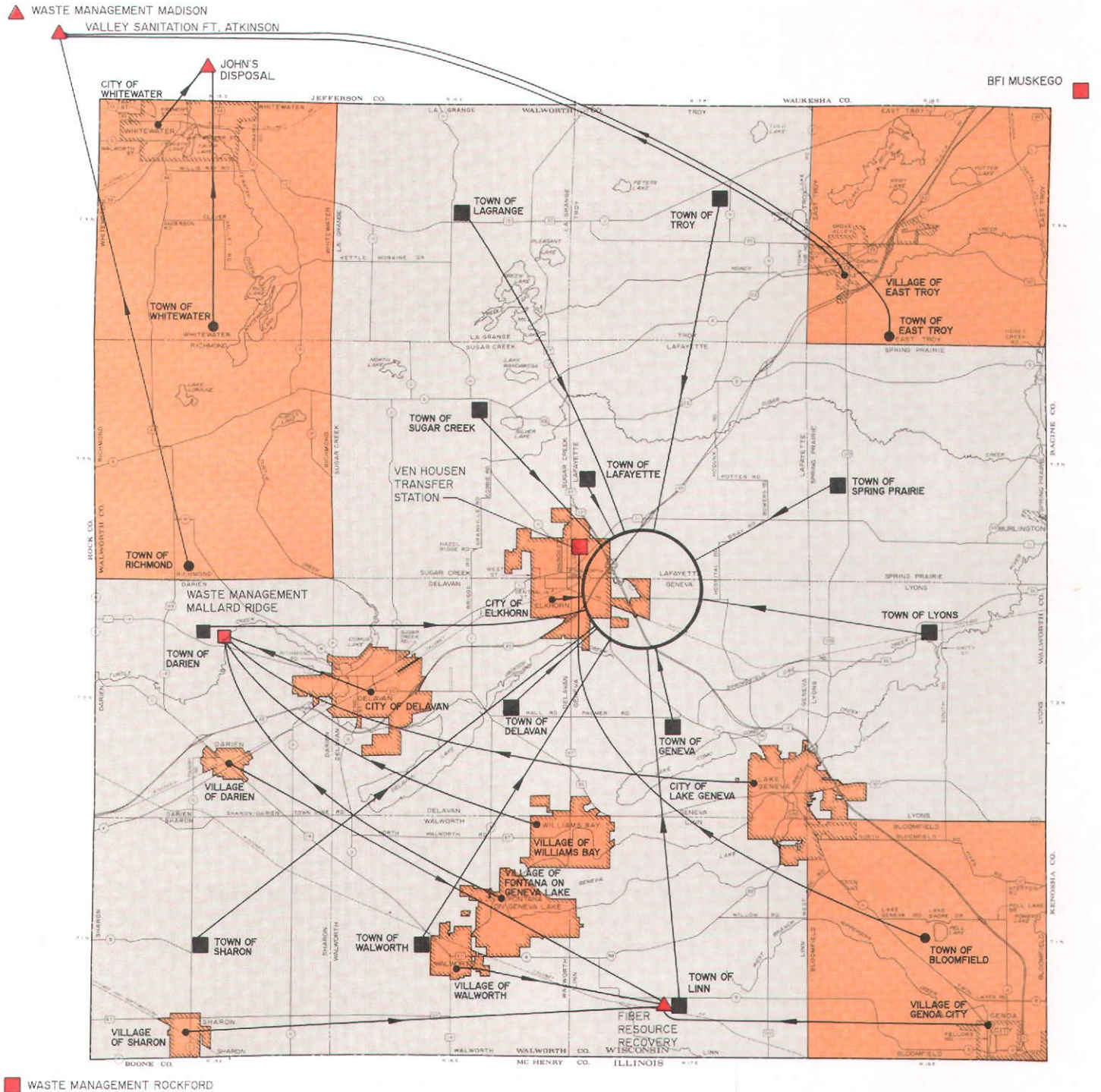


Source: Walworth County Solid Waste Department and SEWRPC.



Map 13

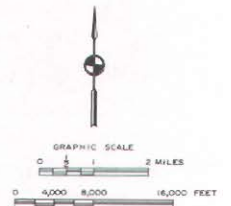
**ALTERNATIVE PLAN NO. 2: CONTINUED USE OF EXISTING CURBSIDE RECYCLING SYSTEMS WITH PROCESSING OF DROP-OFF SYSTEM MATERIAL AT COUNTYWIDE TRANSFER STATION**



**LEGEND**

- RECYCLED SOLID WASTE PROCESSING FACILITY
- RECYCLED SOLID WASTE TRANSFER STATION
- COMMUNITY WITH CURBSIDE RECYCLING PROGRAM
- COMMUNITY WITH DROP-OFF RECYCLING PROGRAM

- COUNTYWIDE TRANSFER STATION TO BE LOCATED WITHIN AREA CIRCLED
- LOCATION OF DROP-OFF RECYCLING SITE



Source: Walworth County Solid Waste Department and SEWRPC.

tively, this facility could be an expansion of an existing MRF. However, for fiscal reasons, it was assumed a new facility would be developed at the County Lakeland Complex. The proposed transfer station and sorting facility would have a capacity of about 18 tons per day of recycled material. After processing, or transfer and sorting of the drop-off center recyclables, the recycled waste resource material products are transported to market and the revenues generated from the sale of the material products are used to partially offset the operation and maintenance cost of processing the material. In the case of the materials collected at curbside and processed at the existing private operations, the revenues from the sale of the recyclables are considered to be factored into the overall contract charges for transportation, processing, and marketing. In the case of the centralized facility used for transfer and sorting of the drop-off recycled materials, the revenues from the sale of recyclables are calculated separately from the capital and operation cost. The process residue and contaminants that are generated and collected during the process at the transfer and sorting facility are transported to a landfill in the County for disposal.

The estimated capital cost for the development of the solid waste management facilities proposed under Alternative Plan No. 2 is \$458,000, with an average annual net operating and maintenance cost of \$608,000, including an estimated annual credit of \$25,000 from the revenues generated from the centralized transfer and sorting facility. The total average annual cost of the capital and operation and maintenance is \$648,000, or about \$59 per ton of recycled material.

Alternative Plan No. 3A: Processing  
All Collected Recyclable Waste at a  
Countywide Processing Facility,  
Incorporating a Low Degree of Technology

Under Alternative Plan No. 3A, the recyclable solid waste generated in the study area would continue to be collected in the same manner as under the existing recycled waste management plan. The materials collected in the curbside recycling programs as well as those collected at the drop-off recycling centers would be transported to a single, centrally located materials processing facility. The processing facility proposed under this alternative is to incorporate a low degree of technology and mechanization.

The principal components of this alternative management plan are: 1) transportation of collected, source-separated, recyclable waste material by private hauler to the proposed processing facility, 2) processing the recyclable waste material into recycled waste resource material at the proposed processing facility, 3) transporting and marketing the recycled waste resource materials, and 4) transport and disposal of the processing residue waste material at a landfill. The major facilities to be included under Alternative Plan No. 3A are shown on Map 14.

Under this alternative, the processing would be done at a new MRF centrally located within the County in the vicinity of the County Lakeland Complex, near the City of Elkhorn. Alternatively, this facility could be an expansion of an existing MRF. However, for fiscal reasons, it was assumed a new facility would be developed at the County Lakeland Complex. It is intended that the new MRF receive only source-separated recyclable materials. The capacity of the new facility would be 50 tons per day. The recyclable materials transported to the new MRF would require only separation into two distinct forms. One stream would consist of paper, including newspaper, corrugated containers, magazines, and office and mixed waste paper; the other stream would consist of commingled containers, including ferrous and aluminum cans, glass containers, and plastic containers, initially only PET and HDPE, but expanding to include all plastic resins Nos. 1 through 7 as recycling technologies and markets increase for plastic resins Nos. 3 through 7.

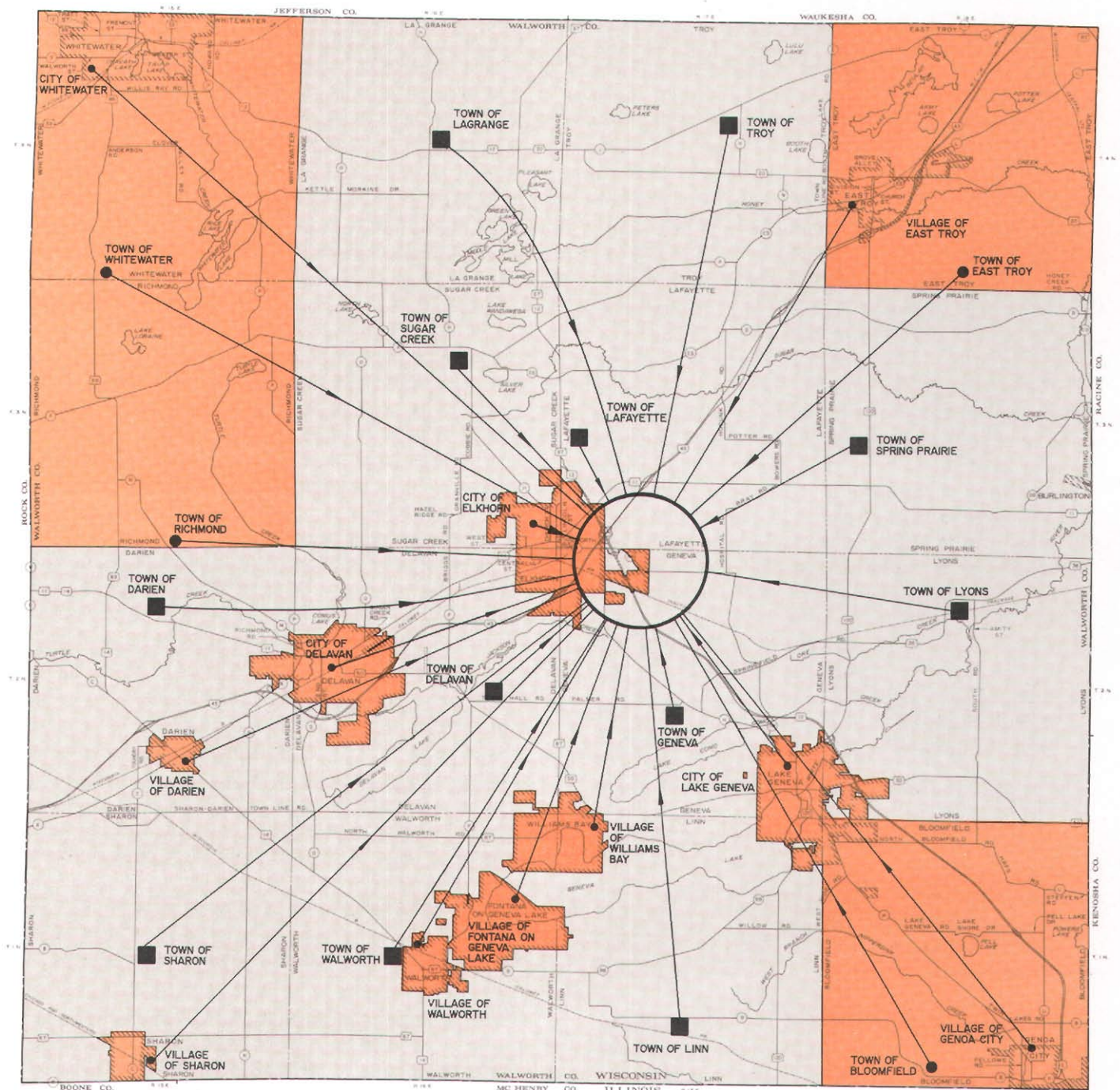
For each of the two incoming fractions of recyclable materials, paper and commingled containers, the MRF will provide raw materials storage, means for separation and processing, storage for finished products, and storage prior to shipping the finished products to market in the separated form.

The processing facility envisioned would provide hand sorting on two separate tipping floor areas, one for paper and one for commingled containers. Materials would be weighed separately. At the paper sorting station, materials would be manually separated into three recyclable components, cardboard, newspaper, and other mixed papers, with the residue to be disposed of by landfilling. The separated paper streams would then be moved by conveyor to a baling station



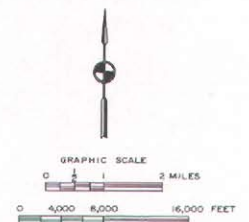
Map 14

**ALTERNATIVE PLANS NO. 3A AND 4A: PROCESSING ALL RECYCLABLE WASTE AT  
COUNTYWIDE LOW- AND MODERATE-TECHNOLOGY MATERIALS RECYCLING FACILITY**



**LEGEND**

- COMMUNITYWIDE CURBSIDE RECYCLING PROGRAM
- COMMUNITYWIDE DROP-OFF RECYCLING PROGRAM
- COUNTYWIDE LOW AND MODERATE-TECH MATERIAL RECYCLING FACILITY TO BE LOCATED WITHIN AREA CIRCLED
- LOCATION OF DROP-OFF RECYCLING SITE



Source: Walworth County Solid Waste Department and SEWRPC.

to be baled prior to being picked up for transport to markets. The commingled containers would be loaded from the tipping floor to a sorting conveyor which would pass through a sorting station where materials would be manually sorted into bi-metal, aluminum, PET plastic, HDPE plastic, and glass in three colors. Residual waste materials would be segregated for transport to a landfill. Processing would include crushing metal and plastic containers. The recyclable material would be stored loose in large containers prior to being picked up for transport to markets. Residual waste materials would be segregated for transport to a landfill.

The estimated capital cost for the development of the solid waste management facilities proposed under Alternative Plan No. 3A is \$1,980,000, with an average annual net operating and maintenance cost of \$522,000, including an estimated annual credit of \$330,000 derived from the revenues generated from the sale of the recycled waste resource material products. The total average annual cost of the capital and operation and maintenance is \$694,000, or about \$64 per ton of recycled material.

Alternative Plan No. 3B: Continued Use of the Two Material Recovery Facilities Currently Serving the County, with All Other Material Processed at the Countywide Processing Facility, Incorporating a Low Degree of Technology

Under Alternative Plan No. 3B, the recyclable solid waste generated in the study area would continue to be collected in the same manner as under the existing recycled waste management system. Under this alternative, it was assumed that materials which are currently transported to the Fiber Resource Recovery and the John's Disposal facilities would continue to be transported to these facilities. All other collected material would be transported to a single, centrally located MRF for processing. The new MRF proposed under this alternative is to incorporate a low degree of technology and mechanization.

The principal components of this alternative management plan are: 1) transportation of collected, source-separated, recyclable waste material by private hauler, to two existing material recovery facilities in the areas that these facilities are currently serving, 2) transportation of all other collected source separated recyclable waste material by private hauler to a proposed new processing facility, 3) processing

the recyclable waste material into recycled waste resource material at the two existing and one new processing facility, 4) transportation and marketing the recycled waste resource materials, and 5) transport and disposal of the processing residue waste material at a landfill. The major facilities to be included under Alternative Plan No. 3B are shown on Map 15.

The proposed new MRF would be similar to that described under Alternative Plan No. 3A. However, the capacity would be reduced from 50 tons of recyclables per day to about 36 tons. For cost analysis purposes, the new facility was assumed to be located in the vicinity of the County Lakeland Complex.

The estimated capital cost for the development of the solid waste management facilities proposed under Alternative Plan No. 3B is \$1,510,000, with an average annual net operating and maintenance cost of \$540,000, including an estimated annual credit of \$240,000 derived from the revenues generated from the sale of the recycled waste resource material products. The total average annual cost of the capital and operation and maintenance is \$671,000, or about \$61 per ton of recycled material.

Alternative Plan No. 4A: Processing All Collected Recyclable Waste at a Countywide Processing Facility, Incorporating a Medium Degree of Technology

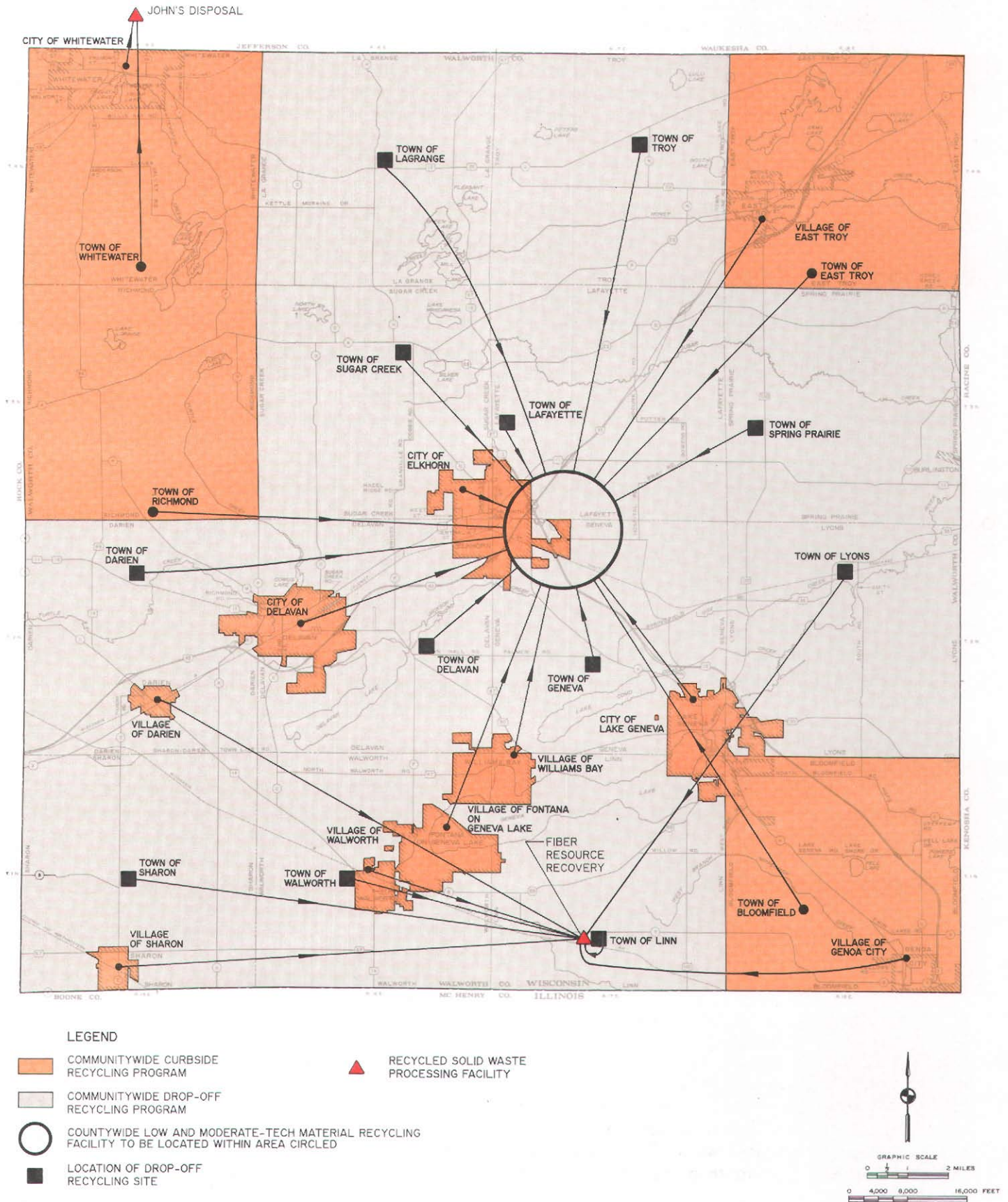
Under Alternative Plan No. 4A, the residential recyclable solid waste generated in the study area would be transported in the same manner as described under Alternative Plan No. 3A. The only difference between Alternative Plan No. 3A and Alternative Plan No. 4A is the degree of technology and mechanization used in the MRF.

The principal components of this alternative management plan are: 1) transport of collected, source-separated, recyclable waste material to a centralized MRF, 2) processing the recyclable waste material into recycled waste resource material product at a new MRF which would incorporate a medium degree of technology and mechanization, 3) transporting and marketing the recycled waste resource materials, and 4) transport and disposal of the processing residue waste material at a landfill. The major facilities to be included in the Alternative 4A are shown on Map 14.



Map 15

ALTERNATIVE PLANS NO. 3B AND 4B: PROCESSING ALL RECYCLABLE  
WASTE AT COUNTYWIDE LOW- AND MODERATE-TECHNOLOGY MATERIALS RECYCLING  
FACILITY WITH CONTINUED OPERATION OF THE TWO EXISTING FACILITIES



Source: Walworth County Solid Waste Department and SEWRPC.

As described under Alternative Plan No. 3A, the processing would be done at a new MRF, assumed to be located in the vicinity of the County Lakeland Complex, near the City of Elkhorn. The facility would have a capacity of 50 tons of recyclables per day. It is intended that the new MRF receive only source-separated recyclable materials. The recyclable materials transported to the new MRF would require only separation into two distinct forms. One stream would consist of paper, including newspaper, corrugated containers, magazines, and office and mixed waste paper; the other stream would consist of commingled containers, including ferrous and aluminum cans, glass containers, and plastic containers initially consisting of only PET and HDPE, but expanding to include all plastic resins Nos. 1 through 7 as recycling technologies and markets increase for plastic resins Nos. 3 through 7.

For each of the two incoming fractions of recyclable materials, the MRF will provide raw materials storage, means for separation and processing, storage for finished products, and storage prior to shipping the finished products to market in the separated form. Incoming materials would be weighed separately for each of the two incoming materials.

The processing facility envisioned would provide two separate infeed conveyors, one for paper and one for commingled containers. The paper infeed conveyor would have a sorting station where paper would be separated into three recyclable components, cardboard, newspaper, and other mixed papers, with the residue to be disposed of by landfilling. The mixed papers would be further sorted at a second station by separating the higher grades from the remaining paper. These two streams would then be moved by conveyor to a baling station to be baled prior to being picked up for transport to markets. The commingled containers would be loaded to an infeed conveyor where the bi-metal and tin containers would be separated by magnetic separation. The remaining commingled containers would be transported on a sorting conveyor which would pass through a sorting station where materials would be further divided into aluminum, PET plastic, HDPE plastic, and glass in three colors. Metal and plastic containers would be crushed and baled as appropriate. The glass recyclable material would be stored loose in large containers prior to being picked up for

transport to markets. Residual waste materials would be segregated for transport to a landfill.

The estimated capital cost for the development of the solid waste management facilities proposed under Alternative Plan No. 4A is \$2,400,000, with an average annual net operating and maintenance cost of \$510,000, including an estimated annual credit of \$357,000 derived from the revenues generated from the sale of the recycled waste resource material products. The total average annual cost of the capital and operation and maintenance is \$719,000, or about \$66 per ton of recycled material.

Alternative Plan No. 4B: Continued  
Use of the Two Material Recovery  
Facilities Currently Serving the  
County, with All Other Material Processed  
at the Countywide Processing Facility,  
Incorporating a Medium Degree of Technology

Alternative Plan No. 4B is the same as Alternative Plan No. 3B except for the level of mechanization to be used at the new MRF. The recyclable solid waste generated in the study area would continue to be collected in the same manner as under the existing recycled waste management system. Under this alternative, it was assumed that materials currently transported to the Fiber Resource Recovery and the John's Disposal facilities would continue to be transported to these facilities. All other collected material would be transported to a single, centrally located MRF for processing. The new MRF proposed under this alternative is to incorporate a medium degree of technology and mechanization and would have the same components as described for the new MRF under Alternative Plan No. 4A.

The principal components of this alternative management plan are: 1) transportation of collected, source-separated, recyclable waste material by private hauler to two existing material recovery facilities in the areas that these facilities are currently serving, 2) transportation of all other collected, source-separated, recyclable waste material by private hauler to a proposed new processing facility, 3) processing the recyclable waste material into recycled waste resource material at the two existing and one new processing facility, 4) transportation and marketing the recycled waste resource materials, and 5) transport and disposal of the processing residue waste material at a landfill. The major facilities to be included under Alternative Plan No. 4B are shown on Map 15.



The proposed new MRF would be similar to that described under Alternative Plan No. 4A. However, the capacity would be reduced from 50 to about 36 tons per day. For cost-analysis purposes, the new facility was assumed to be located in the vicinity of the County Lakeland Complex.

The estimated capital cost for the development of the solid waste management facilities proposed under Alternative Plan No. 4B is \$1,800,000, with an average annual net operating and maintenance cost of \$530,000, including an estimated annual credit of \$262,000 derived from the revenues generated from the sale of the recycled waste resource material products. The total average annual cost of the capital and operation and maintenance is \$687,000, or about \$63 per ton of recycled material.

### EVALUATION OF ALTERNATIVES FOR RECYCLING RESIDENTIAL MATERIALS

The preceding section of this chapter included a description of six alternative plans for recycling residential materials in Walworth County. All alternatives are designed to meet the requirements of the State recycling law and all are considered technically feasible. Thus, the evaluation of the alternative plans considers primarily costs, practicality of implementation, program flexibility, and the ability to meet changing market conditions and regulations.

Alternative Plan No. 1 has the advantage in that no specific major capital expenditure is required for new centralized facilities. The capital cost of operating a system similar to the existing system would continue to be privately funded and would eliminate the need for large initial capital expenditures. Capital expenditures would continue to be made for expanding and operating the existing facilities or for smaller, new facilities. However, these costs would be expected to be privately funded and covered through the charges for the recycling facilities.

Both Alternative Plan 1 and Alternative Plan 2 have capital costs significantly lower than the capital costs for Alternative Plans No. 3A, 3B, 4A, and 4B. Alternative Plan No. 1 has the lowest total cost, with Alternative Plan No. 2 having the second lowest cost, about 10 percent more than Alternative Plan No. 1.

Alternative Plans No. 3A, 3B, 4A, and 4B all require the construction of a new centralized

facility to process wastes from all, or portions, of the County. The costs of these alternatives is generally from 16 to 22 percent higher than under Alternative Plan No. 1, which provides for the continued use of the existing system.

With regard to implementability, Alternative Plan No. 1 requires no specific new implementation actions or institutional arrangements. Each of the other alternatives would require significant change in the current institutional arrangements and would be more difficult to implement than Alternative Plan No. 1 in that there would have to be cooperative agreements developed between the local units of government, such as the type of agreement provided for under Chapter 66.30 of the Wisconsin Statutes. Under Alternative Plan No. 1, there would be no constraints in providing for a competitive marketplace, with each community having the ability to select a contractor for recycling on the basis of costs, service, and other considerations. Under the other alternatives, competition based upon serving a larger user base could also be expected.

Transportation requirements under Alternative Plans No. 3B and 4B are the most favorable in that the materials are transported to three logical locations within the County which provide the shortest hauls of the alternatives considered. Transportation requirements under Alternative Plans No. 1 and 2 are the highest in that the proximity of the processing or transfer sites is driven in part by contractual arrangements rather than proximity to the source of the materials. Should fuel costs increase at a rate greater than inflation over time, this would be a further disadvantage for Alternative Plans No. 1 and 2. However, such fuel pricing changes could result in a change in the contractual arrangements, resulting in a more efficient transportation system.

With regard to program flexibility, each alternative could be adapted to changing regulations and recyclable materials compositions. Such changes would be required at decentralized facilities under Alternative Plans No. 1 and 2 and at more centralized facilities under the other alternatives. Modest changes may be more readily accommodated at a centralized facility. However, major changes could make major facility equipment and facilities obsolete. There appears to be no significant differences in the alternatives regarding flexibility and adaptability.

Upon evaluation of the alternatives considered, there appears to be no over-riding factors which would favor the construction of a major new centralized recycling facility in the County. This is particularly true in that the local units of government in the County, to date, have chosen to take the lead in recycling from their individual communities and there has been no significant interest in establishing a centralized system. Since the cost data indicate no savings in developing a centralized system, such a system is not recommended at this time. However, as discussed in Chapter IX, there are significant County costs which will be incurred over the planning period for disposal of solid waste materials and recycling at the County's own facilities. A review of the alternatives described above indicates that there may be certain advantages in a centralized, low-level processing-storage facility in the vicinity of the County Institutions if the facility could serve multiple purposes. Given these two considerations, it is recommended that the County, as part of its negotiations for handling its own solid waste and recyclables, consider including provisions to allow the establishment of a limited processing or transfer facility on open lands in the vicinity of the Lakeland Complex if the County's own costs could be reduced by the provision of such an arrangement. This could allow some compensation to the County for the use of the land and would make the travel distance for handling the County recyclables shorter than it would be otherwise. This type of arrangement could reduce the costs of recycling for other communities if the selected contractor for the County's recycling can make more efficient use of a transfer/processing site which serves the County facilities and other communities. The negotiations for such an arrangement should be considered further by the County Solid Waste Management Department in negotiating for solid waste and recyclable contracts over time.

#### CONSIDERATION OF IMPLEMENTATION AND INSTITUTIONAL ARRANGEMENTS

The institutional ownership and operation options for the facilities required for residential

recycling in Walworth County and the advantages and disadvantages of each are summarized in Table 40. In evaluating these options, consideration was given to the level of government involvement and control, the need for public capital investment, tax-base impacts, achievable economies of scale, financing, flexibility, availability of technical expertise, the potential for equipment-sharing, operational efficiency, and the need to develop new facilities and programs versus continued use of existing facilities and programs.

Upon the recommendations set forth in the preceding section to continue to rely largely on the existing collection, transfer, transportation, and processing system within Walworth County for recycling of residential solid waste, there is no apparent reason for a significant increased involvement by the County in the implementation and institutional arrangements. It is recommended that the current system, whereby the individual communities contract individually or jointly with private contractors, be continued. The County involvement is recommended to be limited to further evaluation of the potential ownership of a centralized transfer/processing site which would be constructed and operated by a private operator. The evaluation of such a County-private business cooperative arrangement would include consideration of the potential savings of such an arrangement to the County for handling the County's own solid waste and recyclable materials. Those negotiations would allow for consideration of use of the County-owned site in exchange for lower County costs and consideration of a facility in close proximity to the County facility. Use of a private site near the County facilities could potentially reduce the transportation cost to the County for recyclables and may have other potential savings. Upon receipt of detailed proposals by private operators, such an arrangement would have to be considered further. It is recommended that the Walworth County Solid Waste Department consider the option as part of the County contractual arrangements for solid waste and recycling services.

Table 40

**COMPARISON OF OWNERSHIP OPTIONS FOR THE PRELIMINARILY  
RECOMMENDED RESIDENTIAL RECYCLING PLAN FOR WALWORTH COUNTY**

Ownership Option	Level of Local Government Control	Level of County Government Control	Public Capital Expenditure	Tax Base Impact Status	Primary Decision-Making Criteria	Economy of Scale	Number of Financing Options	Maintains Existing System	Viability in Walworth County	Other
Private Nonprofit	Low	Low	No	Tax exempt	Nonprofit motivated	Low	Low	No	Viable	Provides for community involvement and revenues for nonprofit organizations
Private Profit-Oriented	Low	Low	No	No significant impact	Profit motivated	Low-moderate	Moderate	No	Viable	Technical expertise is available
Individual Municipality	High	Low	Yes	Tax exempt	Cost and level of service	Low	High	No	Viable	- -
Group of Municipalities	Moderate	Moderate	Yes	Tax exempt	Cost and level of service	Moderate	High	In some cases	Viable	Intermunicipality coordination required
County	Low	High	Yes	Tax exempt	Cost and level of service	High	High	No	Viable	Managerial and technical expertise easily retained
Individual Municipality and County	High	Low	Yes	Tax exempt	Cost and level of service	Low	High	In some cases	Viable	Provision of a compost product for municipal and citizen use

Operation Option	Level of Local Government Control	Level of County Government Control	Level of Flexibility	Decision-Making Criteria	Potential Availability of Technical Expertise	Potential for Equipment Sharing by Government Departments	Efficiency of Operation	Maintains Existing System	Viability in Walworth County
Private Nonprofit	Low	Low	Low	Level of involvement	Moderate	N/A	Moderate	In some cases	Viable
Private Profit-Oriented	Low	Low	Moderate	Profit motivated	High	N/A	High	In some cases	Viable
Individual Municipality	High	Low	Moderate	Cost and level of service	Moderate	High	Moderate	In some cases	Viable
Group of Municipalities	Moderate	Moderate	Moderate	Cost and level of service	Moderate	Moderate	High	No	Viable
County	Low	High	High	Cost and level of service	High	High	High	No	Viable
Individual Municipality	High	Low	Moderate	Cost and level of service	Moderate	High	High	In some cases	Viable

NOTE: N/A indicates information is not applicable.

Source: Walworth County Solid Waste Department and SEWRPC.

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## Chapter VI

# EVALUATION OF ALTERNATIVE YARD WASTE MANAGEMENT SYSTEMS

### INTRODUCTION

This chapter describes and evaluates alternative residential yard waste management systems to be considered for Walworth County. The selection of alternatives to be considered for use in Walworth County was based on consideration of the existing solid waste management systems operating in the County, State regulations governing solid waste management, the solid waste management objectives established under this study, and an understanding of yard waste management practices. In Chapter IV, the available yard waste management techniques which can be utilized were described and screened for potential applicability in Walworth County. Those measures which are considered to be applicable for use in Walworth County may be arranged in four classifications: source-separation measures, including onsite homeowner composting, mulching, and retention of grass clippings in place; yard waste collection by drop-off and curbside methods; centralized processing measures such as composting and chipping operations; and land application, including direct land spreading of leaves and grass on agricultural fields. This chapter provides further information and evaluations with regard to the alternative measures for managing yard waste which could be applicable in Walworth County and considers the role of the County in yard waste management.

Following this introductory section, the chapter documents the types and quantities of yard waste materials to be managed within the County. This is followed by a description of alternative means of source reduction, collection, centralized processing, and land application. The final sections of the chapter summarize the recommendations for County involvement in yard waste management.

### MATERIAL CONSIDERATIONS

Yard waste is generally considered to consist of four components: grass, leaves, brush and other wood waste, and such miscellaneous yard waste as garden weed residue and pine needles. In addition, similar types of materials such as

aquatic plant residue from weed harvesting are considered as yard waste. Consideration of yard waste management must include consideration of the quantities of such materials as well as the seasonal variations in the generation of these materials. Typically, grass clippings are generated throughout the growing season, with higher generation rates in spring. Brush and wood waste generation rates are generally the highest in spring and next highest in January as a result of Christmas tree and decoration discards. Leaves are nearly all generated in fall. Miscellaneous yard wastes such as garden waste and weeds are generated throughout the growing season, with higher rates in fall.

Based upon the inventory information documented in Chapter II, it is estimated that 5,300 tons per year of yard waste, excluding brush and wood waste, were generated by residential land uses in Walworth County during 1992. Assuming a density of 350 pounds per cubic yard, this equals about 30,000 cubic yards per year. Table 41 presents the amount of yard waste which may be expected to be collected in each civil division and the approximate area needed for a community composting site, assuming that 50 percent of the yard waste generated is collected in each community. Because of the current ban on landfilling of yard waste, this assumes the remaining 50 percent of the yard waste will remain on site and be managed by home composting, mulching and burning operations, or will be left in place. This quantity does not include aquatic plant harvesting residue which is generated both by individual lakeshore property owners who hand remove and/or collect drifted aquatic plants, and by municipalities and lake districts or associations who operate lakewide harvesting programs. These aquatic plant residues are normally disposed of by homeowners on site by garden application or composting and by lakewide program operators through land application. Thus, these materials are not specifically considered in the formulation of alternative plans.

In addition to the general yard waste amounts noted above, it is estimated that 1,600 tons of brush and wood wastes were generated in the County in 1992. The density of the brush and

Table 41

## POTENTIAL RESIDENTIAL YARD WASTE SUMMARY FOR WALWORTH COUNTY: 1992

Civil Division	1990 Population	Number of 1990 Households	Estimated Potential Amount of Yard Waste <sup>a</sup> Collected per Year <sup>b</sup>		Approximate Area Required for Composting Operation <sup>c</sup>
			Tons per Year	Cubic Yards per Year	
<b>Cities</b>					
Delavan . . . . .	6,073	2,355	234	1,337	0.6
Elkhorn . . . . .	5,337	2,100	187	1,069	0.5
Lake Geneva . . . . .	5,979	2,599	184	1,051	0.5
Whitewater . . . . .	12,636	3,631	242	1,383	0.6
Subtotal <sup>d</sup>	30,025	10,685	847	4,840	2.2
Subtotal <sup>e</sup>	30,025	10,685	847	4,840	2.1
<b>Villages</b>					
Darien . . . . .	1,158	390	40	229	0.5
East Troy . . . . .	2,664	979	138	789	0.5
Fontana . . . . .	1,635	652	94	537	0.5
Genoa City . . . . .	1,277	455	55	314	0.5
Sharon . . . . .	1,250	448	53	303	0.5
Walworth . . . . .	1,614	658	48	274	0.5
Williams Bay . . . . .	2,108	844	73	417	0.5
Subtotal <sup>d</sup>	11,706	4,426	501	2,863	3.5
Subtotal <sup>e</sup>	11,706	4,426	501	2,863	1.2
<b>Towns</b>					
Bloomfield . . . . .	3,723	1,412	95	543	0.5
Darien . . . . .	1,490	522	49	280	0.5
Delavan . . . . .	4,195	1,614	227	1,297	0.6
East Troy . . . . .	3,687	1,269	149	851	0.5
Geneva . . . . .	3,472	1,213	93	531	0.5
Lafayette . . . . .	1,276	436	39	223	0.5
LaGrange . . . . .	1,643	606	94	537	0.5
Linn . . . . .	2,062	817	99	566	0.5
Lyons . . . . .	2,579	968	77	440	0.5
Richmond . . . . .	1,405	526	75	429	0.5
Sharon . . . . .	1,016	333	33	189	0.5
Spring Prairie . . . . .	1,752	560	56	320	0.5
Sugar Creek . . . . .	2,661	895	80	457	0.5
Troy . . . . .	2,051	678	39	223	0.5
Walworth . . . . .	1,341	457	43	246	0.5
Whitewater . . . . .	1,378	497	44	251	0.5
Subtotal <sup>d</sup>	35,731	12,803	1,292	7,383	8.1
Subtotal <sup>e</sup>	35,731	12,803	1,292	7,383	3.2
<b>Total<sup>d</sup></b>	<b>77,462</b>	<b>27,914</b>	<b>2,640</b>	<b>15,086</b>	<b>13.8</b>
<b>Total<sup>e</sup></b>	<b>77,462</b>	<b>27,914</b>	<b>2,640</b>	<b>15,086</b>	<b>6.5</b>

<sup>a</sup>Includes leaves, grass, and garden wastes. Does not include trees and brush.

<sup>b</sup>Volume based upon assumption that 50 percent of amount generated is collected. Assumes leaves at 300 pounds per cubic yard and grass at 400 pounds per cubic yard. Remainder of yard waste is assumed to be handled "on site".

<sup>c</sup>Areas based upon a 50 percent volume reduction after one year, retention time of 18 months, and a ratio of one acre of facility for every 2,300 cubic yards of waste. Does not include the buffer area, which could be expected to increase site requirements by about 50 to 100 percent. A minimum site size of 0.5 acre is used.

<sup>d</sup>Based upon sum of individual sites.

<sup>e</sup>Based upon consideration of total amount generated.

Source: SEWRPC.

wood waste is variable. However, at an unprocessed density of 200 pounds per cubic yard, this would result in 16,000 cubic yards of material.

On the basis of planned design year 2010 development conditions described in Chapter III of this report, the amounts of these materials generated may be expected to range from about the same as in 1992 to as much as 40 percent more under the range of future conditions considered, depending upon the level of development which actually takes place within the County. Thus, by the year 2010, as much as 7,400 tons, or 42,000 cubic yards, of general yard waste and about 2,200 tons, or 22,000 cubic yards, of brush and wood wastes could be generated within the County.

## MANAGEMENT ALTERNATIVES FOR YARD WASTES

Management alternatives for yard waste and potential County involvement, including source-reduction, collection, centralized processing, and land application, are considered in the following paragraphs.

### Source Reduction

The quantity of yard waste collected for disposal can be reduced significantly through methods that manage this material more effectively on site. One approach to source-reduction which is relatively effective is to leave the grass clippings on the lawn rather than to collect and bag them. The clippings disintegrate relatively rapidly and provide a nutrient to the soil. Mowing the lawn more frequently and/or using a mulching lawn mower will keep the grass clippings fine enough to disintegrate within a few days without producing unsightly grass clumps and will minimize thatch build up. Additional methods of onsite management of grass and leaves include using these organic wastes for mulch in flower beds, gardens, and other plantings; chipping light brush; and developing of home compost piles.

Another potential means for source-reduction consists of the alteration of existing landscaping for the use of varieties of plant materials that produce less foliage and the use of grasses that grow at a slower rate, thus reducing the amount of yard waste generated. Reducing the amount of area covered by turf by using alternative ground cover, naturalizing the landscape, and putting plants in groups are also options.

Because the costs for collecting, transporting, and processing yard wastes off site can be significant, about \$20 to \$40 per ton, the use of onsite yard waste management methods should comprise a significant component of the County solid waste management plan. Because of the nature of such programs, however, the potential County role in onsite yard waste management would be limited to the provision of assistance in developing the public education and information programs which are needed to implement such programs. Accordingly, it is recommended that the County Solid Waste Management Department work cooperatively with the County University of Wisconsin Extension staff and the local units of government to implement the public education and information program needed to implement onsite yard waste management. Such a program could include the use of the news media; of nonmedia vehicles; of demonstrations, workshops, and displays; of the distribution of compost bins; and of the use of a "master composter" program.

Use of the news media may include public service announcements, news releases, and advertising. Use of the nonmedia vehicles may include the preparation and distribution of brochures, posters, fact sheets, and community newsletters. These materials can be developed at minimal cost by using available educational materials developed by others, such as the University of Wisconsin Extension Service and the Wisconsin Department of Natural Resources (DNR).

Demonstrations and displays on yard waste management could be developed for use at special events such as the County Fair or for periodic stationing at sites where interest may be attracted, including school sites. Displays could be part of, or be separate from, other material recycling-related displays. A permanent demonstration site could also potentially be developed at the County Lakeland Complex.

The distribution of compost units or bins or of information on where compost units and plans for the construction of such bins and units may be obtained can be a useful method of implementation. Home composting units typically cost from \$20 to \$60.

Another program which could be considered is the "master composter" program, involving a training session to develop volunteers who can then act as advisors to residents on home

Table 42

## COMPARISON OF YEAR WASTE COLLECTION OPTIONS

Method	Advantages	Disadvantages	Cost per Cubic Yard
Curbside Pickup Vacuum	<ul style="list-style-type: none"> <li>• Flexibility</li> <li>• Speed of operation</li> </ul>	<ul style="list-style-type: none"> <li>• Some traffic disruption</li> <li>• Operational problems during wet weather</li> <li>• Not appropriate for grass</li> </ul>	\$10 to \$35
Front-End Loader and Truck	<ul style="list-style-type: none"> <li>• Ability to handle large loads and wet leaves</li> </ul>	<ul style="list-style-type: none"> <li>• Requires some manual handling of leaves</li> <li>• Traffic disruption</li> <li>• Potential for street damage</li> <li>• Not appropriate for grass</li> </ul>	\$20 to \$30
Leaf Loader	<ul style="list-style-type: none"> <li>• Speed of operation</li> </ul>	<ul style="list-style-type: none"> <li>• Limited collection on street with parked vehicles</li> <li>• Not appropriate for grass</li> </ul>	--
Plastic Bags	<ul style="list-style-type: none"> <li>• Convenience to resident</li> <li>• Can be collected in a variety of trucks</li> </ul>	<ul style="list-style-type: none"> <li>• Bags must be separated</li> <li>• Bags may contain trash</li> </ul>	\$5 to \$10
Paper Bags	<ul style="list-style-type: none"> <li>• Bag is biodegradable</li> <li>• Can be collected in a variety of trucks</li> </ul>	<ul style="list-style-type: none"> <li>• Bags must be purchased at specific locations</li> <li>• Bags can increase time required for composting</li> </ul>	\$5 to \$10
Rigid Containers	<ul style="list-style-type: none"> <li>• Reusable</li> </ul>	<ul style="list-style-type: none"> <li>• Size limitations</li> </ul>	\$5 to \$10
Drop-off Site	<ul style="list-style-type: none"> <li>• Ease of implementation</li> <li>• Encourages onsite management</li> </ul>	<ul style="list-style-type: none"> <li>• Inconvenient for many homeowners</li> </ul>	-- <sup>a</sup>

<sup>a</sup>Costs vary. However, if cost to operate personal vehicle is accounted for, cost can exceed curbside collection costs.

Source: Gershman, Brickner & Bratton, Inc., *Draft Waukesha County Comprehensive Solid Waste Management Plan*, January 1994.

composting. A 10- to 20-hour training program would typically be used, which would cover the basics of composting and could include the provision of written and video presentations to the public.

Since the local units of government have taken the lead on recycling efforts within Walworth County and are the recipients of the State funding relating to recycling, the County role in the development of a public education and information program would likely be limited to the provision of coordination and assistance through the Solid Waste Management Department and the University of Wisconsin Extension staffs. Some elements of such programs may be more readily developed on a County-wide basis, than by the individual communities.

### Collection

As noted in Chapter IV, there are two basic types of collection systems which can be used for the portion of the yard waste to be managed off site: curbside collection and drop-off collection. Both methods are considered to be applicable in Walworth County.

There are several alternative means of carrying out curbside collection of yard waste. Table 42 provides a summary of the selected characteristics of the collection options. Yard waste stored in plastic or paper bags or in rigid containers can be collected in packer or open trucks. Vacuums, front-end loaders, or specially designed sweepers can be used to pick up loose material such as leaves. During the season when



Table 43

## ESTIMATED COSTS FOR COMPOSTING, MONITORING, AND FINISHING EQUIPMENT

Equipment	Cost Range	Capacity Range
Windrow-Turners		
Self-Propelled . . . . .	\$150,000 to \$250,000	--
Pull-Behind . . . . .	\$15,000 to \$100,000	--
Front-End Loader . . . . .	\$30,000 to \$200,000	--
Chippers and Shredders . . . . .	\$15,000 to \$100,000	20 to 200 cubic yards per hour
Tub Grinders . . . . .	\$50,000 to \$250,000	10 to 50 tons per hour
Screens . . . . .	\$60,000 to \$150,000	10 to 50 tons per hour
Oxygen Meter . . . . .	\$200 to \$400	--
Thermometers		
Analog . . . . .	\$50 to \$150	--
Digital . . . . .	\$300 to \$750	--
Moisture Meter . . . . .	About \$350	--

Source: Gershman, Brickner & Bratton, Inc., *Draft Waukesha County Comprehensive Solid Waste Management Plan*, January 1994.

leaves make up a large component of the waste stream, a separate collection of that material is often provided. In Walworth County, this is the only time curbside leaf collection is conducted in most communities.

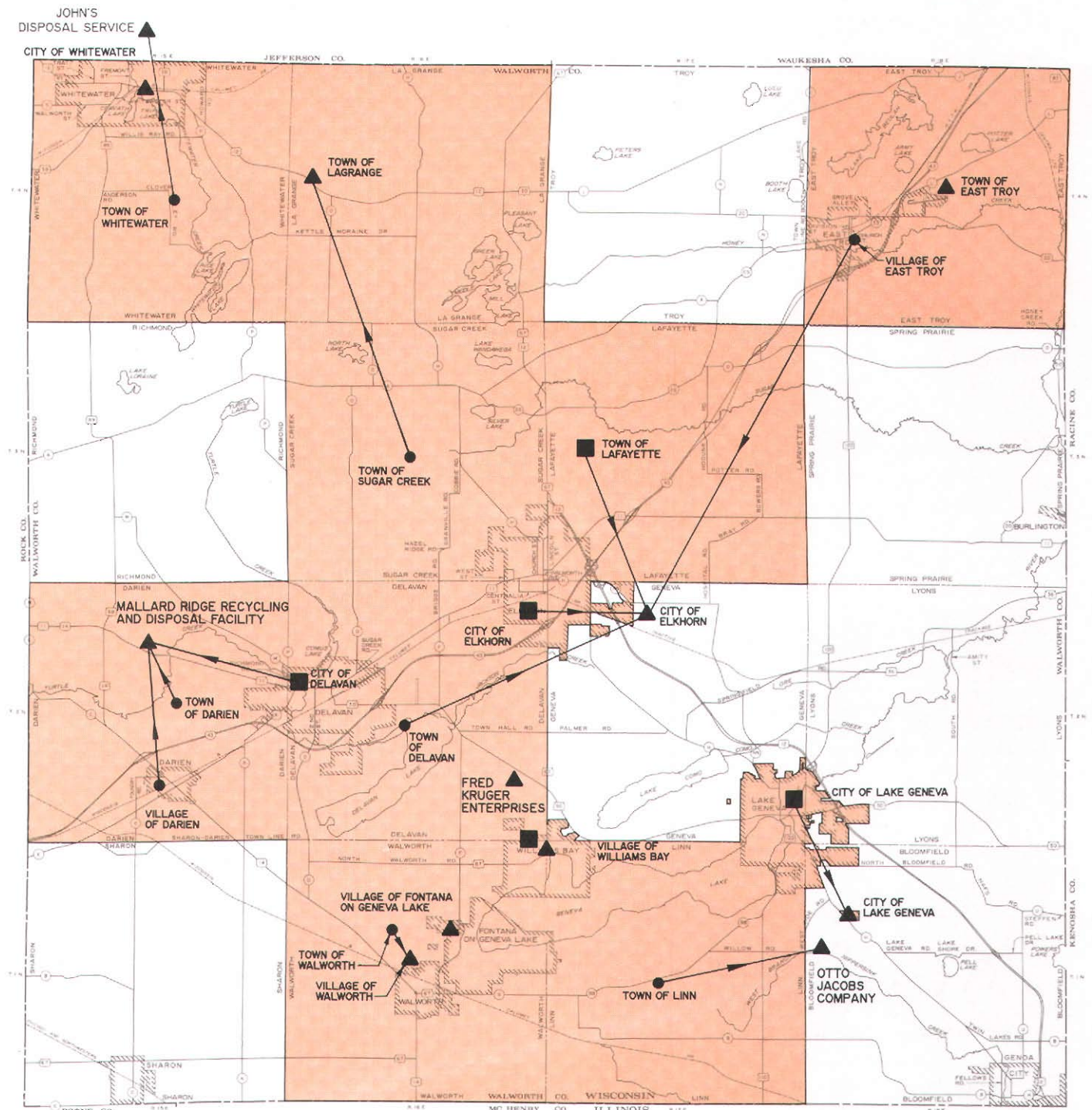
Decisions regarding the collection function are recommended to continue to be made by the private collection operations and local municipalities, based on equipment and manpower availability, contractual options, and the levels of service found to be needed in each community; no County level direct involvement is envisioned.

#### Centralized Processing and Land Application

As shown on Map 16, there are currently 11 yard waste storage and composting operations in Walworth County. In addition, there is one storage operation from which yard waste is removed for various direct uses prior to composting. Typical composting facilities and operational requirements are described in Chapter IV of this report. The cost of operating a composting operation may be expected to range from \$5.00 to \$20 per ton, plus transportation cost. The capital costs vary, depending upon the availability of land and equipment. The latter is typically needed only on a part-time basis. Typical equipment costs are shown in Table 43 and the estimated site size requirements for each individual community are shown in Table 41.

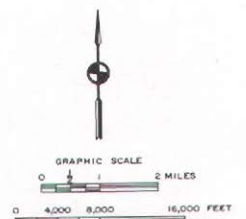
Composting operations are governed as processing facilities under Chapter NR 502 of the Wisconsin Administrative Code. Yard waste composting sites which process 50 cubic yards of material or less are exempt from permit requirements. Composting operations which are expected to process in excess of 50 cubic yards but no more than 20,000 cubic yards per year must be approved by the Wisconsin Department of Natural Resources. Approval requires preparation and approval of a report that discusses the project, proposed facility location, volume of material to be processed, operational practices, proposed size of facility, and potential markets for the compost. The solid waste disposal firms that will accept any waste generated must be identified in the report. Compost sites which process more than 20,000 cubic yards of material per year must obtain a processing license from DNR. Composting operational plan reports for these sites must include such information as the legal description and ownership of the property, neighboring land use, consistency of facility development with areawide solid waste plans and land use plans, persons responsible for operation, nuisance control procedures, markets, and a timetable for construction and operation. Detailed facility operational procedures must be provided. An existing conditions map is required to include information such as property lines, utilities, surface waters, wetlands, and other drainage features.

ALTERNATIVE PLAN NO. 1: EXISTING YARD WASTE MANAGEMENT SYSTEMS IN WALWORTH COUNTY: 1993



LEGEND

- COMMUNITIES UTILIZING COMPOST SITES
- COMPOST SITE OR STORAGE AND DIRECT USE SITE
- DROP-OFF SITE



Source: Walworth County Solid Waste Department and SEWRPC.

As can be seen by review of Table 41, all composting operations envisioned in Walworth County would fall into the category of having a capacity to process from 51 to 20,000 cubic yards of material per year.

An additional option which may be considered is direct spreading of yard waste. Land application of yard waste can be relatively low-cost, generally in the range of \$2.00 to \$4.00 per cubic yard, plus transportation cost. Under this option, leaves and grass clippings would be delivered to an acceptable site, spread in a thin layer, and cultivated into the soil. Farm equipment such as a front-end loader or manure spreader can be used to spread the materials. Because no special processing is required, this option may be particularly attractive to communities located near suitable croplands or land reclamation areas. Land application of uncomposted yard waste would be regulated under Chapter NR 518 of the Wisconsin Administrative Code, which sets forth certain locational and performance standards and may require Department approval of a solid waste land-spreading plan. There are provisions in Chapter 518 to provide exceptions from the requirements. Such exemptions cover certain research projects which would have a land-spreading area of four acres or less. Exemptions of other requirements for larger facilities are also possible but must be approved by the Department in writing.

Land application programs have found that thick layers of leaves or grass are difficult to incorporate into the soil. Yard waste applied in thicknesses greater than three inches or densities of more than 20 tons of yard waste per acre of land can require several passes with the tilling equipment. Although application of the leaves and/or grass clippings within seven days reduces the potential for odors, there are advantages to forming incoming loads into windrows before applying leaves on the agricultural site or land reclamation area. This process enables the leaves to begin composting, densifying the material and making spreading more efficient. Leaves may be delivered to a farm at a time that conflicts with the farmer's harvesting schedule. By placing leaves in windrows as they are received, the farmer can spread the material at a more convenient time. As noted previously, if the storage site is to receive over 50 cubic yards of material per year, a Wisconsin Department of Natural Resources processing facility approval may be required.

Grass and leaves that have been land applied should be incorporated into the soil no later than the next tilling season. Tilling leaves and grass clippings into the soil soon after application reduces the risk of blowing leaves becoming a nuisance to neighboring properties.

Based upon a review of the existing processing operations and the potential options considered to be applicable in Walworth County, four alternative plans for managing yard wastes were considered. Under each alternative plan, it was assumed that a parallel program of onsite management would be implemented and that about 50 percent of the yard waste would, accordingly, be managed on site. It was also assumed that over time, yard waste would no longer be burned in the urbanized areas of the County but would be otherwise managed on site or off site. The four alternative plans considered were:

1. An alternative providing for the continued use of the existing yard waste management systems, including continued use of the existing system of transporting yard wastes to various existing storage and composting sites.
2. An alternative providing for the expansion of the compost site located at the County's Lakeland Complex to serve other communities within the County.
3. An alternative providing for contracting with a private firm which manufactures commercial compost and which would receive the yard waste from the County and utilize it for compost production.
4. An alternative providing for land application of yard waste at a site in the vicinity of the County Lakeland Complex.

The principal features and costs of the four alternative plans dealing with the residentially generated yard waste material are summarized in Table 44. Each alternative is described below. All costs are expressed in 1993 dollars. The alternative management plans consider the management of the yard waste from post-collection through processing. Collection costs were assumed to be the same for all alternatives. It is assumed that the finished compost material under the first two alternatives could be disposed of by citizen pick up at no cost or revenue.

Table 44

**SELECTED COST-ANALYSIS DATA FOR RESIDENTIAL  
YARD WASTE MANAGEMENT PLANS FOR WALWORTH COUNTY**

Alternative Plan	Initial Capital Cost	Average Annual Operation and Maintenance Cost	Total Cost of Capital and Operation and Maintenance	
			Total Annual Cost <sup>a</sup>	Cost per Ton of Yard Waste
No. 1: Continued Use of Existing Yard Waste Management Systems	- -	\$ 67,000	\$ 67,000	\$24.80
No. 2: Expansion of the Composting Operation at the County Lakeland Complex	\$85,000	70,000	81,600	30.20
No. 3: Contracting with a Compost Manufacturer to Process Yard Waste	10,000	150,000 <sup>b</sup>	151,400 <sup>b</sup>	56.00 <sup>b</sup>
No. 4: Land Application of a Portion of the Yard Waste Generated in the County	20,000	63,000	65,700	24.30

<sup>a</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 10-year period.

<sup>b</sup>Costs based upon a 50-mile haul. Costs would be reduced to about \$40.00 per ton if haul were reduced to 15 miles.

Source: SEWRPC.

Alternative Plan No. 1: Continued Use of Existing Yard Waste Management Systems: Under Alternative Plan No. 1, the residential yard waste generated in the study area would be managed in the same manner as under the existing yard waste management system. The principal components of this alternative management plan include the continued use of the existing four private and eight public storage sites and five existing drop-off storage sites. The major facilities to be included under Alternative Plan No.1 are shown on Map 16. Selected information on the existing facilities are provided in Chapter II.

There are 11 compost sites, including eight publicly operated and three privately operated sites currently operating in the County at the locations shown on Map 16. In addition, there is one storage site operated by John's Disposal Service from which yard waste is removed for direct use prior to composting. Summary information regarding the compost sites and other yard waste management practices being carried out in the County in 1993 is provided in Chapter II. As can be seen, composting sites are

operated by the Cities of Elkhorn, Lake Geneva, and Whitewater; the Villages of Fontana, Walworth, and Williams Bay; and the Towns of East Troy and LaGrange. The City of Elkhorn compost site is located on lands in the southeast portion of the Walworth County Lakeland Complex and is also used by the County and by the Towns of Delavan and Lafayette and the Village of East Troy on a limited basis. In addition, there are four privately operated storage sites serving the County. Three of those sites also include compost operations and one site provides for direct use of the yard waste prior to composting. Under the alternative, the five existing drop-off centers operated in the County would continue to operate. It was assumed that those communities with no current yard waste program would provide drop-off facilities and utilize existing operations.

The total estimated average annual cost for continuing to manage yard waste in a manner similar to the existing systems, as proposed under Alternative Plan No. 1, is \$67,000. The total average annual cost of this alternative plan equals about \$25 per ton of yard waste.



Alternative Plan No. 2: Expansion of the Composting Operation Located at the County Lakeland Complex: Under Alternative Plan No. 2, a portion of the yard waste generated in the study area would be managed at an expanded composting operation at the County Lakeland Complex. Under this option, assuming public ownership, the site could be used by any of the communities and would be allowed to use the site at an appropriate fee. However, for costing purposes, it was assumed the site would be used by communities within a reasonable haul distance, about eight miles, from that facility, as shown on Map 17. For cost-analysis purposes, it was assumed that for the remaining communities, yard waste would be managed in a similar manner to the existing system as set forth in Alternative No. 1. The facility at the Lakeland Complex would be expanded to handle about 1,000 tons, or 5,500 cubic yards, of yard waste per year. The site size would be about three acres. Under this alternative, it was assumed that a pull-behind windrow-turner would be purchased for use at the site and that a County-owned front-end loader and tractor would be used on a part-time basis.

The total estimated average annual cost for continuing to manage yard waste as proposed under Alternative Plan No. 2, is \$70,000. The total average annual cost of this alternative plan equals about \$30 per ton of yard waste.

Alternative Plan No. 3: Contract Composting at a Private Firm: Under Alternative Plan No. 3, the yard waste from the County would be transported to a private compost manufacturer from a centralized storage and transfer facility located in the vicinity of the Lakeland Complex.

Under this alternative, the yard waste would be transferred to larger trucks at a storage site assumed to be located in the vicinity of the County Lakeland Complex and delivered to the compost manufacturer. One such manufacturer operates a facility in the Village of Germantown, near the Waukesha-Washington County Line, and is an option. However, the distance to this site makes this option significantly more costly than the other alternatives. A sub-option considered assumes a local manufacturer can be found. For costing purposes, it was assumed that manufacturers with a one-way haul distance ranging from 15 to 50 miles would be found. Under both options, a \$7.00 per ton processing fee was

assumed. Under this option, it was assumed that agreements would be entered into under which municipalities in the County would use this option and share costs for storage, transfer, and transport of yard waste to the manufacturers.

The total estimated average annual cost for continuing to manage yard waste as proposed under Alternative Plan No. 3, is \$151,000 assuming a 50-mile haul and about \$107,000 assuming a 15-mile haul. The total average annual cost of this alternative plan equals about \$56 per ton of yard waste assuming a 50-mile haul, and about \$40 per ton assuming a 15-mile haul.

Alternative Plan No. 4: Land Application of Yard Waste: Under Alternative Plan No. 4, the residential yard waste generated in a portion of the study area would be land applied to agricultural lands in the vicinity of the County Lakeland Complex. For costing purposes, it was assumed that only those communities with a reasonable haul distance, about eight miles, would implement such an option if it were available at a reasonable cost. Yard waste from the remaining areas would be managed in a manner similar to the existing systems as in Alternative Plan No. 1.

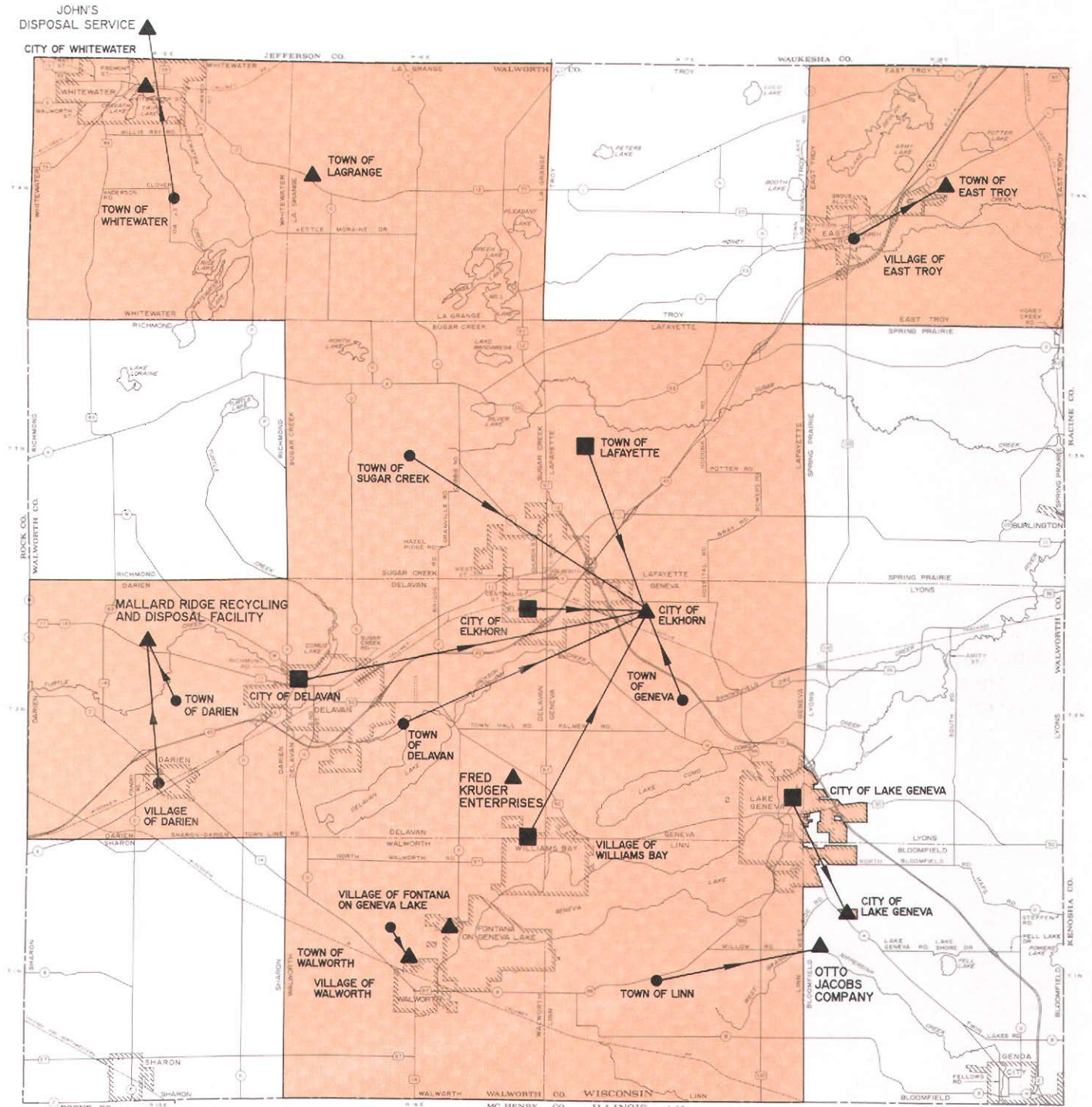
The total estimated average annual cost for continuing to manage yard waste as proposed under Alternative Plan No. 4 is \$65,700. The total average annual cost of this alternative plan equals about \$24.30 per ton of yard waste.

Evaluation of Yard Waste Processing Alternatives: The preceding section of this chapter included a description of four alternative plans for yard waste management in Walworth County. All the alternatives may be considered to be technically feasible. Thus, the evaluation of the alternative plans considered primarily costs, practicality of implementation, program flexibility, and the ability to meet changing conditions and regulations.

Alternative Plan No. 1 has the advantage of requiring no major capital expenditure for new centralized facilities. The capital cost of operating a system similar to the existing system would continue to be privately funded or would largely be in place, thus eliminating the need for large initial capital expenditures. Alternative Plan No. 3 also entails only limited capital cost as it is assumed the transportation to the compost manufacturer would be contracted for.

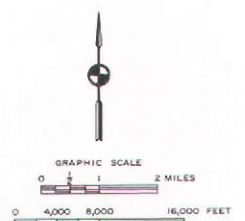
Map 17

**ALTERNATIVE PLAN NO. 2: EXPANSION OF THE  
COMPOSTING OPERATION AT THE COUNTY LAKELAND COMPLEX**



**LEGEND**

- COMMUNITIES UTILIZING COMPOST SITES
- COMPOST SITE OR STORAGE AND DIRECT USE SITE
- DROP-OFF SITE



Source: Walworth County Solid Waste Department and SEWRPC.

Alternative Plan No. 4 has a relatively low capital cost since the land application system requires only a storage site and assumes the shared use equipment with other operators.

Alternative Plan No. 4 has the lowest total cost, with the costs of Alternative Plans No. 1 and 2 being about 6 and 24 percent higher, respectively. This indicates that land application practices are the least expensive method of yard waste management. Alternative Plan No. 2 has the highest capital cost because it was assumed that a windrow-turner/shredder would be purchased for use at the County Lakeland Complex and other public sites.

With regard to implementability, Alternative Plan No. 1 requires no specific new implementation actions or institutional arrangements. Each of the other alternatives would require some change in the current institutional arrangements and would be more difficult to implement than Alternative Plan No. 1. Alternative Plan No. 3 would require the most significant changes in institutional arrangements.

Transportation requirements under Alternative Plans No. 1, 2, and 3 are the most favorable in that the materials are transported to locations relatively near the generation sites.

Alternative Plan No. 2 has the advantage that it provides for the use of a windrow-turner, which would result in a somewhat better compost product than under Alternative Plan No. 1. Alternative Plan No. 4 has the disadvantage that the use of land application could adversely affect the farming operations; demonstration studies would be needed to assess the impacts and determine the benefits and liabilities of this practice on farm operations.

On the basis of a review of the existing facilities in the County, the alternatives considered, and the advantages and disadvantages of each alternative, it can be concluded that adequate storage and compost operations exist within the County. It is thus recommended that the communities seek to utilize the facilities in the most efficient manner. It can also be concluded that there are potential advantages to having better equipment available for composting, such as shredders and windrow-turners. The main advantage of using this type of equipment is the production of a better product. In view of these conclusions, it is recommended that considera-

tion be given to expanding the compost operation located at the County Lakeland Complex and that it be made available to the communities in the County for an appropriate fee. Since it can be assumed that only the communities within a reasonable distance would use the site, the initial capacity needed is estimated to be 1,000 tons, or about 5,500 cubic yards of materials per year. This will require a site of about three acres. It is further recommended that the County consider working cooperatively with the City of Elkhorn to consider the County assuming responsibility for the operation of the compost site at the Lakeland Complex, since that site is used by several municipalities and the County and since the County staff is more advantageously located to manage the site. In addition, it is recommended that a pull-behind windrow-turner be purchased for use at this site and potentially to be shared for use at other compost sites in the County. In this regard, it is recommended that the County contact the other operators of public compost sites within the County to assess their interest in shared use and purchase of such equipment. The County has staff readily available for maintaining such equipment.

Another conclusion of the alternatives analyses is that land application of yard waste is the least costly option. Thus, it is recommended that the County pursue further evaluations of the benefits and liabilities on the agricultural operations at the County facilities associated with land application of yard wastes. Such evaluations could include the use and testing of demonstration plots.

#### Brush and Woody Materials Management

As noted above, it is estimated that 16,000 cubic yards of brush and wood wastes may be expected to be generated within the County per year. Current costs for processing such wastes at a private facility range from \$8.00 to \$12 per cubic yard, plus transportation. Several communities have recently purchased chipping equipment suitable for chipping small to medium-sized brush, including Christmas trees. In addition, there are private operations available for such processing. Thus, there appears to be no need for any further consideration of alternatives for chipping of brush and wood waste. However, there is the potential need in the County for a combination windrow/chipping equipment which can be used at compost sites for dual purposes of windrow-turning and pro-

cessing of some brush and woody waste in the compost windrows. Additionally, there is a potential need for a tub grinder to handle larger wood wastes as well as brush. Such items could potentially serve the County as well as some of the municipalities.

Two demonstrations of equipment which could be used for managing brush and wood wastes were conducted in the County during 1993. The first demonstration was held on April 27, 1993, at the City of Elkhorn/Walworth County compost site. The machine demonstrated was the Jenz Model AX30 Mobile Shredding Machine manufactured by the Banner Welder Corporation. The unit was used to shred composted material at the City of Elkhorn compost site at the County Lakeland Complex and then was moved into the City, where it was used to shred uncomposted yard waste and some brush and small tree limbs. This machine was found to be unsuitable for material larger than 18 inches in diameter. Representatives from the Towns of East Troy, Troy, Linn, Richmond and the Cities of Elkhorn and Whitewater attended the demonstration. The cost of this type of equipment is about \$150,000. Operating costs are estimated to be \$12 to \$20 per hour.

The second demonstration involved a Morbark Model 1200 Tub Grinder which was demonstrated by the Bark River Company. The demonstration was held on June 22 and 23, 1993, at the Highway Department burning pit area. The unit was used to grind a variety of materials, including large stumps, brush, composted yard waste, and some demolition waste. Representative from the Towns of East Troy, Sugar Creek, LaGrange, Darien, Delavan, and the Villages of Williams Bay and Genoa City, and the Cities of Elkhorn, Whitewater, and Delavan attended the demonstration. The cost of this type of equipment is about \$200,000 to \$250,000. Operating costs are estimated to be \$18 to \$25 per hour.

There are private operations located within the County which can process large wood waste using a tub grinder. This normally would require transport to a private disposal firm. In addition, the County currently has a permitted air curtain destructor which can burn large wood waste, as described in Chapter IX.

On the basis of the above discussion, the purchase of these types of equipment does not

appear to be justified at this time. It is recommended that the purchase of a tub grinder be explored further at such time as the County air curtain destructor is no longer able to be operated because of regulatory or operational constraints. The cost of purchasing and maintaining a tub grinder should be evaluated further, along with the option of contracting for the processing of larger wood wastes. The cost and use of such equipment, if purchased, could be shared with other municipalities.

## SUMMARY AND CONCLUSIONS OF YARD WASTE ALTERNATIVES ANALYSIS

Upon consideration of practicable alternatives, it is recommended that the County yard waste management program consist of the following components:

1. A joint effort of the County Solid Waste Department and University of Wisconsin Extension staffs to assist the local units of government in developing, coordinating, and implementing a public information and education program designed to promote the use of onsite yard waste management measures. The County's cost of this program should be able to be absorbed in the County ongoing programs.
2. Expansion of the existing City of Elkhorn compost site at the County Lakeland Complex, an operation currently used by a number of municipalities within the County and which could be made available to other users under appropriate cost arrangements. It is recommended that the County work with the City of Elkhorn to consider the County assuming responsibility for the operation of the compost site. It is assumed only communities within a reasonable distance would be interested in this option. Initially, a capacity of about 1,000 tons, or 5,500 cubic yards is estimated to be needed, requiring a site with about three acres. The operation is recommended to include the use of a pull-behind windrow-turner. The cost of site improvements and the windrow-turner are estimated to be \$80,000. The cost of operation of the site is estimated to be \$12,000 per year. The total cost of capital and opera-



tion and maintenance would be about \$21,000, or about \$21 per ton of yard waste, or about \$4.50 per cubic yard of yard waste material. This cost could be reduced somewhat if the windrow turner cost is shared by others.

3. At such time as the County air curtain destructor can no longer be operated, the County consider further the potential purchase of a tub grinder and, as an alternative, contracting for processing of large wood wastes. This could be done in cooperation with the municipalities, with the machine used cooperatively in the

County. The capital cost of this equipment is expected to be \$200,000 to \$250,000.

4. A joint effort by the County and the University of Wisconsin Extension staff to evaluate the potential for disposal of yard waste by land application on the County farms through the use of demonstration projects and testing. Following further testing, material could be diverted from the compost operations to land application, improving the cost-effectiveness of the yard waste system. The costs of this testing program should be minimal and could probably be absorbed in the existing operations.

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## Chapter VII

# EVALUATION OF ALTERNATIVE HOUSEHOLD HAZARDOUS MATERIALS MANAGEMENT SYSTEMS

### INTRODUCTION

If hazardous wastes generated by households are improperly disposed of, they may cause soil contamination and ground and surface water pollution either directly or indirectly by disposal through onsite sewage disposal systems, public sanitary sewerage systems, or landfills. These wastes come in various forms and are normally stored in relatively small amounts at many widely dispersed places, including both urban and rural households. Some of these products contain substances now banned, or contain compounds for which there are no approved conventional disposal options. These conditions make the proper collection and disposal of this type of waste necessary, even though logistically difficult and potentially costly.

In practice, sanitary landfill disposal in large amounts of the same chemicals present in household hazardous wastes is prohibited. Industries and commercial establishments that generate hazardous chemical wastes must manage those wastes in accordance with regulations issued under the authority of the Federal Resource Conservation and Recovery Act. However, such regulations do not apply to wastes generated by households; thus, most household-generated hazardous wastes are deposited in landfills. When county or local governments do attempt to collect and dispose of such wastes, State and U. S. Environmental Protection Agency guidelines governing the collection, transport, storage, and disposal of hazardous materials must be met. The State regulations concerning hazardous waste management have been developed in accordance with Sections 144.60 to 144.74, which are known as the State Hazardous Waste Management Act. The associated regulations are further set forth in Chapters NR 600 through NR 685 of the Wisconsin Administrative Code. These regulations identify three generator classifications: very small-quantity generators, small-quantity generators, and large-quantity generators. They also set forth storage limitations and transportation regulations relating to each classification. This tends to make most types of collection and

disposal efforts expensive for counties and local units of government to undertake, even with available grant funding. Consequently, there are, generally, limited options available to householders wishing to dispose of these wastes properly. Therefore, many of these wastes may be disposed of via improper channels, such as storm sewers, toilets, and drains, through backyard dumping, in addition to being mixed with other refuse which is to be landfilled. The presence of these wastes in landfills adds an unknown amount of hazardous chemicals, which in turn may contribute to costly and complicated environmental cleanup operations at these sites at a later date.

Septic tank and mound-type onsite sewage disposal systems are not capable of breaking down most of the toxic chemicals found in household hazardous wastes. Moreover, the ability of these systems to assimilate ordinary household sewage effectively may be severely impaired by these chemicals, which can destroy the bacteria that septic systems rely on for proper operation. This condition can lead to groundwater contamination, not only by the chemicals themselves, but also by the untreated effluent released from the septic systems.

The growing magnitude of potential environmental problems posed by the improper disposal of household hazardous wastes suggests that an appropriate long-term approach to the management of these wastes would be to remove the toxic constituents from these products altogether, or at least to limit their use to extreme situations. There are two ways this might be accomplished: the first, strict product labeling requirements coupled with expensive hazardous product tax stamps designed to discourage consumers from using toxic products through economic and informational disincentives; the second, through an outright prohibition of the manufacture of household products containing toxic constituents. These appear unlikely to occur, at least in the near future. Thus, the problem of disposal of household hazardous wastes is left primarily to states, counties, and local units of government.

This chapter describes alternative residential household hazardous materials management systems to be considered for use in Walworth County. The selection of these alternatives was based on consideration of the existing solid waste management systems operating in the County, State regulations governing solid waste management, the solid waste management objectives established under this study, and an understanding of the available management practices. The available household hazardous waste management techniques which can be utilized were described in Chapter IV and screened for potential applicability in Walworth County. Those measures found to be applicable in Walworth County consisted of four basic options: 1) public information and education programs, 2) periodic short-term collection programs such as the "clean sweep" programs which have been held in Walworth County for both the urban household and agricultural wastes, 3) permanent fixed-site collection programs, and 4) collection programs operated by retail establishments. This chapter provides further information and evaluation of the measures for managing household hazardous waste found to be potentially applicable in Walworth County and considers the role of the County in the management of such wastes.

As a point of interest, during 1993, the Milwaukee Metropolitan Sewerage District and local units of government in Milwaukee County were planning to locate a permanent household hazardous waste collection facility in Milwaukee County. In addition, evaluations were made under a Waukesha County planning program to consider the potential for a regional facility, with Waukesha and Milwaukee Counties participating. That study concluded that a separate facility should be developed for Waukesha County. Because the long travel distances involved would result in limited participation of Walworth County in a regional household hazardous waste collection facility in Milwaukee or Waukesha Counties, this option was not considered to be viable for use in Walworth County unless the option was coupled with a mobile satellite facility to be located temporarily in Walworth County.

Following this introductory section, this chapter documents the types and quantities of household hazardous waste materials to be managed within the County. The next section of the

chapter includes a description and evaluation of alternative means of managing these wastes. The final section of the chapter summarizes the recommendations for County involvement in household hazardous waste management.

## MATERIAL CONSIDERATIONS

Typically, household hazardous wastes include pesticides and herbicides, swimming pool chemicals, solvents, oil-based paints, paint thinners, household cleaners, aerosols, used motor oil, fuels, antifreeze, and vehicle batteries. A list of hazardous compounds present in common household products is presented in Table 35 in Chapter IV.

As described in Chapter II, the Walworth County Solid Waste Department conducted a household hazardous waste collection program on August 8, 1992, with collection stations at two locations: the County Lakeland Complex and in the City of Whitewater. A total of 321 households, or about one percent of all the households in the County, participated in the program. About 9,400 pounds of potentially hazardous material were collected, including 225 gallons of used motor oil, 75 gallons of used antifreeze, and 21 used vehicle batteries. This amounts to about 30 pounds per participating household. Excluding the used motor oil, antifreeze, and vehicle batteries, about 7,100 pounds were collected, or about 22 pounds per participating household. The total cost of the collection program was about \$35,000, including the cost of disposal. Of that total, the Wisconsin Department of Natural Resources contributed \$15,000 and the City of Whitewater \$4,500, with Walworth County funding the remaining \$15,500.

On the basis of the household hazardous waste collection programs held in Walworth County in 1992, it is estimated that there are currently three gallons, or about 25 pounds, of hazardous wastes generated annually per household in Walworth County. This equals a total of about 88,000 gallons, or about 730,000 pounds, County-wide. This estimate includes latex paints, used motor oil, batteries, and other materials that could be managed through recycling or waste exchange programs and would not have to be part of a household hazardous waste management program. These materials typically account for about 50 percent of the total household hazardous wastes. The estimated amounts



Table 45

**COMPOSITION AND QUANTITY OF HOUSEHOLD HAZARDOUS WASTES  
FROM A TYPICAL WASTE COLLECTION IN WALWORTH COUNTY**

Material	Estimated Percentage	Estimated Amount of Material <sup>a</sup> (pounds)
Flammable Liquids (paints, thinner, turpentine)	45	5,500
Flammable Gas (aerosol containers)	10	1,100
Acids, Alkalies, Oxidizers (household cleaners, resins, pool chemicals)	7	900
Pesticides and Herbicides	10	1,100
Used Oil and Antifreeze	20	2,400
Batteries	5	600
Miscellaneous	3	400
Total	100	12,000

<sup>a</sup>Based upon an estimated 400 participating households.

Source: Walworth County Solid Waste Management Department.

and composition of the collected wastes, assuming a typical collection program with a participation rate of 400 households, are as shown in Table 45.

On April 21, 1993, the Walworth County Solid Waste Department conducted an agricultural hazardous waste collection program, with one collection station, at the County Lakeland Complex. A total of 114 farms participated in the program. About 11,800 pounds of material were collected at a total cost of \$69,700, including the cost of disposal. A grant in the amount of \$22,260 was received from the Wisconsin Department of Agriculture, Trade and Consumer Protection in partial support of the program. The remainder of the cost was borne by Walworth County.

The approximate 12,000 pounds of agricultural wastes collected during the County 1993 agricultural hazardous waste collection is estimated to be from 40 to 60 percent of the unwanted agricultural materials of this type in storage at that time. Thus, there is a potential of 8,000 to 18,000 pounds of material to be collected and disposed of. The material consists largely of pesticides and herbicides, as well as some of the same wastes described in Table 45. Of the waste materials collected, about 1,900 pounds were

materials classified as "suspended or canceled" for use. In addition, small amounts of the targeted chemicals, including aldrin, DDT, chlordane, atrazine, lead paint, and dieldrin, were collected.

#### ALTERNATIVES FOR HOUSEHOLD AND AGRICULTURAL HAZARDOUS WASTE MANAGEMENT

Management alternatives for such household hazardous wastes as source-reduction and specialized collections are described below. The alternative measures are intended to provide an effective and affordable approach to the management of hazardous household wastes and, in the long term, to reduce the quantities of hazardous waste accumulated in households.

##### Source-Reduction Measures

The source-reduction techniques which could be considered potentially viable include general public information and education, waste-exchange programs, and the use of a household hazardous waste "hotline."

General Public Information and Education Programs: It is generally recognized that the most cost-efficient long-term means of managing

household hazardous waste probably is through public information and education programs directed toward reducing the amounts of such wastes which are accumulated. Such a program should include information on both alternative products and proper disposal methods. The purpose of the public information and education program is to increase participation in collection efforts and waste exchanges where such measures are available, to encourage purchasing practices and uses of materials which do not leave residual materials in storage, and to encourage greater use of nonhazardous material alternatives with the long-term goal of greatly reducing the dependence on hazardous products. This strategy can be best applied through a coordinated effort that uses fact sheets and other printed materials, public and private presentations, media coverage and publicity, and, where possible, the direct infusion of this information into the activities and curriculums of schools, youth groups, and other appropriate group settings. Hazardous household waste information efforts should be integrated into an overall educational program that addresses all aspects of solid waste, recycling, and related environmental issues.

In terms of educational tools and media, there are a number of possibilities which are described in greater detail in Chapter IV. The approaches that might be particularly well suited for use in Walworth County include:

1. Press releases or packets to all media. These are particularly useful for promoting certain events or programs;
2. Newspaper media, including special- and personal-interest stories, advertisements, letters to the editor, guest columns, and public notices;
3. Flyers and posters at supermarkets, recycling centers, schools, malls, and neighborhood centers;
4. Information released to the newsletters of major employers and various other organizations;
5. Direct educational presentations to churches, schools, and other community groups;
6. Information booths at community events, such as the County Fair; and

7. Fact sheets, brochures, and informational tabloids distributed at the County offices and by civic or environmental groups. These information materials could be made available to the other local units of government for use in local programs.

Some counties have a specific staff to provide the public information programs necessary for the effective management of household hazardous wastes. The types of informational and educational activities outlined above could be provided by the Walworth County Solid Waste Management Department staff in cooperation with the existing University of Wisconsin-Extension staff. There are good public information materials available from agencies such as the Wisconsin Department of Natural Resources.

It is estimated that the cost of providing a comprehensive household hazardous waste management education program would be \$2,000 to \$3,000 per year, primarily for preparing, printing, and distribution of information materials.

Waste-Exchange Programs: As already noted, about 50 percent of the total household hazardous wastes generated are still usable or can be recycled via existing programs. Examples of reusable materials include paints, household cleaning products, car-care products, chemicals for swimming pools, and some yard-maintenance items. Examples of items for which recycling programs already exist include used motor oil, some solvents, and lead-acid batteries. Given the expense associated with household hazardous waste disposal, it is generally desirable to promote the reuse and recycling of products, rather than to pay a contractor to dispose of them. Thus, the educational emphasis of collection programs should be placed on bringing to the collection stations the most hazardous items for which alternative disposal options do not exist and promoting the use of alternative disposal options when such options do exist.

In some states, waste-exchange systems have been established to assist in establishing network contacts between people with leftover usable materials and potential users of those materials. Such a program could require a significant effort and could entail legal liability if the County were the lead agency. Accordingly, it is recommended that Walworth County take

the following steps toward establishing a waste-exchange element for household hazardous waste management:

1. Use the aforementioned public information and education programs to encourage people to donate such items as paint and maintenance items to charitable organizations, nonprofit groups, and schools.
2. Develop a list of potential waste exchange opportunities as they develop, including recyclers of household hazardous waste materials.
3. Obtain or develop educational and prototype materials for distribution to such private groups and organizations as churches, trade associations, educational organizations, and neighborhood centers, who could then establish their own internal waste exchanges.
4. Develop a list of nonprofit groups, charitable organizations, schools, and others who may accept donations of unused materials, particularly large volumes of paint.

The cost of these measures would be included in the cost of the public information and education program previously described.

**Household Hazardous Waste Hotline:** One of the major obstacles to better household hazardous waste management is that some residents are not aware of opportunities to participate in sound disposal programs, of the potential dangers associated with many hazardous household products, nor of the proper way to safely store and dispose of such wastes. In most areas, the general public does not know how to obtain comprehensive information on all the various waste management alternatives.

There are several ways to provide this type of information, most of which involve direct or indirect education using printed literature or presentations to various groups by informed individuals, as described earlier. One management option which may be considered is the establishment of a hotline to provide answers to many waste-related questions. The primary purpose of the hotline would be to provide information on the characteristics of household hazardous wastes, what home alternatives are available to render the material nonhazardous,

what types of programs are locally available to exchange or dispose of particular wastes, where recycling drop-off centers are located and what materials are accepted, thus facilitating the dissemination of educational materials to interested groups. The hotline would have to be staffed by County or local unit of government employees specifically trained to provide this type of information. This could involve considerable cost if the staff were to be available a full eight or nine hours a day. While the hotline staff could potentially carry out other duties, the use of such a system would add significantly to the current Walworth County Solid Waste Department staff requirements. Thus, the use of a formal hotline program is not considered practical. However, it is recommended that the Walworth County Solid Waste Department staff continue its practice of providing an informal hotline service when staff is available.

#### Household Hazardous Waste Collection Options

Four means of providing household hazardous waste collection and disposal in Walworth County are considered in detail in this section. These include two alternative levels of single-day collection programs: one option providing for a fixed-site collection program, the other providing use of a mobile unit. Recommendations for agricultural hazardous waste collection programs are considered in a separate section following.

The principal features and costs of the four alternative plans dealing with household hazardous waste are summarized in Table 46. Each alternative is described below. All costs are expressed in 1993 dollars.

**Alternative Plan No. 1: Annual Household Waste Collection at Two Locations with No Material Limitations:** Under Alternative Plan No. 1, an annual collection of household hazardous wastes would be undertaken in a manner similar to the 1992 County collection. The 1992 program used one site at the County Lakeland Complex and one at the City of Whitewater. The sites could be rotated to different locations within the County to develop a higher participation rate. The final site selection should be made in concert with the local municipalities to ascertain the locations where the local municipalities were interested in participating and to determine the likely local percent participation level. The annual collection at the two selected locations would be scheduled for a Saturday in the summer months to allow participation by seasonal or part-time

Table 46

**SELECTED COST ANALYSIS DATA FOR ALTERNATIVE HOUSEHOLD  
HAZARDOUS WASTE MANAGEMENT PLANS FOR WALWORTH COUNTY**

Alternative Plan	Initial Capital Cost	Average Operation and Maintenance Cost per Collection	Total Cost of Capital and Operation and Maintenance <sup>a</sup>	
			Total Average Annual Cost <sup>b</sup>	Cost per Pound of Household Hazardous Waste
No. 1: Annual Household Waste Collection at Two Locations with No Material Limitations	--	\$54,000	\$54,000	\$4.50-\$7.50 <sup>c</sup>
No. 2: Biannual Refined Household Waste Collection with Material Limitations	--	57,000	28,500	6.30 <sup>d</sup>
No. 3: Establishment of a Permanent Household Waste Collection Facility with Material Limitations	\$50,000	72,000	80,000	8.00 <sup>e</sup>
No. 4: Mobile Collection Program for Household Hazardous Wastes with Material Limitations	--	84,000	84,000 <sup>f</sup>	5.60 <sup>g</sup>

<sup>a</sup>Costs are total costs. There is potential for State grants to reduce the local cost.

<sup>b</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 10-year period.

<sup>c</sup>Cost for all material is \$4.50 per pound for 12,000 pounds. Cost per pound for material excluding latex paint, used oil and antifreeze, and batteries is \$7.50 per pound for 7,200 pounds.

<sup>d</sup>Material collected does not include latex paint, used oil and antifreeze, and used batteries. Total amount collected is estimated to be 9,000 pounds.

<sup>e</sup>Material collected does not include latex paint, used oil and antifreeze, and batteries. Total amount of material collected is estimated to be 10,000 pounds.

<sup>f</sup>If mobile collection were reduced frequency to once biannually, the average annual cost would be \$45,000.

<sup>g</sup>Material collected does not include latex paint, used oil and antifreeze, and batteries. Total amount collected is estimated to be 15,000 pounds.

Source: SEWRPC.

residents. All materials considered to be household hazardous wastes, as listed in Table 45, would be collected. Volunteers would be solicited to assist the County and specialized contractor staffs. The contractor would provide a training program before the collection to instruct volunteers and the county staff regarding proper handling, safety, and emergency procedures. Collection hours would probably be from 9:00 a.m. to 2:00 p.m.

On the basis of previous experience in Walworth County, it was assumed for cost-analysis purposes that about 400 households would participate by dropping off a total of 12,000 pounds of materials at the once-per-year collection sites. Materials would be final-packaged and disposed of by the selected contractor.

The total estimated average annual cost of collecting and disposing of household hazardous



wastes under Alternative Plan No. 1, is \$54,000, or an average of \$4.50 per pound of waste. It should be noted that a portion of the waste collected would be disposed of by other conventional means. Excluding used motor oil and antifreeze, latex paint, and vehicle batteries, this alternative may be expected to cost about \$7.50 per pound.

Alternative Plan No. 2: Biannual Refined Household Waste Collection with Material Limitation:

Alternative Plan No. 2 represents a refinement of the program outlined under Alternative Plan No. 1 to reduce the cost of providing the collection of household hazardous wastes while still providing a means for Walworth County residents to dispose of those household hazardous wastes for which there is no reasonable alternative means of disposal. Under Alternative Plan No. 2, the collection of household waste would be carried out once every other year at two locations. In addition, the targeted materials would be limited, in that latex paints, used motor oil and antifreeze, and vehicle batteries would not be accepted, since other disposal alternatives are available for these items. Residents can give latex paints to neighbors, local groups, churches, schools, or other facilities, or, alternatively, dry small amounts of latex paint and dispose of the dried paint with the regular solid waste. Since the latex paint is not considered hazardous, it is only necessary to reduce the liquid content prior to disposal. Used motor oil is currently collected at some service stations and drop-off sites within the County. Lead-acid batteries can be returned to the retailers or taken to local scrap dealers. For each type of waste not accepted at the facility, information on the appropriate agency to contact and/or disposal method would be provided to the residents.

On the basis of previous experience in Walworth County, it is estimated that 500 households would participate annually in the program by dropping off a total of 9,000 pounds of materials at the collection sites once every other year.

The total estimated cost for collecting and disposing of household hazardous wastes under Alternative Plan No. 2, is \$57,000. Since the collection would be carried out on a biannual basis, the average cost per year would be \$28,000. The total cost of this alternative plan equals about \$6.30 per pound of household hazardous waste collected and disposed of.

Alternative Plan No. 3: Establishment of a Permanent Household Waste Collection Facility with Material Limitations: Under Alternative Plan No. 3, a permanent household hazardous waste collection facility would be established, as has already been done in Dane County and the City of Kenosha. Consideration is currently being given to establishing such a site in Milwaukee County. It was assumed that the permanent collection station would be located in the County Highway Department area of the Lakeland Complex. Such a site would be relatively centrally located within the County. However, other locations could be considered. In order to minimize the cost of operating such a site, the facility would not accept latex paints, used motor oil and antifreeze, and lead-acid batteries. In addition, the facility operation would be limited to one Saturday per month during the six-month period from May to October of each year. The collection facility would include the use of a storage building with proper fencing to prevent indiscriminate drop-offs. Material would be temporarily stored in the building after segregation and packaging. Drum storage space would be provided both outside and inside the building. The facility would require electric power and a water supply connection. A safety shower and an emergency eye-washing device and other appropriate safety equipment would be installed.

Operating costs may be expected to vary, depending upon the participation rates, volume, and type of materials accepted. These factors will affect the traffic management, labor, and training needs, as well as quantities collected and disposed of. Other program operations would include waste inspections, identification of unknown wastes, sorting and segregation, bulking, processing for recycling, packaging, and shipping for disposal.

Staffing was assumed to be provided by two County employees paid at time and one-half and by contract personnel handling chemical testing and final packaging for each of the six Saturday operations. A written training program for the personnel involved would be required.

On the basis of previous experience in Walworth County, it is estimated that 600 households, or 100 participants per collection day, would utilize the facility, delivering 10,000 pounds of materials per year. Materials would be packaged and disposed of by a selected contractor.

The establishment of a permanent site would entail an estimated capital cost of \$50,000 and an annual operation and maintenance cost of \$72,000. The total estimated average annual cost of collecting and disposing of household hazardous wastes under Alternative Plan No. 3, is \$80,000. The total average annual cost of this alternative plan equals \$8.00 per pound of household hazardous waste collected and disposed of.

Alternative Plan No. 4: Mobile Collection Program for Household Hazardous Wastes with Material Limitations: Under Alternative Plan No. 4, the County would contract for, and assist in the operation of, a mobile collection unit operated for one day once each year in each of six different locations. For purposes of this analysis, it was assumed these six collection operations would take place over a two-week period each summer. The mobile equipment would be leased or purchased. For purpose of this analysis, a lease cost of \$7,000 per year was assumed for the mobile system or for the mobilization of more fixed equipment. The participation rate may be expected to be higher than under the other plans because of the greater convenience of the locations. The basic approach would be to use a large vehicle to collect household hazardous wastes. Each collection vehicle would carry all the necessary equipment, such as drums, tables, protective clothing, safety equipment, and could be manned by trained County staff and/or staff of a hazardous waste contractor. To the extent possible, the collection would be carried out at either the drop-off sites for recyclable materials, at other solid waste facilities, or at local fire stations or public works garages. Such sites could allow for short-term storage, which would allow the wastes to be stored for up to five days and be picked up by either the County or a contractor during the following week.

On the basis of previous experience in Walworth County, it was assumed that 900 households, or 150 households per site, would participate and that a total of 15,000 pounds of material would be collected at the six collection sites combined. Materials would be packaged and disposed of by a selected contractor.

The total estimated average annual cost of collecting and disposing of household hazardous waste under Alternative Plan No. 4 is \$84,000.

On an average annual basis, this equals about \$5.60 per pound of household hazardous waste collected and disposed of. If such collections were made on a biannual basis, the annual costs would be reduced to about \$45,000 per year, or \$5.50 per pound of waste collected and disposed of, with a slightly higher participation rate per collection expected and a slightly better economy of scale. If this alternative were carried out in cooperation with other counties, some of the costs to Walworth County could potentially be reduced.

Evaluation of Alternative Plans for Household Hazardous Wastes: The preceding section of this chapter presented four alternative plans for the collection and disposal of household hazardous waste in Walworth County. The options cannot be considered easily comparable alternatives since that each results in a different level of participation and collection. However, each alternative meets the objective of providing a means for County residents to dispose of hazardous household materials for which there is no other viable outlet except improper disposal. Each of the options is considered to be technically feasible. Thus, the evaluation of the options considered was made based upon costs, program flexibility, practicality of implementation, and level of effectiveness with regard to participation.

Alternative Plan No. 2 has the lowest average annual cost and the second lowest unit cost per pound of hazardous material collected and disposed of. Alternative Plans No. 1 and 2 do not involve any capital expenditures since the services would be provided on a contract basis and are temporary in nature. Alternative Plan No. 3 requires a capital expenditure and has the highest unit cost. Alternative Plan No. 4 could have some initial capital cost associated with the purchase of mobile equipment. However, this equipment could also be leased, since it would be in use in Walworth County for only about two weeks per year. This alternative has the lowest unit cost because of the higher level of participation expected and the economy of scale for some of the operation.

Alternative Plans No. 1 and 2 are the most flexible, since scheduling, material selections, and site selections can be varied year to year. Alternative Plan No. 3 is the least flexible, since the location of the collection site is fixed. Alternative Plan No. 4 also provides flexibility of site selection.

Alternative Plan No. 2 results in the lowest participation and least amount of hazardous material collected and disposed of. Alternative Plan No. 4 results in the highest participation and the greatest amount of hazardous material collected and disposed of. Alternative Plan No. 4 has the advantage of providing a more uniform service to the County.

On the basis of review of the alternative plans, it is recommended that the County consider the institution of a mobile collection program, or, alternatively, a collection operation which is mobilized to several locations. An option whereby two or more counties in conjunction with a private firm would develop the program might result in a local cost which would be similar to the lowest-cost option considered within the highest level of participation because of the convenience of location. The program could be operated in the summer months when the potential for obtaining part-time labor is best and when the seasonal residents can participate. The program could be operated on an annual or biannual schedule. This option offers the most uniform service throughout the County and presents the opportunity for the highest level of participation. It is recommended that the County seek input from the local units of government on their potential involvement in such collections beginning in 1995 and that the mobile or mobilized program be developed based upon that response.

#### Agricultural Hazardous Waste Collection Measures

As already noted, an agricultural hazardous waste collection program was conducted during 1993 in Walworth County. That program was successful in that it resulted in the removal of an estimated 40 to 60 percent of the stored hazardous materials. The program also had a relatively high cost, approximately \$70,000, of which a State grant provided \$22,260. There is an apparent need to conduct additional agricultural hazardous waste collections periodically and the plan so recommends. However, there is currently insufficient information available to determine the timing and potential participation rate of further agricultural hazardous waste collection programs. Experience at the initial collection also indicated that a significant portion of the waste was not banned and could be used. Thus, subsequent collections will include consideration of a waste exchange program.

In this regard, it is recommended that the County Solid Waste Department work cooperatively with the University of Wisconsin-Extension office for Walworth County and the Land Conservation offices to survey a representative number of farm operators to determine material stored which could be collected or exchanged in a waste-exchange program and also the potential participation in a future agricultural waste collection program. That information could then be used to develop the timing of a subsequent agricultural waste collection program.

#### **SUMMARY AND CONCLUSIONS OF HOUSEHOLD AND AGRICULTURAL HAZARDOUS WASTE EVALUATIONS**

On the basis of the consideration of practicable alternatives, it is recommended that the County household and agricultural hazardous waste management program include the following actions as components:

1. That a joint effort be made by Walworth County and University of Wisconsin-Extension staffs to implement a public information and education program designed to promote the use of nontoxic alternatives and the proper disposal of household wastes for which outlets are available. This program would be designed to improve the potential for waste exchanges in the County. The County cost of this program is estimated to be \$3,000 per year and would include such other solid waste issues as recycling. State grant funds and readily obtainable materials may be available to reduce the local cost of this program.
2. That Walworth County consider establishing a mobile household hazardous waste collection program which would collect household hazardous wastes at some six sites in the County during a period of about two weeks in the summer. This will require contacting the local units of government, grant funding agencies, and private contractors to assess further the cost and the potential for grant funds and cooperative ventures with the local units of government. The cost of the operation once

in place is estimated to be \$45,000 to \$88,000 per year, depending upon whether the program is carried out once annually or biannually. Grant funds should be available to reduce the local cost of this program. In addition, it is possible to carry out the program in cooperation with other counties, which could also lower the cost. It is recommended that the County Solid Waste Department contact the local units of government to assess local interest in such a mobilized program and to design the programs beginning in 1995 on the basis of local interest.

3. That the Walworth County Solid Waste Management Department, in cooperation with the County Land Conservation Committee, conduct a survey of the amounts of stored material and the potential participation level in an agricultural hazardous waste program. This survey would target a representative number of the 1,100 farms in the County.
4. That the Walworth County Solid Waste Management Department seek State funding in partial support of all of the recommended programs.



## Chapter VIII

### LANDFILL AND INCINERATION PLAN ELEMENT CONSIDERATIONS

#### INTRODUCTION

The initial Walworth County solid waste management plan included a general landfill siting analysis and recommendations regarding the need for additional landfill capacity to serve the residents, industry, and commerce of Walworth County, as well as recommendations with regard to the potential future use in the County of solid waste incineration facilities incorporating energy recovery. The plan recommended that the unrecycled portion of the County solid waste stream be disposed of at the Mallard Ridge Recycling and Disposal Facility and other landfills located in adjacent counties. The adopted plan also included a contingency recommendation to be considered if adequate landfill capacity was not being provided by the private sector. Under that contingency recommendation, the County would become involved more directly in siting a landfill facility for use by County residents and operated under a contract with a private operator.

The initial County solid waste management plan of 1982 also concluded, on the basis of then current cost comparisons, that solid waste incineration with energy recovery was not a favorable alternative. However, it was concluded that the economics of incineration with energy recovery could become cost-effective during the planning period, depending upon the changes which occurred in landfill tipping fees and energy costs. Thus, the plan recommended that the County further consider the use of solid waste incineration and energy recovery at a future date after preparation of a feasibility study.

This chapter presents selected information on both landfilling and incineration with energy recovery, including updated landfill siting criteria and mapping similar to that provided in the initial plan, and including information on the timing and conditions under which the County should consider reopening the issue of incineration. In addition, this plan update discusses current State and Federal regulations on solid waste landfilling and incineration facilities and the impact of those regulations on the initial plan recommendations.

#### SOLID WASTE LANDFILL ELEMENT CONSIDERATIONS

##### Landfill Capacity Discussion

Since the initial solid waste management plan was prepared in 1982, the number of active landfills within

Walworth County has been reduced from seven to three. The three remaining landfills are the Greidanus landfill, renamed the Mallard Ridge Recycling and Disposal Facility; the Mann Brothers Sand and Gravel Company landfill; and the Troy Area Landfill. The latter was developed after the initial plan was prepared. As of 1992, there were six licensed active landfills within, and adjacent to, the Southeastern Wisconsin Region receiving wastes from Walworth County, three of which were located in Walworth County. One of these, the Mann Brothers Sand and Gravel Company landfill, is a private, special-purpose landfill, used only by the owner and not generally available for disposal of typical residential, commercial, and industrial solid wastes. Specific pertinent data on the remaining five landfills, including site capacities remaining, are provided in Table 47.

Since the completion of the initial solid waste plan for Walworth County, there has been a continuing trend, in both Walworth County and in the Southeastern Wisconsin Region and related adjacent areas, toward fewer and larger landfill operations. This has resulted largely from the changing regulatory framework within which landfills are sited and operated. Landfills constructed in the 1970s and earlier were designed to less stringent environmental protection standards than currently and were operated without requirements for the owner/operator to establish funds to provide for proper closure, care after closure, or potential cleanup activities.

Review of the information in Table 47, indicates that the site life for the landfills which could serve the Walworth County area is approximately ten years at current loading rates and considering recent and pending potential future expansion proposals. In some cases, these landfill operators already own additional land at the same location which may be considered for expansion. However, it should be noted that the service areas of the landfills which receive solid waste from Walworth County extend beyond the County boundaries and that the amount of waste that can be accepted varies and depends upon the operators' choices. For these reasons and because the Troy Area landfill expansion has not yet been approved as proposed, it is not possible to ascertain the long-term capacity which will be available for use by Walworth County.

As noted in Chapter III, the average annual quantity of solid waste generated by residential, commercial, and industrial sources in Walworth County and not

Table 47

**CAPACITY SUMMARY OF ACTIVE DISPOSAL SITES CURRENTLY  
ACCEPTING SOLID WASTE FROM THE WALWORTH COUNTY AREA: 1993**

Facility Name	Owner/Operator	License Number	Location <sup>a</sup>	Licensed Area (acres)	Total Design Capacity <sup>b</sup> (cubic yards)	Waste Design Capacity <sup>c</sup> (cubic yards)	Remaining Capacity <sup>d</sup> (cubic yards)	Waste Load (cubic yards per week)	Expansion Plans Submitted to Department of Natural Resources	Approximate Remaining Site Life (years)
Deer Track Park	Deer Track Park, Inc.	3230	Northeast 1/4 of Section 8, Town of Farmington, Jefferson County	38	2,862,000	--	2,826,000	4,500	No	12
Mallard Ridge Recycling and Disposal Facility	Waste Management of Wisconsin, Inc.	0140	Northeast 1/4 of Section 9, Town of Darien, Walworth County	45	2,460,400	1,866,450	< 500,000 <sup>e</sup>	15,000	Yes <sup>e</sup>	-- <sup>e</sup>
Pheasant Run	Waste Management of Wisconsin, Inc.	3062	Southeast 1/4 of Section 32, Town of Paris, Kenosha County	80	7,000,000	5,600,000	3,470,000	5,000	Yes	13
Valley Sanitation Landfill	Valley Sanitation Company, Inc.	2686	Northeast 1/4 of Section 35, Town of Koshkonong, Jefferson County	29	2,017,000	--	1,206,500	2,710	No	8
Troy Area Landfill	Browning Ferris Industries	3090	Northeast 1/4 of Section 31, Town of East Troy, Walworth County	51	4,925,000	3,828,000	1,570,000 <sup>f</sup>	10,600	Yes <sup>f</sup>	2 <sup>f</sup>

<sup>a</sup> See Map 6.

<sup>b</sup> Total design capacity includes volumes of both waste and cover material, but excludes cap material.

<sup>c</sup> Waste design capacity includes the volume of waste only.

<sup>d</sup> Remaining capacity as of January 1993.

<sup>e</sup> As of March 1994, a 40-acre expansion of the Mallard Ridge Recycling and Disposal Facility landfill was approved by the Wisconsin Department of Natural Resources. This expansion provides for a capacity of about 5,197,000 cubic yards with an estimated site life of seven years at a projected annual waste load of 780,000 cubic yards per year, including cover material.

<sup>f</sup> The Troy Area Landfill has applied for approval of an expansion which would provide for a capacity of 6,300,000 cubic yards and would extend the facility site life for about 10 to 14 years.

Source: Wisconsin Department of Natural Resources, Walworth County Solid Waste Management Department, and SEWRPC.

expected to be recycled is estimated to be between 71,000 and 103,000 tons per year. This would require some 140,000 to 210,000 cubic yards of landfill capacity per year, or between 2,200,000 and 3,400,000 cubic yards of capacity through the year 2010. As

indicated in Table 47, the currently available landfill capacity at the five landfills listed is about 14,000,000 cubic yards. The total loading to these five landfills listed in Table 47 is about 2,000,000 cubic yards per year. Because of these large volumes of loading and

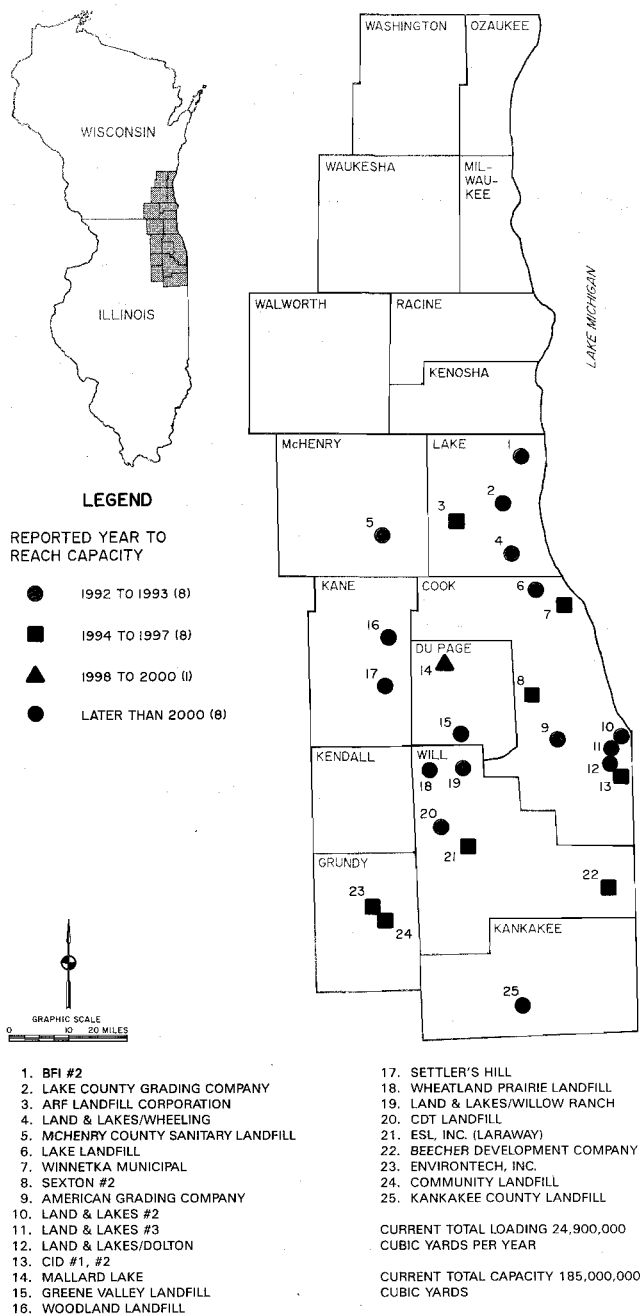
capacity, factors external to Walworth County may be expected to have a significant impact on the landfill capacity available for use by Walworth County. Such factors include the amounts of solid waste generated in areas outside of Walworth County in Southeastern Wisconsin and in Northeastern Illinois and disposed of at Walworth County landfills. In this regard, it should be noted that a report prepared by the Illinois Environmental Protection Agency<sup>1</sup> provides information on solid waste landfill capacities and solid waste loadings for Illinois. The remaining capacity and loadings for the landfills in northeastern Illinois, including Lake and McHenry Counties, located immediately south of the Region, are summarized on Figure 28. Figure 28 indicates that in 1992 there were 25 landfills in Northeastern Illinois. Of those 25 landfills, 16, including all but one in McHenry and Lake Counties, were estimated to have a remaining site life of less than four years because of the very large amounts of solid waste generated and currently landfilled in Northeastern Illinois. The one landfill with a longer site life, in Lake County, is a private, special-purpose landfill which receives only construction and demolition waste. In addition, there is only one active landfill each in Boone and Winnebago Counties, Illinois, immediately south and southwest of Walworth County. The landfill in Boone County has a site life of only about one year. The landfill in Winnebago County has a site life of five to seven years. The annual northeastern Illinois solid waste landfill loading was 7,500,000 tons in 1992 and the annual solid waste loading to landfills in Boone and Winnebago Counties was about 160,000 tons in 1992. These loadings may be compared to the total amount of unrecycled solid waste generated by residential, commercial, and industrial sources during 1992 in Walworth County, 70,000 tons, and to the remaining capacities of about 7,000,000 to 8,000,000 tons for the five landfills listed in Table 47.

It should be noted that the Mann Brothers Sand and Gravel Company landfill has a significant site life remaining, about 50 years at current loading rates. Thus, one option which could be considered in order to extend the life of the general-purpose landfills in the County would be to have additional construction and demolition wastes directed to the Mann Brothers Sand and Gravel Company landfill and thus preserve more capacity in the general-purpose landfills.

<sup>1</sup>Illinois Environmental Protection Agency, *Available Disposal Capacity for Solid Waste in Illinois*, January 1993.

Figure 28

# ACTIVE NONHAZARDOUS-WASTE LANDFILLS IN NORTHEASTERN ILLINOIS (REGION 2): 1992



Source: Illinois Environmental Protection Agency.

However, the total available capacity of the Mann Brothers Sand and Gravel Company landfill, as documented in Chapter II, is about 200,000 cubic yards. The relatively long site life assigned is due to the relatively small loading, less than about 100 cubic

yards per week. The total available capacity of 200,000 cubic yards compares to the total available capacity of about 14,000,000 cubic yards at the five general-purpose landfills currently being utilized for disposal by Walworth County residents and businesses and to a need of from 190,000 to 210,000 cubic yards of landfill capacity per year for Walworth County wastes. Thus, increased use of the Mann Brothers Sand and Gravel Company landfill for disposal of construction and demolition waste would increase the available capacity for other solid wastes by only a small amount. Furthermore, the Mann Brothers Sand & Gravel Company landfill is a private operation. The expanded use of this private site would increase the regulatory and permitting requirements; the owners have chosen not to open the landfill to other users. It was thus concluded that no recommendations regarding the expanded use of this site would be included in the County plan.

It is, however, recommended that the County staff, as part of its public education and information program, include an element to encourage construction and demolition waste reduction and recycling systems. A description of potentially applicable construction and demolition waste reduction and recycling practices is summarized in Appendix D.

On this basis, there appears to be adequate landfill capacity available or planned at the landfills receiving Walworth County solid wastes, assuming the current loadings to those landfills are not significantly increased. However, because of the relatively large potential solid waste loadings to those landfills from areas outside Walworth County, compared to the solid waste loading generated in Walworth County, the situation regarding available capacity is subject to rapid change.

## CURRENT LANDFILL REGULATIONS

The problems which have resulted from historic sanitary landfill design and operation practices have led to significant changes in the regulation of landfills and improvement in their design and operation. In 1992, the U. S. Environmental Protection Agency (EPA) promulgated regulations now commonly referred to as Subtitle D. Wisconsin Department of Natural Resources regulations currently in effect meet these new Federal requirements. Wisconsin Department of Natural Resources regulations related to landfills are set forth in Chapter 144 Wis. Statutes and Chapters NR 140, NR 185, and Chapters NR 500 to 522 of the Wisconsin Administrative Code.

The U. S. Environmental Protection Agency Subtitle D regulations and Wisconsin Department of Natural Resources rules set forth six categories of criteria for municipal solid waste landfills, including criteria relating to location, operation, design, groundwater monitoring and corrective action, closure and post-closure care, and financial assurance.

The location restrictions that apply to municipal landfills are related to airports, floodplains, wetlands, surface waters, major transportation routes, and parks. These locational criteria and others considered in the study are listed in the next section of this chapter.

As to operation of landfills, the current regulations require that all operators must develop plans, including provisions for controlling receipt of regulated hazardous wastes, controlling explosive gases, storm-water management and surface water protection, prohibiting acceptance of bulk liquids, and record keeping. Each landfill must have a program to detect and prevent disposal of regulated quantities of hazardous wastes. Such programs generally include random inspections, record keeping, training personnel on recognition, and notification of the Wisconsin Department of Natural Resources if prohibited wastes are discovered. In addition, provision must be made to control methane gas, including active landfill gas collection and combustion facilities.

Current regulations also prohibit the disposal of bulk liquids in landfills to help reduce leachate generation. Stormwater management requirements and surface water protection measures place restrictions on the discharge of pollutants into water bodies and wetlands.

Current design features include requirements for a liner and final cover system. The Wisconsin Department of Natural Resources regulations currently require a composite liner consisting of a four-foot compacted clay liner plus a 60-mil-thick high-density polyethylene plastic liner for new landfills or landfill expansion areas. To control leachate, a collection and treatment system is required in which the leachate is either piped directly, or hauled, to a municipal wastewater treatment plant. The leachate is required to be tested prior to discharge to the treatment plant. If the leachate does not meet treatment plant requirements, the landfill must provide "pretreatment" to reduce pollutant concentrations.

Additional design features require the landfill final cover to be designed to minimize infiltration and



erosion. The final cover placed on the landfill after each cell reaches its final height typically includes a two-foot-deep compacted clay cap, a geomembrane appropriate for the site, and 18 to 30 inches of rooting layer. Adequate topsoil at least six inches in depth must be placed on top of the rooting layer so as to support grass growth to reduce erosion.

Groundwater monitoring is required to detect and correct groundwater problems before they cause off-site impacts. In this regard, landfill operations are currently required to prepare groundwater monitoring plans; install monitoring wells both up and down flow; and follow a groundwater sampling program for background water quality, detecting releases, and assessment of any releases. If problems are noted, corrective measures are required. These measures may include slurry walls to block groundwater flow, leachate extraction wells, and leachate treatment.

With regard to closure and postclosure, the current regulations establish specific standards for closing a landfill, such as the final cover requirements, as noted above, and for maintaining the site for 30 years after closure. The landfill owner/operator is responsible for maintaining the integrity of the final cover, monitoring groundwater and gas management, and continuing leachate collection and treatment for the full 30 years. The period of time can be extended if required; currently the Wisconsin Department of Natural Resources requires 40 years of responsibility.

As to financial assurance, the landfill owner/operator must develop a financing mechanism to provide for the cost of closure, postclosure care, and corrective action of known releases. This requirement is intended to address situations where a landfill owner/operator has closed a site that needs corrective action and has gone out of business or otherwise does not have the financial resources to conduct the cleanup. In past instances, such a landfill may have been placed on a "Superfund" list, cleanup actions taken, and restitution sought by the State from the landfill users, such as local industries, businesses, municipalities, or counties. Under the current requirements, operating landfills must fund closure and postclosure care requirements as a part of the daily operating costs so that funds are available from the owner/operator at the time of closure for the 30-year postclosure care period.

#### Landfill General Siting Analysis

As part of the initial solid waste management plan, a general landfill siting analysis was prepared to assist

the County in evaluating landfilling options and proposals and to provide data on the potential for future landfilling operations in the County. Under the present planning effort, the initial siting analysis was updated. The new general siting analysis is intended to be consistent with, and to support, the County landfill siting ordinance currently under preparation.

A general siting analysis requires the development and application of a set of criteria associated with the environmental, engineering, and regulatory considerations applicable to landfill siting. The criteria utilized in the analysis made under this study were based upon the requirements of Chapters NR 140, NR 185, and NR 504 of the Wisconsin Administrative Code and on other pertinent engineering requirements related to the screening of potential landfill sites.

The criteria formulated and applied in this study can be categorized as relating to geology, groundwater, surface water, environmentally significant areas, urban areas, major transportation routes, parklands, urban and urbanizing areas, airports, and soils. Pertinent data on these natural and man-made features of the study area were presented in Chapter II. In some cases, application of the criteria may preclude use of a proposed solid waste disposal site, while in other cases, such application may only limit the site potential. For the purposes of the general siting analysis, the criteria utilized were formulated and applied in a conservative manner in order not to categorically eliminate sites that may have potential for landfill development upon further site-specific evaluation.

#### Geology

In order to reduce the potential for groundwater contamination, a separation between the confining layer or liner at the bottom of the landfill and the bedrock should be maintained. Soil types and bedrock mapping were used as an indicator of depth to bedrock within Walworth County. Areas with a depth to bedrock of less than 20 feet were classified as having no potential for landfill siting.

#### Groundwater

Areas with shallow depths to groundwater are considered to have additional limitations for landfill siting and development because of the potential impacts on groundwater quality. Within Walworth County, depths to groundwater were also considered, based upon soil interpretations. Those areas with a depth to groundwater of less than five feet were considered to have no potential for landfill siting.

Chapter NR 504 of the Wisconsin Administrative Code additionally requires that a solid waste landfill not be located within an area where the Wisconsin Department of Natural Resources finds there is reasonable probability that the disposal of solid waste within such an area will have a detrimental effect on groundwater quality. Potential impacts on groundwater users were considered as part of the criteria relating landfill siting to existing and planned urban land uses, as described later in this section. Additional impacts can be properly evaluated only on a site-by-site basis.

#### Surface Water

With regard to the surface waters of the Region, the locational criteria for the siting of a solid waste disposal site are set forth in Chapter NR 504 of the Wisconsin Administrative Code. The Code does not permit development of a landfill within the following areas: within 1,000 feet of any navigable lake, pond, or flowage; within 300 feet of a navigable river or stream; within a floodplain; within wetlands; and within an area where the Wisconsin Department of Natural Resources finds that there is a reasonable probability that disposal of solid waste within such an area will have a detrimental effect on any surface water.

These criteria were applied as defined by the Wisconsin Department of Natural Resources, with the wetland criteria being applied to all mapped wetlands having an area of one acre or more. The locations of floodplains, wetlands, major lakes, and streams within Walworth County are described in Chapter II.

#### Environmentally Significant Areas

Primary environmental corridors were considered as having no potential for the location and development of solid waste landfills. These environmentally significant areas include lakes, ponds, flowages, rivers, and streams and their associated shorelands and floodlands; wetlands; woodlands; wildlife habitat areas; areas of steep slopes; prairies; existing and proposed park sites; and areas having scenic, scientific, or cultural value. The location and extent of these corridors are described in Chapter II.

#### Major Transportation Routes and Parks

Chapter NR 504 of the Wisconsin Administrative Code requires a horizontal distance of at least 1,000 feet between a landfill and right-of-way of a State trunk highway or interstate highway and the boundary of any public park unless suitable screening and buffering provisions are made. Areas within 1,000 feet of the rights-of-way of State trunk and interstate highways were considered to have no potential for the location and development of solid waste landfills.

#### Urban Areas

Chapter NR 540 of the Wisconsin Administrative Code requires a horizontal distance of at least 1,200 feet between a landfill and any public or private water supply source. This limit may be increased or decreased if justified by site-specific groundwater studies. For purposes of landfill site selection, areas within a distance of less than one-quarter mile, or 1,320 feet, of existing areas of residential, commercial, and industrial urban development were considered to have no potential for landfill siting. In addition, all areas planned for urban uses in the year 2010 regional and County land use plans were considered to have no potential for landfill siting. Existing urban areas and planned urban service areas within Walworth County are described in Chapter II. The extent of the year 2010 planned urban areas in Walworth County is described in Chapter III.

#### Airports

The Federal Aviation Administration and the Wisconsin Department of Natural Resources have adopted restrictions on the development of solid waste landfills within the vicinity of airports. The location of all airports in Walworth County are indicated in Chapter II. All areas located within 10,000 feet of any runway used, or planned to be used, by turbojet powered aircraft; areas located within 5,000 feet of any runway used only by reciprocating-engined aircraft; and areas located between the runway approach and departure patterns of an airport were considered to have no potential for landfill siting.

#### Soils

Through a cooperative agreement with the U. S. Soil Conservation Service, detailed soil surveys for Walworth County were completed by the Regional Planning Commission. These surveys included interpretations of the soil properties, including interpretations of the suitability for landfill construction. All the areas which were not included in the "no potential" category based upon the above criteria were then categorized as having either the "best potential" or "limited potential" on the basis of soil conditions. "Limited potential" ratings were assigned to soil types which have a severe or moderate limitation for landfill construction. The remaining area was classified as having "best potential." Map 18 indicates the interpretation of soils for landfill siting.

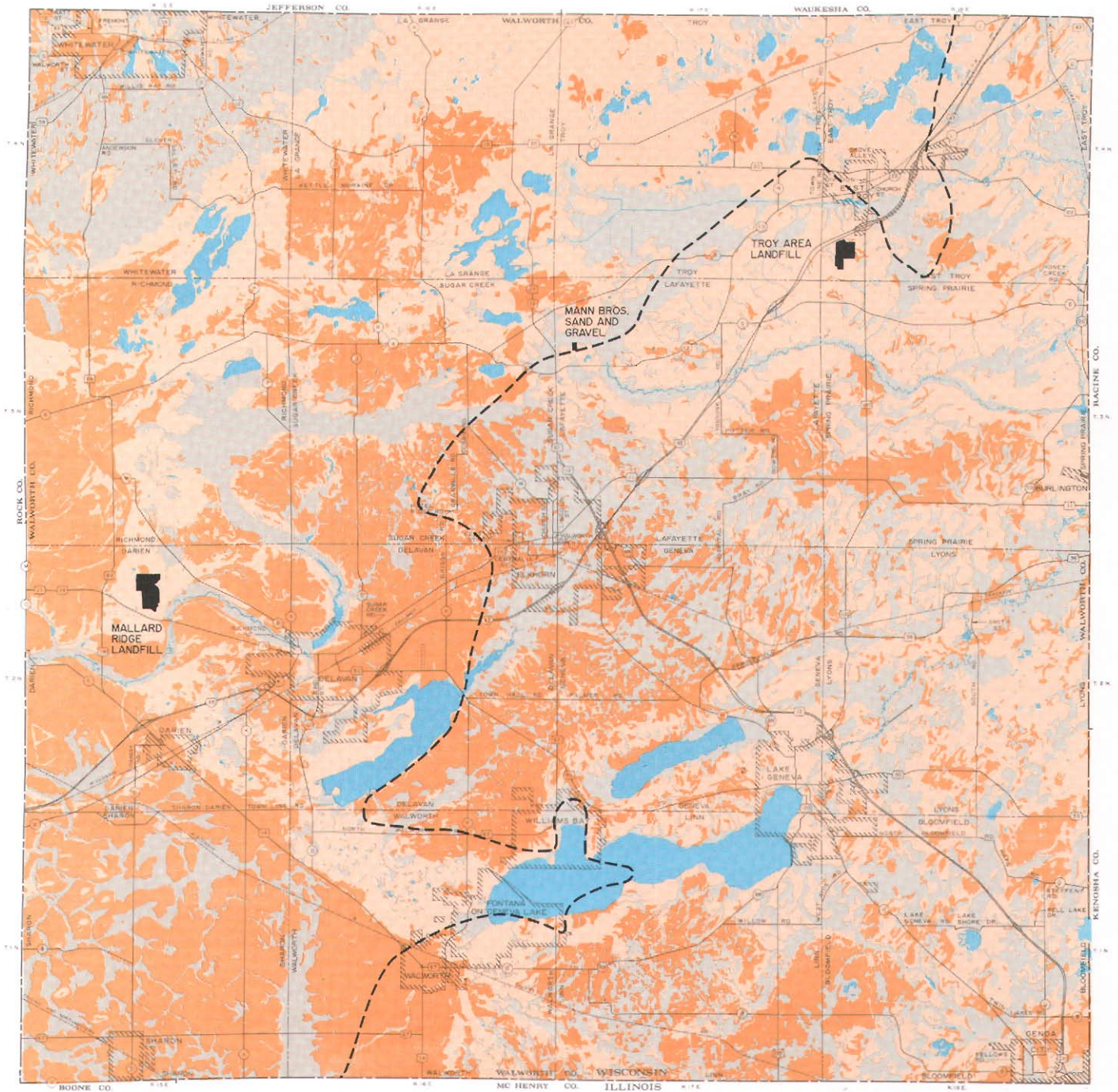
#### Prime Agricultural Lands

Walworth County has developed a plan to protect the best remaining agricultural lands in the County. Areas designated as A-1 on the County zoning district map should be maintained in agricultural use. Lands



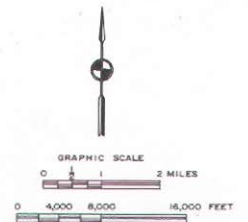
Map 18

SOIL POTENTIAL FOR LANDFILL SITING IN WALWORTH COUNTY



LEGEND

- SOILS WITH BEST POTENTIAL FOR LANDFILL SITING  
(166 SQUARE MILES OR 30 PERCENT)
- SOILS WITH LIMITED POTENTIAL FOR LANDFILL SITING  
(230 SQUARE MILES OR 42 PERCENT)
- SOILS WITH NO POTENTIAL FOR LANDFILL SITING  
(157 SQUARE MILES OR 28 PERCENT)
- SURFACE WATER
- EASTERN LIMITS OF THE SANDSTONE  
AQUIFER RECHARGE AREA



Source: U. S. Soil Conservation Service; Walworth County Planning, Zoning, and Sanitation Office; and SEWRPC.

designated as prime agricultural lands in the year 2010 regional land use plan and the Walworth County Development Plan cover about 325 square miles, or 59 percent of the County, as shown on Map 19. Designation of an area for agricultural land preservation should be regarded as a severe constraint on the potential for landfill siting. However, such zoning should not be interpreted as absolutely precluding the use of an area for landfilling. Thus, areas zoned for agricultural land preservation were considered to have potential for landfill siting.

#### Landfill Siting Analysis Summary

A composite map, based upon the findings of the application of the criteria, was prepared, showing areas in three classes of suitability for landfill siting. The County contains approximately 553 square miles of land area and 23 square miles of water surface area. Of the total land area, approximately 387 square miles, or about 70 percent, were categorized as having no potential for landfill siting. Approximately 117 square miles, or about 21 percent, were categorized as having limited potential for landfill siting. Potential sites located in these areas may be expected to require more intensive engineering and to entail higher site development costs. Approximately 49 square miles, or about 9 percent of the total land area of the County, were categorized as having the best potential for landfill siting. The landfill siting potential is shown in graphic summary on Map 20.

It should be noted that the analysis of the potential for landfill siting set forth herein is intended to provide a general indication of the areas and the extent of the areas which can be considered for landfill siting. The actual siting of a landfill will require site-specific evaluations considering factors in addition to those described above. Also, it is possible that site-specific field evaluations would indicate, in some cases, different subsurface conditions for small areas than those in the above analysis. In addition, the evaluation of a specific landfill proposal would also have to consider other factors which are not readily mapped on a countywide basis, such as local land use plans, wellhead protection areas, public input, and impacts on such community facilities as hospitals and nursing homes.

#### Potential Role of Walworth County in Handling Solid Waste

As previously noted, the landfills receiving solid waste from Walworth County appear to have about 10 years of life remaining at current loading rates. However, because of the regional nature of the loadings to these landfills, this site life is subject to rapid change. In

addition, the County has been directly involved with the siting of a major landfill and with expansion of a landfill in the County. As a result, the County Board has passed a resolution recommending that Section 144.445 of the Wisconsin Landfill Siting Law be amended to include counties as appropriate governing bodies for approval of negotiated agreements for landfill siting. It is, nevertheless, recommended that the County continue to rely upon the existing private landfill operations for disposal of nonrecycled solid wastes. The existing landfills currently used for disposal of Walworth County solid waste include the Mallard Ridge Recycling and Disposal facility in the Town of Darien and the Troy Area Landfill in the Town of East Troy, both in Walworth County, as well as the Deer Park Landfill and Valley Sanitation Landfill in Jefferson County and the Pheasant Run Landfill in Kenosha County. Under the updated plan, it is envisioned that, upon full implementation, about 71,000 to 103,000 tons per year, or about 65 percent of the average annual Walworth County solid waste load generated by residential, commercial, and industrial sources, would be disposed of at these landfills. The other existing landfill in the study area is the Mann Brothers Sand and Gravel Company landfill, used primarily for disposal of such special wastes as noncombustible material and demolition debris.

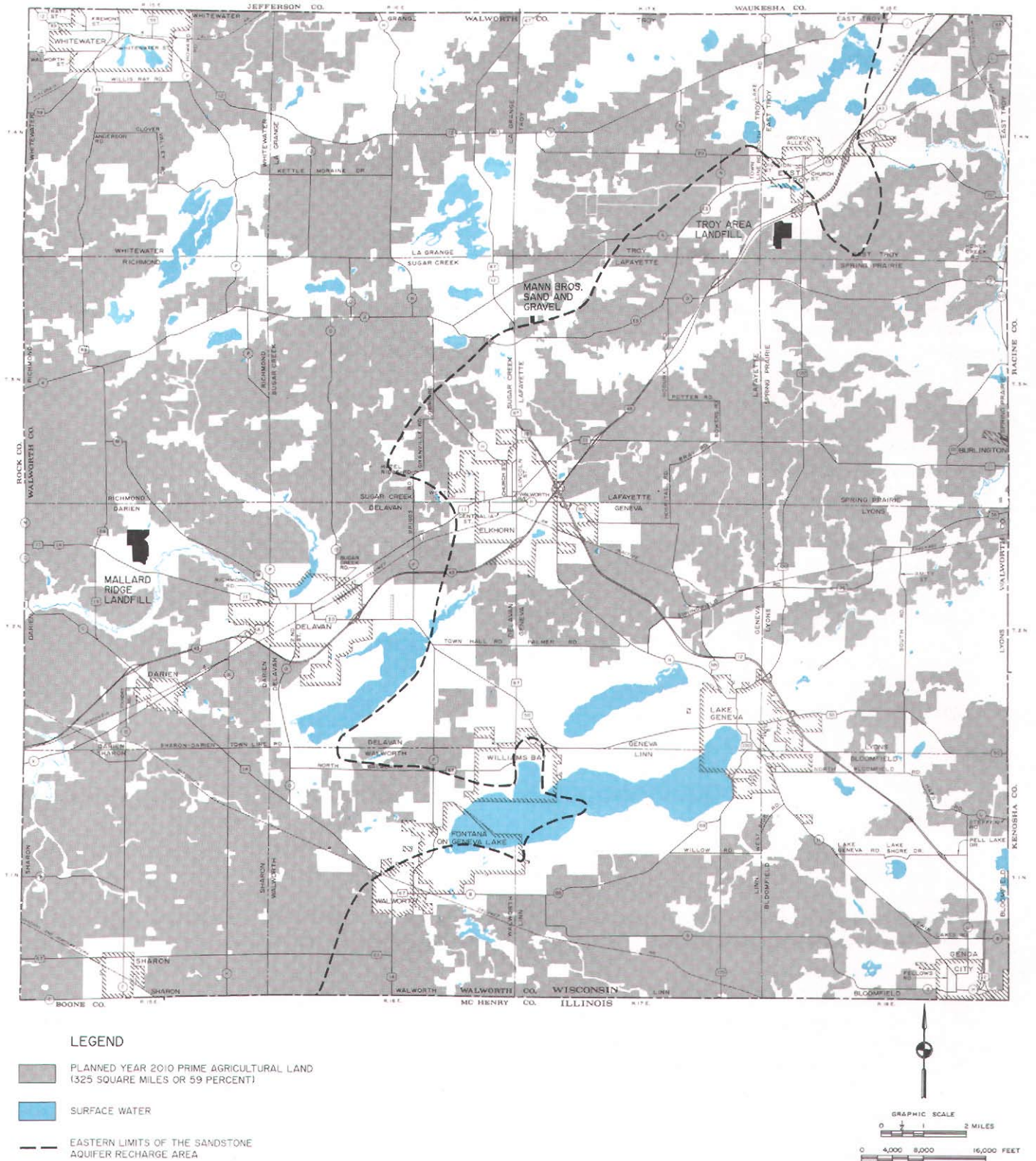
While the updated recommended plan provides for disposal of solid wastes at existing landfill facilities, the potential exists that approved landfill capacity for disposal of that portion of the solid waste load which cannot be recycled may become inadequate in the future. It may therefore become necessary for the County to assume a more direct role in the construction and operation of a new sanitary landfill for the disposal of Walworth County solid waste. Should this become necessary, it is recommended that a County-owned facility operated by a private operator under contract be considered. A landfill facility designed to handle all the nonrecycled wastes generated in the study area over a twenty-year period would require about 60 acres of land and should have a total capacity of about 1,000,000 tons of material. In the absence of a demonstrated problem with available landfill capacity within the County, however, it is not recommended that the County proceed further toward acquisition and site approval for a new landfill.

It is further recommended that the County proceed with the preparation and adoption of an ordinance providing regulations pertaining to landfills. Because of the potential impact of solid waste generated in other counties on landfill capacities available for Walworth County, it is recommended that the capaci-



Map 19

PRIME AGRICULTURAL LAND IN WALWORTH COUNTY: 2010



Source: Walworth County Planning, Zoning, and Sanitation Office and SEWRPC.

ties available and the total loadings be monitored annually by the County Solid Waste Management Department. In addition, it is recommended that the County Solid Waste Management Department work with the Wisconsin Department of Natural Resources to monitor transport of solid waste generated out of State and out of County into the County.

## INCINERATION ELEMENT CONSIDERATIONS

### Historical Overview

The initial County solid waste management plan recommended that the County undertake a feasibility study and, if that study so recommended, undertake the construction and operation of the waste-to-energy incineration system envisioned in the initial plan. The feasibility study<sup>2</sup> was completed in July 1985 by R.W. Beck & Associates.

The primary purpose of the study was to determine the estimated tipping fees for a solid waste incineration resource recovery facility to be located at the Walworth County Lakeland Complex. The report set forth the findings of investigations of potential steam and electric revenues, estimated capital and operating costs for the incineration resource recovery facility, and projected tipping fees for solid waste disposal.

A preliminary site for the facility was identified near the County Highway Department Building, as shown on Figure 29. The facility would have a capacity of 50 tons of solid waste per day. The study estimated that tipping fees at the new incinerator would be about \$40 per ton, expressed in 1988 dollars. Because this cost was significantly higher than the then-current landfill costs of about \$10 per ton, it was concluded by the County that the proposed solid waste resource recovery facility was not economically viable then. The consultant noted that a larger facility could result in lower tipping fees if the larger waste loadings required were available. The consultant also concluded that if the existing or proposed landfills have sufficient capacity to receive area waste, it would be difficult to direct the flow of solid waste to the proposed incineration facility since haulers and generators of solid waste would tend to use the cheapest disposal method available. The cost analyses set forth in that study have been updated and are included in the next section of this chapter.

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<sup>2</sup>R. W. Beck & Associates, Walworth County Solid Waste Recovery Preliminary Planning Study, July 1985.

### Cost Update for Incineration with Energy Recovery

The new cost analyses were based upon the use of an incineration system with a capacity of 50 tons per day, as was assumed in the 1985 study. This size facility would be capable of processing about 50 percent of the nonrecycled residential solid waste generated in the County. As was assumed in the 1985 study, the waste-to-energy facility would be located at the Lakeland Complex, as shown in Figure 29 and would supply steam to heat to the Lakeland Hospital, the Lakeland Nursing Home, the County Annex, the Counseling Center, and the Highway Department buildings.

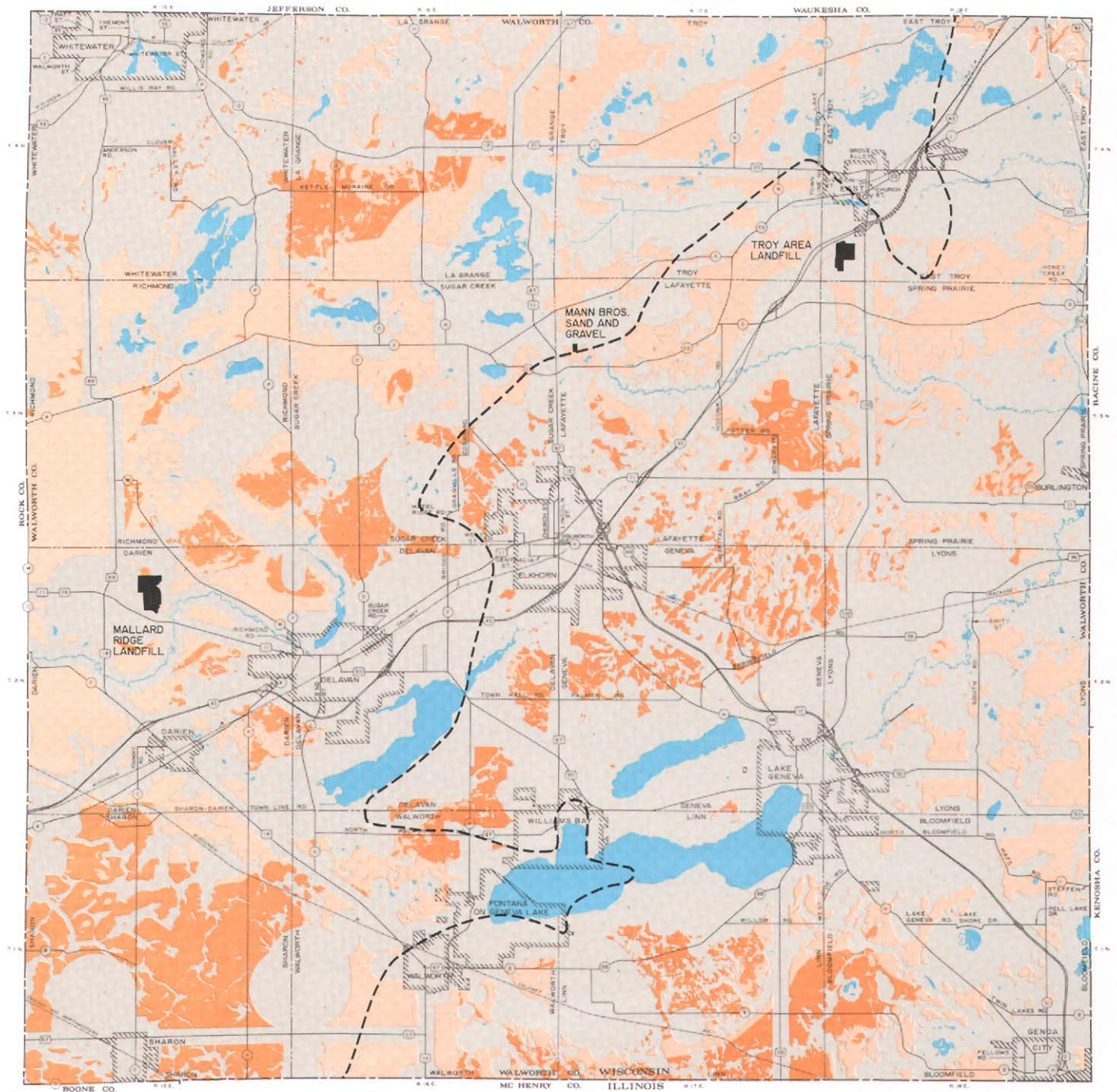
Cost adjustments were made to the 1985 estimates to reflect current conditions. These adjustments included increased construction costs because of general price inflation as reflected by the Engineering News Record Index; reduced debt payments due to a reduction in the interest rate from the assumed 1985 level of 8.5 percent to 6.0 percent considered to reflect current rates, adjustment of the energy credit factors to reflect current energy costs, and increased landfill costs for incinerator ash and bypassed solid waste. The most significant adjustment made was to the value of the energy produced. It was found that the value of the steam produced would currently be lower than it was in 1985. The current value of the steam was estimated at \$3.74 per 1,000 pounds in 1995 versus \$4.69 per 1,000 pounds in 1985. This change may be attributed in part to the change in County procurement practices in 1986. At that time, the County began the practice of purchasing natural gas through a private firm which negotiates the purchase of energy products on behalf of multiple users. This practice, as well as the general abundance of natural gas, apparently resulted in a one-time drop in the base value of fuel. It should be noted in this regard that the cost of fuel for the Lakeland complex has risen consistently since the change in purchasing practice, with the change between 1992 and 1993 being from \$222,600 to \$257,831, or about 16 percent.

The results of the updated cost analysis are summarized and compared to potential future landfill costs in Figure 30 and are shown in tabular form in Appendix E. It was estimated that the tipping fee for a new incineration waste-to-energy facility constructed in 1995 would range from about \$69 per ton in 1995 to about \$114 per ton in the year 2014 if both operating costs and energy revenues recouped were estimated to increase by 4 percent per year. Assuming general operating costs escalated at 4 percent per year and energy revenues escalated at 10 percent per year, the tipping fee would range from \$69 per ton in 1995 to about \$61 in 2014. It may accordingly be concluded



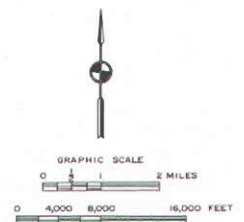
Map 20

LANDFILL SITING POTENTIAL IN WALWORTH COUNTY



LEGEND

- AREAS WITH BEST POTENTIAL FOR LANDFILL SITING  
(49 SQUARE MILES OR 9 PERCENT)
- AREAS WITH LIMITED POTENTIAL FOR LANDFILL SITING  
(117 SQUARE MILES OR 21 PERCENT)
- AREAS WITH NO POTENTIAL FOR LANDFILL SITING  
(387 SQUARE MILES OR 70 PERCENT)
- SURFACE WATER
- EASTERN LIMITS OF THE SANDSTONE  
AQUIFER RECHARGE AREA



Source: U. S. Soil Conservation Service; Walworth County Planning, Zoning, and Sanitation Office; and SEWRPC.

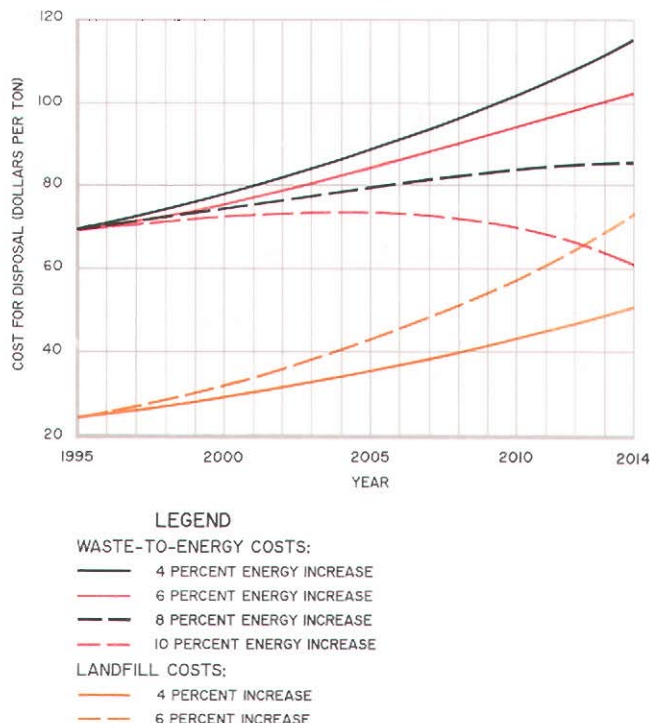






Figure 30

# WALWORTH COUNTY WASTE-TO-ENERGY ALTERNATIVES COST DATA



Source: R. W. Beck & Associates, Walworth County Solid Waste Management Department, and SEWRPC.

Amendments requirements were issued by EPA in February 1991; however, the Clean Air Act Amendments require EPA to review these requirements, making them more stringent if necessary, and add new rules to control metals, especially lead, cadmium, and mercury. The EPA intends to develop separate rules, as appropriate, for existing and new facilities. The 1991 EPA rules require the use of Maximum Available Control Technology, which for a mass-burn incinerator is defined as a baghouse and scrubber system for flue gas cleaning. Pending rules for metals control may require the addition of other equipment to address metals emissions.

Mercury emissions from waste-to-energy facilities have recently received attention. However, lead emissions are probably the most important concern. Recently the acceptable ambient lead level was sharply reduced by EPA recently because of recent evidence that even very trace amounts can cause developmental damage to infants and young children. In addition, several states have laws regulating household batteries and bans pending on mercury-

containing batteries, which are currently being phased out by manufacturers. Since batteries are the primary source of mercury in mixed solid waste, significant reductions in mercury emissions may be expected to result from the combined ban and phaseout of mercury in household batteries.

**Ash Residue:** As a result of a mass-burn facility operation, bottom ash, flyash, and scrubber residues are produced. The residue produced by combustion of processible waste consists of bottom ash, which is collected beneath the furnace chamber, and fly ash, which is the fine particulate matter extracted from the flue gas and which also contains lime from the scrubber. Bottom and flyash are typically combined and quenched with water to cool the material and control dust.

The volume reduction resulting from combustion of municipal wastes in a mass-burn facility ranges from 70 to 90 percent. This volume reduction range may increase slightly, from 90 to 95 percent, if source separation is included. The ash is more dense than raw mixed solid waste and approximately 20 to 30 percent by weight of the solid waste received at the plant becomes ash.

Ash residue from waste-to-energy facilities currently is regulated under the Resource Conservation and Recovery Act (RCRA) Subtitle D, Nonhazardous Waste. While there has been considerable pressure from environmental groups on Congress and the U. S. Environmental Protection Agency to regulate all ash, not just any ash testing hazardous, under RCRA Subtitle C-Hazardous Waste, it is EPA's position that ash disposal does not require the elaborate and costly protective measures required under Subtitle C. The EPA issued Draft Guidelines for the handling and transportation of waste combustion residues under Subtitle D in January 1988, which require covered, leakproof transfer trucks and handling techniques to minimize dust. These are guidelines, not regulations, but most states have adopted the approach to ash management set forth by the EPA. In the 1991 Clean Air Act Amendments, Congress declined to regulate waste combustion residues, but indicated that ash residues would be addressed under the reauthorization of the Resource Conservation and Recovery Act by Congress at a later date. However, difficulties in obtaining consensus on solid waste approaches prevented passage in 1993 of the Resource Conservation and Recovery Act reauthorization. It is now likely that the Resource Conservation and Recovery Act will have to wait for reauthorization until the next Congress, seated in 1995.

Municipal solid waste combustor residue management rules were adopted by the State of Wisconsin Natural Resources Board on October 24, 1991. The rules were reviewed by the Rules Review Committee of the State Legislature and sent to the Revisor of Statutes for publication. The rules became effective in May 1992. Section NR 502.14 contains the residue sampling and characterization requirements for municipal solid waste incinerators.

The new rules exempt municipal waste combustor ash from hazardous waste regulations but provide specific management requirements for the combustor ash as a special waste. The rules establish a plan review and licensing process for new and existing municipal waste combustors, including provisions for waste screening, combustor operation, ash storage, ash sampling and

testing, and reporting. There are also requirements for ash disposal and landfill design. The ash must be placed in composite-lined monofills after January 1, 1993, in order to stabilize heavy metals found in the ash and reduce the leaching that currently occurs in landfills where ash is mixed with municipal garbage.

#### Potential Role of Walworth County in Waste-to-Energy Incineration

On the basis of the cost analysis described above, as well as the more burdensome regulatory requirements governing incineration systems, it is recommended that the County limit its role to monitoring energy and landfill cost inflation. Should these cost rise at rates significantly exceeding the rate of general inflation, the issue of incineration should be reexamined late in the planning period.

## Chapter IX

### EVALUATION OF ALTERNATIVE COUNTY FACILITY INTERNAL WASTE RECYCLING

#### INTRODUCTION

As part of the update of the Walworth County Solid Waste Management Plan, the plan is being expanded to include an evaluation of alternative internal County facility solid waste management programs. The new State rules relating to recycling, including Chapter NR 544 of the Wisconsin Administrative Code, require nonresidential buildings and facilities to institute recycling programs providing for recycling materials banned from landfilling. Such requirements are to be set forth in local ordinances of municipalities operating local recycling programs. As noted in Chapter IV, the materials which must be recycled include: batteries; yard wastes; appliances; waste oil; newspapers; magazines; office paper; corrugated paper; aluminum, glass, steel, and plastic containers; certain plastics; and waste tires.

As part of this plan update, a review was conducted of the current solid waste management practices being carried out internally at Walworth County facilities to provide a basis for evaluating alternative means of implementing State-required recycling programs and to examine potential means of reducing the existing and probable future costs of solid waste management at County facilities. Alternatives were considered for improved waste reduction, classification, and recycling of selected portions of those solid wastes generated by County operations.

The following first section of this chapter provides a summary description of the solid waste management procedures currently being used at the County facilities for internally generated wastes. Following the description of the existing solid waste management procedures, the chapter sets forth the goals established for this plan by the Walworth County Solid Waste Management Board to provide a framework within which the alternative plans for managing the solid wastes generated by County operations could be formulated and evaluated. Next is a discussion of the solid waste materials which were considered for inclusion in a waste reduction and recycling program for wastes generated by County operations. The final three sections of the chapter describe the alternative and recommended solid waste management practices which could be considered in modifying the existing procedures, with

sections on waste reduction alternatives, on recycling alternatives, and on yard waste management alternatives.

#### DESCRIPTION OF EXISTING SOLID WASTE MANAGEMENT SYSTEMS

Significant amounts of solid waste are currently generated by County operations at nine locations. These are shown on Map 21 and Figure 31. A brief description of each of the solid waste management practices carried out at each of these locations is provided in Table 48. The current recycling programs at the County facilities consist of an office paper (white- and green-bar computer paper) recycling program being carried out by the Walworth County Solid Waste Department; a corrugated paper recycling program at the Lakeland Medical Center; limited aluminum can recycling at some County facilities; limited composting of County-generated yard wastes at the City of Elkhorn compost facility, on County lands but operated by the City and used for County yard waste disposal under an agreement between the City and County; and recycling of a number of materials by the County Highway Department. The current office paper recycling program has demonstrated that recycling is achievable facilitywide. The experience gained with that program has been used to develop the alternative and recommended plans for expanded programs described in this chapter.

The cost of solid waste management at Walworth County facilities has nearly doubled over the four-year period of 1990 through 1993, as shown in Table 49. Because of State mandates, these costs may be expected to continue to increase even when adjusted to reflect the impacts of general price inflation and landfill costs.

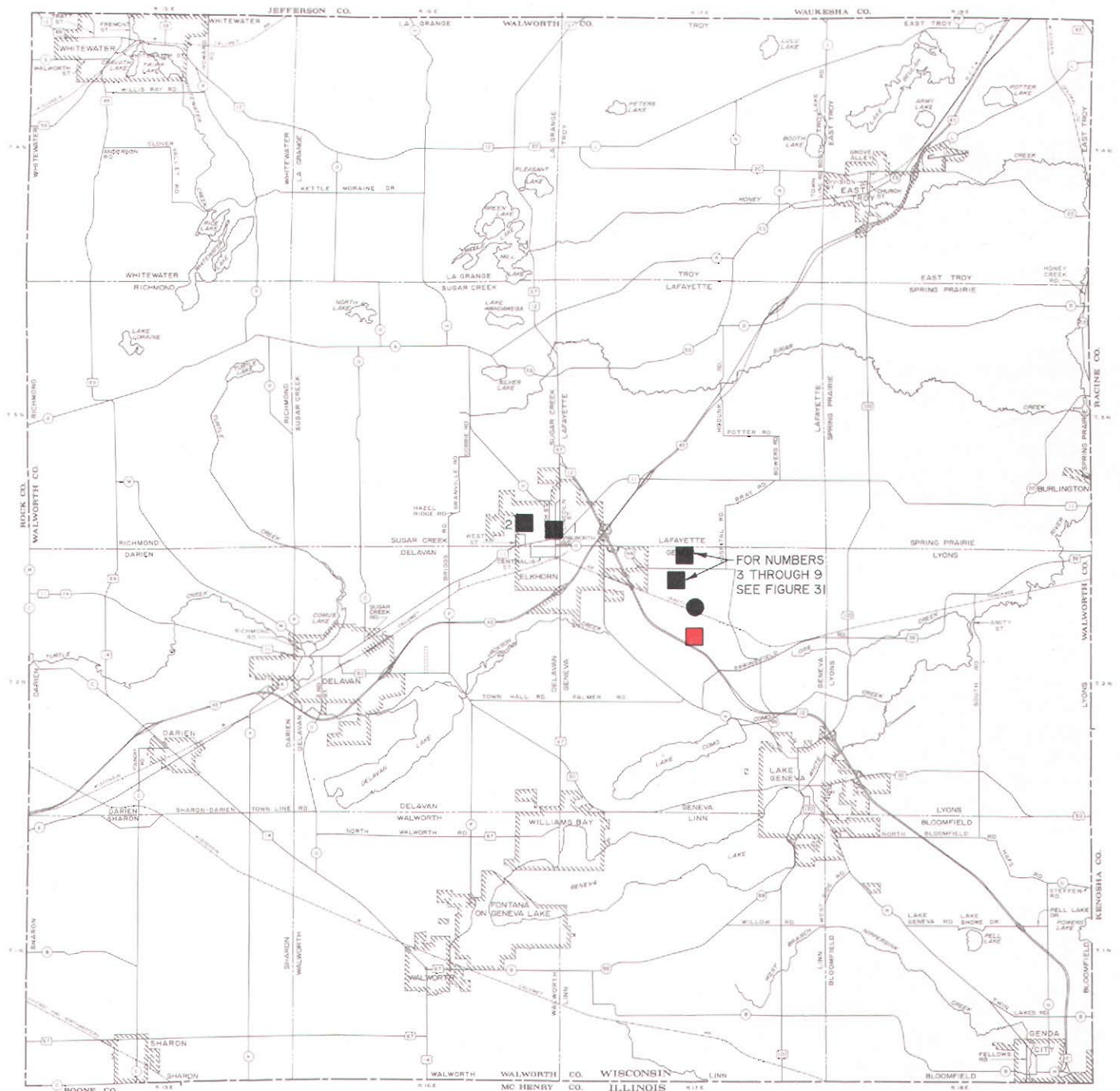
#### Walworth County Courthouse

The Walworth County Courthouse, located in the City of Elkhorn, houses 17 County departments, the Sheriff's Department headquarters, and the jail facility. The solid waste generated at the Sheriff's Department is taken by private cleaning service personnel to a four-cubic-yard dumpster provided by Ven Housen Disposal Service, Inc. Solid waste generated at the jail is taken by the jail maintenance staff to the same dumpster, adjacent to the north



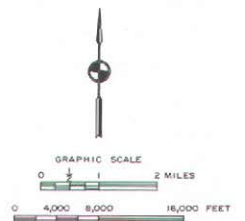
Map 21

LOCATION OF SOLID WASTE COLLECTION POINTS FOR WALWORTH COUNTY FACILITIES



LEGEND

- WASTE COLLECTION POINTS AND IDENTIFICATION NUMBERS (SEE TABLE 4B)
- CITY OF ELKHORN COMPOST SITE
- COUNTY AIR CURTAIN DESTRUCTOR SITE

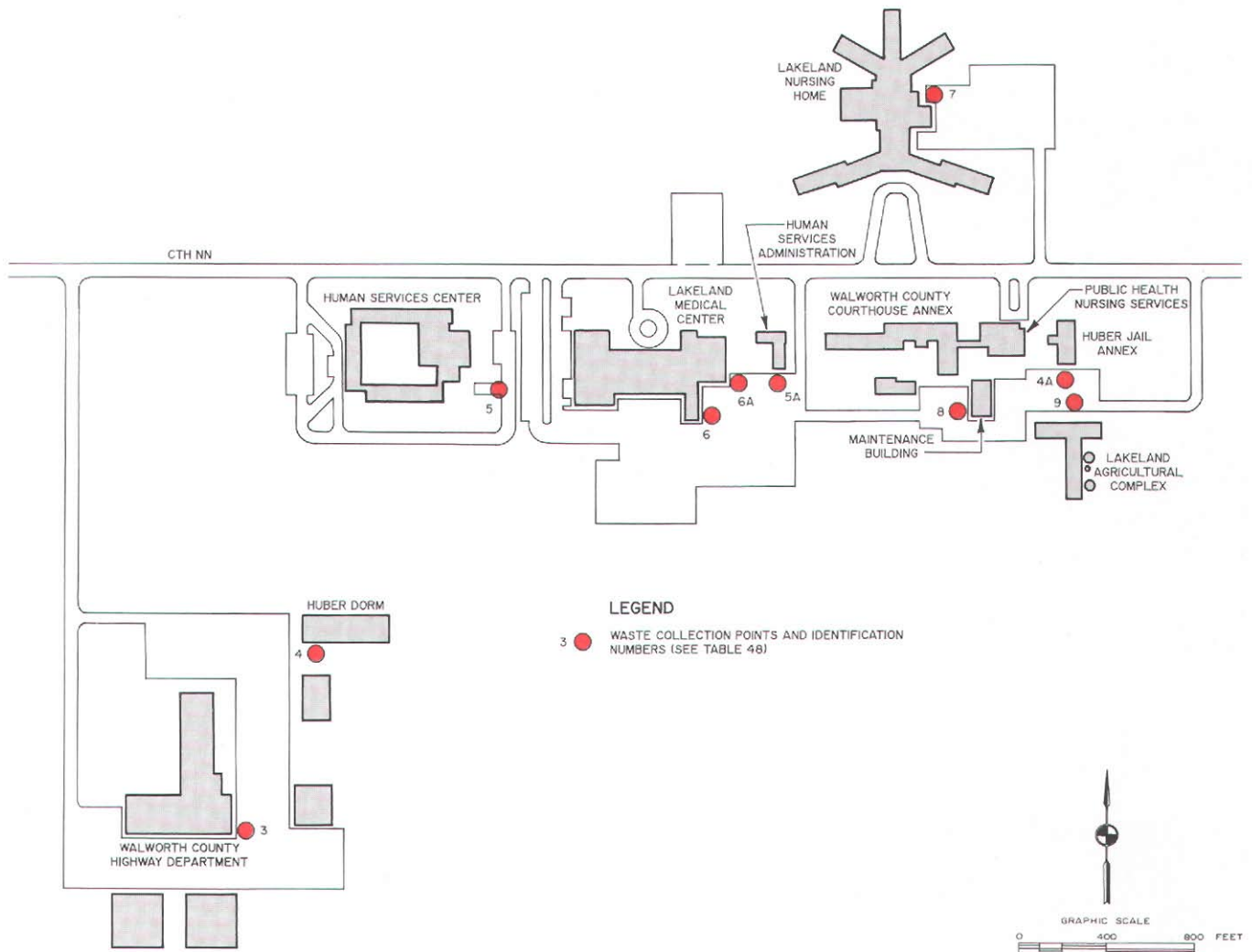


Source: Walworth County Solid Waste Management Department and SEWRPC.



Figure 31

LOCATION OF SOLID WASTE COLLECTION POINTS FOR THE WALWORTH COUNTY LAKELAND COMPLEX



Source: Walworth County Solid Waste Management Department and SEWRPC.

side of the building. Solid waste generated at the other departments in the building is taken in plastic bags to a basement storage area for temporary holding and then loaded onto a service elevator. The capacity of the storage area is about three cubic yards. Waste is picked up by the contractor three times per week. A total of about 98 tons of waste per year is estimated to be generated by this facility. The disposal cost is about \$1,700 per year, or about \$17.35 per ton. The only solid waste management equipment available at this site is a paper shredder, operated at the facility. A limited amount of yard waste generated at the facility is taken to the Elkhorn composting site.

#### Lakeland School

The Lakeland School, located in the City of Elkhorn, is a specialty education facility with about 210 students and about 50 employees. The School's solid waste is taken by in-house maintenance personnel to a two-cubic-yard dumpster, also provided by Ven Housen Disposal Service, Inc., adjacent to the school kitchen facilities. It is estimated that about 60 percent of the solid waste generated at this facility is generated by the kitchen facilities. Waste is picked up by a contractor two times per week. Additional special pickups are made at the end of the normal school year for wastes generated in year-end cleanup programs. In addition, one 20-cubic-yard roll off

Table 48

## SUMMARY OF WALWORTH COUNTY INTERNAL FACILITY SOLID WASTE MANAGEMENT DATA

Name of Facility and Facility Number (see Figure 31)	Mixed Unrecycled Solid Waste					Recycled Solid Waste					
	Annual Unrecycled Solid Waste Quantity (tons)	Contractor	Equipment Used	Estimated Annual Contract Cost <sup>a</sup>	Comment	Material <sup>b</sup>	Annual Quantity	Contractor	Equipment Used	Annual Cost or Revenue <sup>a</sup>	Comments
1. Courthouse	98 <sup>c</sup>	Van Housen Disposal, Inc.	One four-cubic-yard dumpster One court-house freight elevator for storage	\$ 1,700	Miscellaneous mixed waste from 17 departments, jail, Sheriff's Department. Pickup three times per week	Leaves and lawn waste	Five pickup truck loads per year	--	Pickup truck	N/A	To City of Elkhorn compost site
2. Lakeland School	25 <sup>d</sup>	Van Housen Disposal, Inc.	One two-cubic-yard dumpster	1,060	About 60 percent of waste is from kitchen. Wood waste is separated. Pickup two times per week. One special collection per year for "Schoolfest" and at end of school year	Cans Brush, leaves, and lawn waste	N/A Five pickup truck loads	-- --	-- Pickup truck	N/A N/A	Student project To City of Elkhorn compost site and County air curtain destructor
3. Walworth County Highway Department	50 <sup>c</sup>	Waste Management of Geneva Lakes	One six-cubic-yard dumpster  One 20-cubic-yard dumpster	1,260	No formal contracts. Special wastes include crushed oil filters, rags. Pickup once per week  Used for Spring highway cleanup in April through June	Scrap metal Batteries Cardboard Wood waste Recyclables Used Oil Tires Aluminum Highway Signs	40 tons Two to 25 15 tons N/A -- 1,100 gallons N/A N/A	Kiebaun Iron & Metal Company, Whitewater FCF Metal Salvage, Burlington -- -- Waste Management of Geneva Lakes Oil Services, Inc., Waukesha -- --	-- -- Six-cubic-yard dumpster Air curtain destructor 10 90-gallon totes 2,000 gallon storage tank -- -- -- Also available forklift, tractor-loader, and bander	\$900 N/A N/A N/A N/A N/A N/A N/A	Materials delivered by County Materials delivered by County \$50 per month container rental; \$24 per haul Potential air quality problem \$4.00 per full tote 3¢ per gallon \$100 per ton. Materials delivered by County Remanufactured and Reused
4. Huber Dorm 4A. Jail Annex	25  25	Waste Management of Rockford	One six-cubic-yard dumpster  One six-cubic-yard dumpster	1,700	--	Aluminum cans	N/A	Recycled by Department personnel	N/A	N/A	Potential to recycle metal cans, plastic, and cardboard generated largely in kitchens
5. Human Services Center and 5A. Administration Building	56 <sup>c</sup>  10 <sup>c</sup>	Waste Management of Geneva Lakes	One four-cubic-yard dumpster  One two-cubic-yard dumpster	4,200	--	--	--	--	--	--	Some paper is shredded
6. and 6A. Lakeland Medical Center	350 <sup>b</sup>	Waste Management of Geneva Lakes	One 30-cubic-yard compactor and sterilizer One six-cubic-yard dumpster	15,300	No formal contract in place. Six-cubic-yard dumpster is for spillover and bulky wastes	Cardboard Brush and leaves	15 tons 10 pickup loads	Waste Management of Geneva Lakes	One six-cubic-yard dumpster --	\$400 --	-- --
7. Lakeland Nursing Home	700 <sup>b</sup>	Waste Management of Geneva Lakes	30-cubic-yard compactor	34,600	No formal contract in place. Medical waste to Lakeland Medical Center	Plastics Brush and leaves Wood waste	N/A 10 pickup loads N/A	New Way Recycling -- --	10-yard trailer -- To County air curtain destructor	N/A N/A N/A	-- To Elkhorn compost site --

Table 48 (continued)

Name of Facility and Facility Number (see Figure 31)	Mixed Unrecycled Solid Waste					Recycled Solid Waste					
	Annual Unrecycled Solid Waste Quantity (tons)	Contractor	Equipment Used	Estimated Annual Contract Cost <sup>a</sup>	Comment	Material <sup>b</sup>	Annual Quantity	Contractor	Equipment Used	Annual Cost or Revenue <sup>a</sup>	Comments
8. Courthouse Annex	75	Waste Management of Geneva Lakes	One eight-cubic-yard dumpster	\$ 2,400	Wastes from eight departments. Medical wastes: two bags per week to be sterilized at Lakeland Medical Center	--	--	--	--	--	--
9. Lakeland Agricultural Complex	5 <sup>d</sup>	Wal-Rock Disposal	One one-cubic-yard dumpster	500	--	Wood waste Brush	Three pickup loads Six pickup loads	County disposal	To County air curtain destructor	N/A	--

NOTE: N/A Indicates data not available.

<sup>a</sup>Cost analysis does not include in-house costs.

<sup>b</sup>All Departments participate in the Countywide office and computer paper recycling program.

<sup>c</sup>Assumes 200 pounds per cubic yard.

<sup>d</sup>Assumes 300 pounds per cubic yard.

<sup>e</sup>Assumes 600 pounds per cubic yard for compactor wastes.

Source: Walworth County Solid Waste Management Department and SEWRPC.

Table 49

## SUMMARY OF SOLID WASTE MANAGEMENT COSTS FOR WALWORTH COUNTY INTERNAL FACILITIES

Facility	1990	1991	1992	1993 <sup>a</sup>
Courthouse .....	\$ 1,522	\$ 1,330	\$ 1,650	\$ 1,728
Courthouse Annex .....	484	758	1,181	2,454
Lakeland School .....	963	1,051	1,059	1,060
Lakeland Agricultural Complex .....	392	434	420	1,670 <sup>b</sup>
Highway Department .....	1,620	1,730	1,750	1,260
Sheriff's Department .....	401	591	1,056	1,480
Lakeland Nursing Home .....	19,823	23,149	26,416	34,666
Lakeland Medical Center .....	5,061	4,964	8,215	15,310
Human Services .....	2,824	3,054	2,945	4,206
Total	\$33,090	\$37,061	\$44,692	\$63,834

<sup>a</sup>Estimated. Based on first six months' experience.

<sup>b</sup>Includes consideration of a one-time charge for building demolition. A typical annual disposal cost is expected to be about \$500.

Source: Walworth County Solid Waste Management Department.

container is used for waste disposal once per year during a "Schoolfest" weekend. A total of about 25 tons of waste per year are estimated to be generated by this facility. The disposal cost is about \$1,100 per year, or about \$44 per ton. The students at the school recycle aluminum cans as a school project. A limited amount of yard waste is taken to the Elkhorn composting site.

**Walworth County Highway Department Complex**  
The Walworth County Highway Department, located in the southwest corner of the Lakeland Complex, has a solid waste management system to serve its offices and shop areas, as well as wastes collected from its highway clean-up operations. Mixed unrecycled solid waste is taken by private cleaning service personnel to a central location in the shop area and

then taken by Department personnel with a front-end loader to a six-cubic-yard dumpster at the complex provided by Waste Management of Geneva Lakes. During the spring highway clean-up period of April through June, an additional 20-cubic-yard roll-off container is used at the site. Both storage containers are picked up by contractor once a week. A total of about 50 tons of waste per year is estimated to be generated by this facility. The disposal cost is about \$1,300 per year, or about \$26 per ton.

The County Highway Department operates an air curtain destructor to burn the brush and wood wastes it collects, as well as such wastes delivered from other County departments. The Highway Department also operates a recycling program for scrap metal, batteries, cardboard, mixed recyclables, used oil, tires, brush, and aluminum highway signs. Scrap metal, tires, and wood wastes are stored in bins divided by concrete block walls. These materials are transported by County personnel to recycling locations, or in the case of wood, to the County air curtain destructor. Used oil is stored in a 2,000 gallon tank which is pumped out about twice per year by a contractor. Mixed glass, aluminum, bi-metal, and plastics are stored in 10 90-gallon tote containers which are picked up by a contractor when full. Brush waste is chipped. The Department has equipment which could be considered for use in a recycling program, including tractor loaders, brush chippers, a forklift, and a bander.

#### Huber Dorm and Jail Annex

The Huber Dorm, located northeast of the County Highway Department, has, on the average, about 100 prisoners and about four employees. The Jail Annex, located at the extreme east end of the Lakeland Complex, on the average, has about 80 prisoners and about 15 employees on the day shift and about four employees on other shifts. Both facilities have kitchen operations. Each facility uses a 6-cubic-yard dumpster provided by Waste Management of Rockford. Waste is taken to the dumpsters by Huber prisoners or guards and picked up by a contractor once a week. A total of about 25 tons of waste per year is estimated to be generated by this facility. The disposal cost is about \$1,700 per year, or about \$68 per ton. Aluminum cans are recycled by the Department personnel. There is the potential to recycle cardboard, plastic, and metal containers generated in the kitchen operations of this facility.

#### Human Services Center and Administration Buildings

The County Human Services Center, located in the

southeast area of the Lakeland complex, serves about 200 clients per day with about 100 employees, most of whom work daytime shifts. The administration building, located in the south central area of the Lakeland Complex, serves an average of about 85 clients per day and has about 50 employees. A cafeteria at the Center serves continental breakfast and about 150 lunches per day. Solid waste from the Center is disposed of by County housekeeping staff in a four-cubic-yard dumpster provided by Waste Management of Geneva Lakes and adjacent to the building. Solid waste from the Administration Building is disposed of in a two-cubic-yard dumpster provided by the same contractor. Waste is picked up by a contractor three times weekly from the Center and once weekly from the Administration Building. A total of about 56 tons of waste per year is generated by the Center and about 10 tons per year by the Administration Building. The disposal cost is about \$4,200 per year, or about \$63.60 per ton.

#### Lakeland Medical Center

The Lakeland Medical Center, located in the south central area of the Lakeland Complex, is a 100-bed hospital with about 400 employees. Most of the solid waste is taken to a 30-cubic-yard compactor with an attached sterilizer unit for disposal of medical wastes. In addition, a six-cubic-yard dumpster provided by Waste Management of Geneva Lakes is used for bulky waste and excess waste from the compactor. A separate six-cubic-yard dumpster is provided for recycling corrugated paper. Waste is taken by County housekeeping personnel to the compactor dumpster area at the southeast side of the building. Waste is picked up by a contractor about every 10 days for the compactor, once weekly for the cardboard dumpster, and once per month for the other dumpster. Because of the inclusion of medical waste in the mixed solid waste stream, special landfilling techniques are required for waste disposal. A total of about 350 tons of waste per year are generated by the facility. The disposal cost is about \$16,000 per year, or about \$45.71 per ton. Some medical waste from the Lakeland Nursing Home is disposed of at the Medical Center sterilizer unit. A limited amount of yard waste is taken to the City of Elkhorn compost site at the County Lakeland Complex.

#### Lakeland Nursing Home

The Lakeland Nursing Home, located at the northeast area of the Lakeland Complex, is a 328-bed facility with about 350 employees. Solid waste is disposed of at the facility by County housekeeping personnel in a 30-cubic-yard compactor provided by Waste Management of Geneva Lakes. Waste is



picked up by a contractor one or two times weekly. A total of about 700 tons of waste per year is generated by this facility. The disposal cost is about \$35,000 per year, or about \$50 per ton. A limited amount of yard waste is taken to the Elkhorn composting site. Some wood waste is taken to the County Highway Department air curtain destructor. The facility also recycles plastic containers, using a 10-cubic-yard trailer provided by New Way Recycling. The trailer is picked up approximately once a month. Medical waste generated at the nursing home is disposed of at the Lakeland Medical Center sterilizer unit.

#### Walworth County Courthouse Annex

The Courthouse Annex houses eight County departments. The solid waste generated at the facility is taken by housekeeping personnel to an eight-cubic-yard dumpster, provided by Waste Management of Geneva Lakes, to the south of the building near the Maintenance Shop. Waste is picked up by a contractor twice a week. A total of about 75 tons of waste per year is generated by this facility. The disposal cost is about \$2,400 per year, or about \$32 per ton. Special department clean-ups occur two or three times per year.

#### Lakeland Agricultural Complex

The Lakeland Agricultural Complex, located at the extreme southeast area of the Lakeland Complex, includes offices and a dairy farm operation. The solid waste is taken by County maintenance personnel to a one-cubic-yard dumpster provided by Wal-Rock Disposal and sited near the dairy barn. Waste is picked up by a contractor once per week. A total of about five tons of waste per year is generated by this facility. The disposal cost is about \$500 per year, or about \$100 per ton per year. About 40 2.5-gallon plastic chemical containers are generated in the spring. Special clean-ups occur two to three times per year. A limited amount of yard waste is taken to the Elkhorn composting site.

#### Summary

In total, at the nine County facility locations described above, there are approximately 1,400 tons of solid waste generated annually and then collected and disposed of by landfilling. In addition, about 20 tons of office paper are currently recycled, as are varying amounts of corrugated paper and such miscellaneous materials as iron and steel, tires, batteries, and used oil. Yard wastes are either composted at the City of Elkhorn compost site at the County Lakeland Complex or, in the case of brush,

are chipped or burned in the County's air curtain destructor with other wood wastes.

The total estimated cost for solid waste collection and disposal is estimated to be about \$64,000, or about \$46 per ton of waste. The costs of solid waste collection disposal vary from as low as \$17.50 per ton to as high as \$100 per ton. The variation in cost can be attributed to the quantity of solid waste generated, the length and status of the contractual arrangement, the type of waste and variations in density.

#### **PURPOSE AND GOALS OF COUNTY INTERNAL SOLID WASTE MANAGEMENT PROGRAMS**

The primary purpose of the County's internal solid waste management program is to reduce the amount of solid waste generated at the County facilities which must be disposed of by landfilling through a cost-efficient program meeting the requirements of the State recycling law. The following goals are recommended to provide a basic framework within which alternative and recommended plans can be formulated.

- To reduce the quantity of solid waste generated
- To reduce solid waste quantities disposed of by landfilling by about 25 percent, consistent with the goals of the State recycling law
- To reduce waste volume and conserve space at sites with space limitations
- To minimize solid waste recycling and disposal costs
- To maintain program flexibility to meet changing needs, market conditions, and regulations
- To keep County personnel involvement in handling materials to a minimum
- To allow individual departments to develop system details compatible with each department's operation
- To maintain security regarding confidential materials
- To maximize the value received from recyclable materials
- To protect public health and safety

Table 50

### MATERIALS WITH POTENTIAL FOR WASTE REDUCTION AND RECYCLING

Conventionally Recycled Materials
Aluminum Containers <sup>a</sup>
Glass Bottles <sup>a</sup>
Brown
Green
Clear
Plastic Bottles <sup>a</sup>
Steel or Bi-Metal Containers <sup>a</sup>
Magazines/Catalogs <sup>a</sup>
Newspaper <sup>a</sup>
Paper
White Office <sup>a</sup>
High-Grade Computer Paper <sup>a</sup>
Colored Ledger Paper <sup>a</sup>
Used Paper Products (towels, napkins, paper cups, etc.)
Cardboard <sup>a</sup>
Yard Waste
Brush <sup>b</sup>
Grass Clippings <sup>b</sup>
Leaves <sup>b</sup>
Tree Limbs
Weeds
Special Waste
Aluminum, Copper, Brass, Other Nonferrous Metals
Batteries <sup>c</sup>
Clean Wood Wastes
Lamps and Bulbs <sup>d</sup>
Polystyrene Packaging <sup>a</sup>
Scrap Iron or Steel
Toner Cartridges
Tires <sup>a</sup>
Waste Oil <sup>c</sup>

<sup>a</sup>Material banned from landfilling January 1995.

<sup>b</sup>Material banned from landfilling January 1993.

<sup>c</sup>Material banned from landfilling January 1991.

<sup>d</sup>Certain waste lamps and bulbs containing toxic metals are not allowed to be landfilled, generally fluorescent and mercury-vapor types.

Source: Wisconsin Department of Natural Resources.

### MATERIAL CONSIDERATIONS

Solid waste reduction and recycling operations can be conducted for a wide variety of materials. Those materials generated at County facilities that have potential for waste reduction and recycling are listed in Table 50. For purposes of this plan, the materials noted in Table 50 have been separated into three groups.

The first group includes those materials which are considered to be generally amenable to facilitywide

conventional recycling systems. These materials include: aluminum containers, steel or bi-metal containers, cardboard, glass bottles, newsprint, magazines and catalogs, white office paper, computer paper, and colored ledger paper.

The second group of materials includes yard waste materials which can be composted or chipped. These materials include brush, leaves, grass clippings, weeds, and selected tree limbs.

The third group, all items in Table 50 not included in the first two groups, is categorized as special waste materials that can be readily recycled but are generated in limited amounts and locations, usually on an intermittent basis. These include scrap iron and steel, other scrap metals, tires, batteries, and used oil, as well as wastes which are not readily recyclable and which require specialized handling, disposal, and recycling or waste reduction procedures, including wood wastes, lamps and bulbs, toner cartridges, and miscellaneous paper and polystyrene products.

Other types of solid waste generated at the County's facilities which cannot be effectively reduced or recycled include food wastes from the seven kitchen and food-service operations, food-contaminated paper and plastic products, medical wastes, disposable diapers, selected used paper products, and selected textiles.

Table 51 lists each of the County's major facilities and an approximate estimate of the amount of each type of material generated at each facility. The quantities of each of the materials generated, as shown in Table 51, represent preliminary estimates made only for the purpose of approximating container needs. The quantities were estimated using the general breakdown of nonresidential solid waste composition documented in Chapter II, applied to the inventory data collected on the total amount of solid waste generated at each facility, and refined to reflect more site-specific data, where available.

### ALTERNATIVE SOURCE-REDUCTION CONSIDERATIONS

Source reduction can be defined as the implementation of policies and practices to reduce the rate of solid waste generation. The purpose of source reduction is to reduce the quantity of solid waste handled in the subsequent solid waste management functions dealing with solid waste after generation. The available options for source reduction are described in Chapter IV.

Table 51

## SUMMARY OF WALWORTH COUNTY INTERNAL FACILITY MATERIAL REDUCTION AND RECYCLING QUANTITIES

Name of Facility and Facility Number (see Figure 31)	Estimated Annual Unrecycled Solid Waste Quantity (tons)	Estimated Conventional Recyclable Material Quantities (tons per year)						Yard Waste (tons per year)	
		White Paper	Computer Paper	Mixed Colored Ledger Paper	Newsprint and Magazines	Cardboard	Mixed Aluminum, Glass, Bi-Metal, and Plastic Containers	Tree Limbs and Brush	Leaves, Grass Clippings, and Weeds
1. Courthouse	98	4.3	3.5	1.5	3.9	29.4	7.8	0.7	2.0
2. Lakeland School	25	0.4	0.4	0.2	0.4	10.5	2.5	0.7	2.0
3. Walworth County Highway Department	50	1.1	0.9	0.4	1.0	15.0	17.0	N/A	N/A
4. Huber Dorm	25	1.1	0.9	0.4	1.0	8.7	6.0	--	--
4A. Jail Annex	25	1.1	0.9	0.4	1.0	8.7	6.0	--	--
5. Human Services Center and 5A. Administration Building	55 10	2.5 0.4	2.0 0.4	1.0 0.2	2.2 0.4	16.8 3.0	4.5 0.8	-- --	-- --
6. and 6A. Lakeland Medical Center	350	6.0	4.0	2.0	14.0	50.0	28.0	--	--
7. Lakeland Nursing Home	700	3.0	2.0	1.0	28.0	100	56.0	--	--
8. Courthouse Annex	75	3.2	2.7	1.1	3.2	22.5	5.9	--	--
9. Lakeland Agricultural Complex	5	0.2	0.2	0.1	0.2	0.1	0.4	N/A	N/A
Total	1,418	23.3	17.9	8.3	55.3	264.7	134.9	1.4	4.0

Name of Facility and Facility Number (see Figure 31)	Annual Amount of Special Wastes								Comments
	Scrap Iron and Steel (tons)	Used Oil (gallons)	Number of Batteries	Number of Tires	Miscellaneous Paper and Polystyrene Products (tons)	Number of Lamps and Bulbs	Number of Toner Cartridges	Other	
1. Courthouse	--	--	--	--	17.6	N/A	N/A	--	--
2. Lakeland School	--	--	--	--	6.3	N/A	N/A	Small amount of wood waste	Potential for recycling portion of kitchen waste
3. Walworth County Highway Department	40	1,100	2 to 25	Variable	4.5	N/A	N/A	Wood wastes	--
4. Huber Dorm	--	--	--	--	4.5	N/A	N/A	--	Potential for recycling portion of kitchen waste
4A. Jail Annex	--	--	--	--	4.5	N/A	N/A	--	
5. Human Services Center and 5A. Administration Building	-- --	-- --	-- --	-- --	10.1 1.8	N/A N/A	N/A N/A	-- --	Potential for recycling portion of kitchen waste
6. and 6A. Lakeland Medical Center	--	--	--	--	63.0	N/A	N/A	--	--
7. Lakeland Nursing Home	--	--	--	--	126.0	N/A	N/A	Plastic containers are recycled	Potential for recycling cardboard
8. Courthouse Annex	--	--	--	--	13.4	N/A	N/A	--	--
9. Lakeland Agricultural Complex	--	--	--	--	0.9	N/A	N/A	Small amount of wood waste 40 2.5-gallon plastic containers in spring	--
Total	40	1,100	2 to 25	Variable	252.6	N/A	N/A	--	--

NOTE: N/A indicates materials are generated and quantity is not available.

-- Means no significant amount of the indicated material is generated.

Source: Walworth County Solid Waste Management Department and SEWRPC.

Source reduction can be carried out at the County facilities through procurement policies, selected equipment and material installation and use, office practices, and staff educational programs. The source-reduction measures which are considered applicable for use at the County's facilities include:

- The use of office copier practices which encourages two-sided copying
- The posting or routing of memoranda and similar office communications rather than providing individual copies
- The institution of purchasing procedures to encourage limited packaging, including returnable or refillable containers
- The creation of scratch pads from paper used on one side
- The reuse of manila envelopes and folders for in-house circulation
- The use of centralized filing rather than the use of individual files
- The reuse of corrugated cartons and styrofoam in packaging and shipping by covering original mailing information with special reuse labels
- The purchase of equipment and durable goods with longer life cycles even if the initial cost may be slightly higher
- The use of washable, reusable plates and cutlery, rather than disposables
- The encouragement of employees to bring their own coffee mugs and/or water containers to the cafeteria for use at the office
- The use of copy machines and laser printers serviced by toner cartridge refilling companies and re-inking computer printer and typewriter ribbons
- The use of hot-air dryers or washable roller towels in the bathrooms and employee lounges instead of paper towels
- The conversion, over time, to increased use of computer-aided layouts and designs, using electronic, rather than hard copy, media

It must be recognized that the amount of solid waste reduction which can be directly achieved by efforts of the County itself is limited. Moreover, the cost of some measures may be prohibitive or the measure impractical. However, the reduction of wastes generated is, nevertheless, a desirable goal. Centralized education efforts and policy oversight through the County government could provide information and have an influence on the potential for reducing wastes through individual department actions. Accordingly, it may be concluded that the source-reduction measures as outlined above should be considered as part of the County's solid waste management program. The potential applicability of each of the measures noted above to each of the County solid waste source centers is summarized in Table 52.

It must be recognized that the specific applicability and timing of implementation of the source-reduction measures must be analyzed by each department on a case-by-case basis. In most cases, a phased approach to implementation will be required as changes in equipment and procedures are carried out for other reasons.

## ALTERNATIVE RECYCLING PLANS

The various recycling measures which can be considered in developing specific alternative plans were described generally in Chapter IV. A review of those measures and of the current solid waste management practices and the program goals set forth above provides a basis for the development and analysis of alternative recycling plans for County facilities.

As reported above, there is a current County facility-wide recycling program for office paper from which experience can be drawn for use in formulating and evaluating options for recycling conventionally recyclable materials. In addition to selected office papers, currently being recycled, these materials include: mixed colored paper; aluminum, bi-metal, glass and plastic containers; newsprint, miscellaneous office paper, magazines, and catalogs; and corrugated paper. Recycling options for the materials included in the special-waste category are considered following the alternatives for the conventionally recycled materials.

For the County internal facilities, the options which are deemed to be practical for further consideration can be related to the degree of source separation to



Table 52

## POTENTIAL APPLICABILITY OF SOURCE REDUCTION MEASURES TO WALWORTH COUNTY SOLID WASTE CENTERS

Potential Source Reduction Measure	Courthouse	Lakeland School	Walworth County Highway Department	Huber Dorm	Jail Annex	Human Services Center	Administration Building	Lakeland Medical Center	Lakeland Nursing Home	Courthouse Annex	Lakeland Agricultural Complex	Comments
Revise Office Copier Practices	X	X	X	X	X	X	X	X	X	X	--	--
Post or Route Office Communications	X	X	X	X	X	X	X	X	X	X	X	--
Revise Purchasing Procedures	X	X	X	X	X	X	X	X	X	X	X	--
Make Used-Paper Scratch Pads	X	X	X	X	X	X	X	X	X	X	X	Potential project for Lakeland School
Reuse Manila Envelopes	X	X	X	X	X	X	X	X	X	X	X	--
Centralized Filing	X	--	--	--	--	X	X	X	X	X	--	--
Reuse Containers	X	--	X	--	--	--	--	--	X	X	--	--
Purchase Equipment and Goods with Longer Life Cycles	X	X	X	X	X	X	X	X	X	X	X	--
Use Reusable Dishes and Cutlery	--	X	--	X	X	X	X	X	X	--	--	--
Use Personal Coffee and Water Mug or Containers	X	X	X	X	X	X	X	X	X	X	X	--
Refill Toner Cartridges	X	X	X	X	X	X	X	X	X	x	--	--
Alternatives to Paper Towels	X	X	X	X	X	X	X	X	X	X	X	--
Increase Use of Electronic Media	X	--	--	--	--	--	X	X	X	X	--	--

Source: Walworth County Solid Waste Management Department and SEWRPC.

be employed and to the institutional arrangement for implementation. In addition, consideration can be given to the degree of recycling to be achieved. For example, one option is to consider which types of office paper would be recycled. The most valuable types include high-quality computer paper and white ledger paper. These two types can be most cost-efficient to separate and recycle. Additionally, colored ledger paper, including any colored or white paper mixed together, as well as common file stock, including material like FAX paper, envelopes, blue-line prints, glossy paper, file folders, magazines, and catalogs can be separated. These latter two groups have less value and become a greater cost liability when separated. To some extent, the degree of separation of the materials and the extent to which paper is recycled is dependent upon the market to which the material is to be delivered. For purposes of the alternatives, it is assumed that all of the conventionally recycled materials noted above will be recycled as required by State regulation. It is, however, recognized that the selected system will have to be implemented in a phased manner and that any recommended program will have to be refined following detailed negotiation with potential contract hauler-marketing firms.

With regard to the level of material separation, two options were considered. The first option would provide for a relatively high level of separation of the conventionally recycled materials into individual containers. Separation would be made for nine items, or groups of items, including white ledger paper; high-grade computer paper; colored ledger paper; mixed office paper, newsprint, magazines, and catalogs; cardboard; aluminum and bi-metal containers; glass containers in two colors; and plastics. Under the second option, a low level of separation would be made for four items or groups of items, including white ledger paper; mixed office paper, newspaper, magazines, and catalogs; cardboard; and commingled aluminum, glass, bi-metal, and plastics.

With regard to the institutional implementation arrangements, two options were considered with regard to the use of County staff and equipment for the program. Under the first option, County staff would be involved in contract administration for all of the solid waste disposal and recycling programs and for the internal storage and collection of recyclable materials to a centralized pickup location from each solid waste center. The County would own the small-scale storage containers needed for the

Table 53

**SUMMARY COST ANALYSIS DATA FOR ALTERNATIVE  
RECYCLING PLANS FOR THE WALWORTH COUNTY FACILITIES**

Alternative Plan	Initial Capital Cost	Average Annual Operation and Maintenance Cost	Total Cost of Capital, Operation and Maintenance <sup>a</sup>	
			Total Annual Cost	Cost per Ton of Recycled Material
High Level of Separation with High Level of County Participation in Marketing and Equipment Ownership . . . . .	\$42,000	\$26,500	\$32,200	\$108.00
High Level of Separation with Limited County Participation in Marketing and Equipment Ownership . . . . .	7,000	18,600	19,600	65.00
Alternative Plan 3: Low Level of Separation with High Level of County Participation in Marketing and Equipment Ownership . . . . .	38,000	27,500	32,800	109.00
Alternative Plan 4: Low Level Separation with Low Level of County Participation in Marketing and Equipment Ownership . . . . .	5,000	19,000	19,700	66.00

<sup>a</sup>Total cost is based upon amortization of the capital cost at a 6 percent interest rate over a 10-year period.

Source: Walworth County Solid Waste Management Department and SEWRPC.

internal storage and collection system. In addition, the County would be responsible to the extent practicable for the external storage at each center and for the transport of the recyclable materials to the various markets. The County would also own the external storage system containers for the recyclables, except dumpsters. It was deemed impractical to own and maintain dumpsters because of the ready availability of such containers from contract haulers, who can purchase these containers more economically in large quantities, and because of the need for the dumpster to be compatible with the hauling equipment. Transportation of the recyclables would be provided by contract with a private hauler. Ownership of the recyclable materials and the revenue from their marketing would remain with the County.

Under the second institutional implementation option, the County's direct role in the recycling program would be limited to contract administration for all solid waste and recycling programs and for the internal storage, collection, and transport of recyclable materials to a centralized pickup location at each solid waste center. County ownership of equip-

ment would be limited to smaller-scale collection and storage containers used for the internal storage and collection of recyclables. The external storage system components, including totes, dumpsters, compactors, and roll-off containers, would be owned by private collection firms, who would also be the transporters as well as the owners and marketers of the recyclable materials.

The options described above have been combined into four separate alternative plans. The principal features and costs of the four alternative plans are summarized in Table 53. Each alternative is described below. All costs are expressed in constant 1993 dollars.

**Alternative Plan No. 1: High  
Level of Separation with High  
Level of County Participation in  
Marketing and Equipment Ownership**

Under Alternative Plan No. 1, the recyclable wastes would be divided into nine categories: white ledger paper; high-grade computer paper; colored ledger paper; mixed office paper, newsprint, magazines, and catalogs; cardboard; aluminum and bi-metal

containers; glass containers, clear and colored; and plastics. In order to accomplish this, an internal storage and collection system with separate containers in each department or centralized collection area would be required. A detailed listing of the estimated number and approximate size of containers and their distribution to each solid waste center is set forth in Appendix F. Under this alternative, it is envisioned that each department or selected office area would be provided with four containers for the paper separation. These containers would generally hold 10 to 20 gallons and would be the type which could be stacked in areas where space is of a concern. Kitchen areas would be provided with one larger container for plastics and metals and smaller containers for clear and for colored glass. Plastic and metal materials and, if needed, colored glass would be re-separated at each center's centralized storage area. Additionally, there would be can-collection containers sited at selected areas in each solid waste center. The internal storage system would be owned by the County. It is envisioned that cardboard would be taken by housekeeping or maintenance personnel directly to the centralized collection area in each facility, without the use of special containers. This internal collection system would be accomplished by maintenance and housekeeping personnel.

The external storage system for recyclables at each center is envisioned to consist of one two- to six-cubic-yard dumpster for cardboard and the appropriate number of 80- to 100-gallon tote-type containers for other recyclables. One two-cubic yard compactor with a 40-cubic-yard storage box would also be provided for cardboard storage at the Lakeland Nursing Home. A detailed listing of the estimated number and approximate size of storage containers and their distribution to each center is set forth in Appendix G. Under this alternative, the County would own the external storage containers except for the dumpsters.

Under Alternative Plan No. 1, the County would be responsible for securing the markets for the generated recyclables. For costing purposes, it was assumed that the County would collect all the office paper recyclables and transport them to a centralized roll-off container site. These paper recyclables would be marketed by the County, by contract transport. Two additional compartments would be installed in that container. The County would also market all of the cardboard generated at the County facilities, contracting for its transport. It is assumed that the other materials, aluminum, glass, plastic, and

bi-metal containers, would be stored in the tote-type covered containers, which can be stored outside, and would be collected from each center by an outside contractor. At this time, it is not expected that any cost advantage could be achieved by the County collecting and/or marketing these materials directly.

As shown in Table 54, the estimated capital cost for development of the recycling facilities under Alternative Plan No. 1 is \$42,000, with an average annual net operation and maintenance cost of \$26,500, which includes an estimated annual credit of \$2,900 from the revenue generated from the sale of the recyclable wastes. The total average annual cost of capital and operation and maintenance is \$32,200, or about \$108 per ton of material recycled.

Alternative Plan No. 2: High Level of Separation with Limited County Participation in Marketing and Equipment Ownership

Under Alternative Plan No. 2, the recyclable wastes would be divided into nine categories: white ledger paper; high-grade computer paper; colored ledger paper; mixed office paper; newsprint, magazines, and catalogs; cardboard; aluminum and bi-metal containers; glass containers, clear and colored; and plastics. In order to accomplish this, an internal storage and collection system with separate containers in each department or centralized collection area would be required, the same as described above for Alternative Plan No. 1. A detailed listing of the estimated number and approximate size of containers and their distribution to each solid waste center is set forth in Appendix F.

The external storage system for recyclables at each center is envisioned to include the same components as described under Alternative Plan No. 1. A detailed listing of the estimated number and approximate size of storage containers and their distribution to each center is set forth in Appendix G. Under this alternative, all the external storage containers would be owned by private haulers/recyclers.

Under Alternative Plan No. 2, the County would have no responsibility for securing the markets for the generated recyclables and the materials would become the property of the contract hauler/recycler at the time of pickup.

As shown in Table 55, the estimated capital cost for development of the recycling facilities under Alternative Plan No. 2 is \$7,000, with an average annual net

Table 54

**COST ANALYSIS FOR ALTERNATIVE PLAN NO. 1: HIGH-LEVEL SEPARATION  
WITH HIGH-LEVEL COUNTY MARKETING PARTICIPATION AND EQUIPMENT OWNERSHIP**

Item	Initial Capital Cost	Operation and Maintenance Cost and Contract Charges
Internal Generation Center Storage and Collection System at Generation Centers . . . . .	\$ 7,000	- <sup>a</sup>
External Storage System at Generation Centers Paper, Aluminum, Bi-Metal, Plastic, and Glass . . . . . Cardboard . . . . .	\$ 6,000 12,000 <sup>b</sup>	- \$ 600 <sup>b</sup>
Centralized Storage System for Paper and Paper Collection System . . . . .	\$17,000 <sup>c</sup>	\$16,000 <sup>d</sup>
Transportation and Contract Charges		
Paper . . . . .	--	\$ 1,600
Aluminum, Bi-Metal, Plastic, and Glass . . . . .	--	5,600
Cardboard . . . . .	--	5,600
Recyclable Revenue		
Paper . . . . .	--	\$-1,200
Aluminum, Bi-Metal, Plastic, and Glass . . . . .	--	--
Cardboard . . . . .	--	-1,700
<b>Total</b>	<b>\$42,000</b>	<b>\$26,500</b>

<sup>a</sup>Internal costs assumed to be similar for all alternatives.

<sup>b</sup>Includes 40-cubic-yard storage bin and two-cubic-yard compactor for Lakeland Nursing Home. Operation and maintenance cost is for annual maintenance by County or contract personnel.

<sup>c</sup>Includes modification to existing roll-off container and purchase of dedicated pickup truck with lift for transportation of paper to containers.

<sup>d</sup>Includes labor cost equivalent to about one full-time person, 50 percent of the time. Assumed to be covered under contract with Highway or Maintenance Departments.

Source: SEWRPC.

operation and maintenance cost of \$18,600. No recyclable revenues are expected, since the value of the recyclables is factored into the contract hauler/recycler contract charges. Total average annual cost of capital and operation and maintenance is \$19,600, or about \$65 per ton of material recycled.

**Alternative Plan No. 3: Low Level of Separation  
with High Level of County Participation in  
Marketing and Equipment Ownership**

Under Alternative Plan No. 3, the recyclable wastes would be divided into four categories: white ledger paper; high-grade computer paper, colored ledger paper, mixed office paper, newsprint, magazines, and catalogs; cardboard; aluminum and bi-metal containers, glass containers, and plastics. In order to accomplish this, an internal storage and collection

system with separate containers in each department or centralized collection area would be required. Under this alternative, it is envisioned that each department or selected office area would be provided with two containers for the paper separation. These containers would hold 10 to 20 gallons and could be stacked in areas where space is of a concern. Kitchen areas would be provided with one large container for plastics, metals, and glass. Additionally, there would be can-collection containers located at selected areas in each solid waste center. It is envisioned that cardboard would be taken by housekeeping or maintenance personnel directly to the centralized collection area in each facility, without the use of special containers. This internal collection system would be accomplished by maintenance and housekeeping personnel.



Table 55

**COST ANALYSIS FOR ALTERNATIVE PLAN NO. 2: HIGH-LEVEL SEPARATION  
WITH LIMITED COUNTY PARTICIPATION IN MARKETING AND EQUIPMENT OWNERSHIP**

Item	Initial Capital Cost	Operation and Maintenance Cost and Contract Charges
Internal Generation Center Storage and Collection System at Generation Centers .....	\$7,000	-- <sup>a</sup>
External Storage System at Generation Centers Paper, Aluminum, Bi-Metal, Plastic, and Glass .....	--	-- <sup>b</sup>
Cardboard .....	--	\$ 2,500 <sup>c</sup>
Centralized Storage System for Paper and Paper Collection System .....	--	--
Transportation and Contract Charges		
Paper .....	--	\$ 4,700
Aluminum, Bi-Metal, Plastic, and Glass .....	--	6,600
Cardboard .....	--	4,800
Recyclable Revenue		
Paper .....	--	--
Aluminum, Bi-Metal, Plastic, and Glass .....	--	--
Cardboard .....	--	--
<b>Total</b>	<b>\$7,000</b>	<b>\$18,600</b>

<sup>a</sup>Internal costs assumed to be similar for all alternatives.

<sup>b</sup>Cost of containers is included in contract charges.

<sup>c</sup>Includes rental of 40-cubic-yard storage bin and two-cubic-yard compactor for Lakeland Nursing Home.

Source: SEWRPC.

The external storage system for recyclables at each center is envisioned to generally consist of one two-to six-cubic-yard dumpster for cardboard and the appropriate number of 80- to 100-gallon tote-type containers for other recyclables. One two-cubic yard compactor with a 40-cubic-yard storage box would also be provided for cardboard storage at the Lakeland Nursing Home. Under this alternative, the County would own the external storage containers except for the dumpsters.

Under Alternative Plan No. 3, the County would be responsible for securing the markets for the recyclables. For costing purposes, it was assumed that the County would collect all of the paper recyclables generated and transport it to a centralized roll-off container site. These paper recyclables would be

marketed by the County with transportation being contracted for. The County would also market all of the cardboard generated at the County facilities, while contracting for its transport. It is assumed that the other materials, aluminum, glass, plastic, and bi-metal containers, would be stored commingled in the tote-type covered containers which can be stored outside and would be collected from each center by an outside contractor. At this time, it is not expected that any cost advantage could be achieved by the County collecting and/or marketing these materials directly.

As shown in Table 56, the estimated capital cost for development of the recycling facilities under Alternative Plan No. 3 is \$38,000, with an average annual net operation and maintenance cost of \$27,500, which includes an estimated annual credit of \$2,600

Table 56

**COST ANALYSIS FOR ALTERNATIVE PLAN NO. 3: LOW-LEVEL RECYCLABLE SEPARATION  
WITH HIGH-LEVEL COUNTY PARTICIPATION IN MARKETING AND EQUIPMENT OWNERSHIP**

Item	Initial Capital Cost	Operation and Maintenance Cost and Contract Charges
Internal Generation Center Storage and Collection System at Generation Centers .....	\$ 5,000	-- <sup>a</sup>
External Storage System at Generation Centers Paper, Aluminum, Bi-Metal, Plastic, and Glass .....	\$ 5,000	--
Cardboard .....	12,000 <sup>b</sup>	\$ 600 <sup>b</sup>
Centralized Storage System for Paper and Paper Collection System .....	\$16,000 <sup>c</sup>	\$16,000 <sup>d</sup>
Transportation and Contract Charges		
Paper .....	--	\$ 2,600
Aluminum, Bi-Metal, Plastic, and Glass .....	--	5,300
Cardboard .....	--	5,600
Recyclable Revenue		
Paper .....	--	\$ -900
Aluminum, Bi-Metal, Plastic, and Glass .....	--	--
Cardboard .....	--	-1,700
<b>Total</b>	<b>\$38,000</b>	<b>\$27,500</b>

<sup>a</sup>Internal costs assumed to be similar for all alternatives.

<sup>b</sup>Includes 40-cubic-yard storage bin and two-cubic-yard compactor for Lakeland Nursing Home. Operation and maintenance cost is for annual maintenance by County or contract personnel.

<sup>c</sup>Includes purchase of dedicated pickup truck with lift for transportation of paper to containers.

<sup>d</sup>Includes labor cost equivalent to about one full-time person, 50 percent of the time. Assumed to be covered under contract with Highway or Maintenance Departments.

Source: SEWRPC.

from the revenue generated from the sale of the recyclable waste resource material products. Total average annual cost of capital and operation and maintenance is \$32,800, or about \$109 per ton of material recycled.

**Alternative Plan No. 4: Low Level of  
Separation with Limited County Participation  
in Marketing and Equipment Ownership**

Under Alternative Plan No. 4, the recyclable wastes would be divided into four categories: white ledger paper; high-grade computer paper, colored ledger paper, mixed office paper, newsprint, magazines, and catalogs; cardboard; and aluminum and bi-metal containers, glass containers, and plastics. In order to accomplish this, an internal storage and collection

system with for separate containers in each department or centralized collection areas would be required, which would be the same as described above for Alternative Plan No. 3.

The external storage system for recyclables at each center is envisioned to be the same as described under Alternative Plan No. 3. However, all of the external storage system containers would be owned by contract haulers/recyclers.

Under Alternative Plan No. 4, the County would not be involved in securing the markets for the recyclables. The recyclable materials would become the property of the contract hauler/recyclers at the time of pickup.

Table 57

**COST ANALYSIS FOR ALTERNATIVE PLAN NO. 4: LOW-LEVEL RECYCLABLE SEPARATION  
WITH LIMITED COUNTY PARTICIPATION IN MARKETING AND EQUIPMENT OWNERSHIP**

Item	Initial Capital Cost	Operation and Maintenance Cost and Contract Charges
Internal Generation Center Storage and Collection System at Generation Centers . . . . .	\$5,000	- <sup>a</sup>
External Storage System at Generation Centers Paper, Aluminum, Bi-Metal, Plastic, and Glass . . . . .	- -	- <sup>b</sup>
Cardboard . . . . .	- -	\$ 2,500 <sup>c</sup>
Centralized Storage System for Paper and Paper Collection System . . . . .	- -	- -
Transportation and Contract Charges		
Paper . . . . .	- -	\$ 5,000
Aluminum, Bi-Metal, Plastic, and Glass . . . . .	- -	6,700
Cardboard . . . . .	- -	4,800
Recyclable Revenue		
Paper . . . . .	- -	- -
Aluminum, Bi-Metal, Plastic, and Glass . . . . .	- -	- -
Cardboard . . . . .	- -	- -
<b>Total</b>	<b>\$5,000</b>	<b>\$19,000</b>

<sup>a</sup>Internal costs assumed to be similar for all alternatives.

<sup>b</sup>Cost of containers is included in contract charges.

<sup>c</sup>Includes rental of 40-cubic-yard storage bin and two-cubic-yard compactor for Lakeland Nursing Home.

Source: SEWRPC.

As shown in Table 57, the estimated capital cost for development of the recycling facilities under Alternative Plan No. 4 is \$5,000, with an average annual net operation and maintenance cost of \$19,000. Total average annual cost of capital and operation and maintenance is \$19,700, or about \$66 per ton of material recycled.

#### Evaluation of Alternatives for Recycling Conventional Materials

The preceding sections of this chapter included description of four alternative plans for recyclables amenable to conventional recycling techniques. All the alternatives are found to meet the requirements of the State recycling law and all are technically feasible. Thus, the evaluation of the alternative plans considers primarily economics, practicality of implementation, program flexibility, the degree of County

personnel involvement required, space requirements, program flexibility to meet changing market conditions and regulations, and the value received for recyclable materials.

Alternative Plan No. 1 has the advantage in that it maximizes the value of the recyclables. However, this alternative has the highest capital and total annual cost of all the alternatives considered. In addition, it requires the most involvement of County personnel. Alternative Plan No. 1 also maintains flexibility to meet changing requirements in that the material separation is maximized, allowing for both complete separation and lesser degrees of separation to meet the market and hauler conditions.

Alternative Plan No. 2 has the major advantage of a relatively low capital and total annual cost. County staff involvement is significantly less than under

Alternative Plans No. 1 and No. 3. However, there is some limited additional staff involvement in that the degree of separations are larger than under Alternative Plans No. 3 and No. 4. Alternative Plan No. 2 provides for future flexibility in that the degree of separations is maximized. The value received for the recyclable materials is less than under Alternative Plans No. 1 and No. 3, but greater than under Alternative No. 4, since the separations achieved potentially make the materials more valuable.

Under Alternative Plan No. 3, the capital and total annual costs are high. In addition, the County involvement is higher than under Alternative Plans No. 2 and No. 4 but less than under Alternative Plan No. 1, since the degree of separations carried out are less. Alternative Plan No. 3 has less flexibility than Alternative Plans No. 1 and No. 2 because the degree of separations are less.

Alternative Plan No. 4 has the advantage of having a relatively low capital and total annual costs. Under Alternative Plan No. 4, flexibility is limited because of the degree of separation of the materials is low and the County involvement in marketing is low. The value received for the recycled materials is the lowest under Alternative Plan No. 4.

On the basis of this review, it is recommended that a combination of Alternative Plans No. 1 and No. 2 be implemented. Under those alternatives, the selected plan would be the same as Alternative Plans No. 1 and No. 2, which provide for a high level of separation into nine categories. The internal storage and collection system would be the same as described for both plans and the equipment needed for this internal storage and collection system would be owned by the County. The County involvement in marketing and equipment ownership for the external storage, transportation, and marketing would be limited, as described in Alternative Plan No. 2, with one exception. It is recommended that high-quality office paper continue to be collected and recycled as is currently done, to the level that can be accomplished with the existing equipment and staff of the Solid Waste Management Department. It is expected that this program will be similar to the current program. However, over time, if quantities are increased or during periods with other personnel demands, this may require collecting only one type of paper, white ledger. The inclusion of this component would require no new equipment and will allow for an increased value for the recyclables.

As shown in Table 58, the estimated capital cost for development of the recycling facilities under the recommended plan is \$7,000, with an average annual net operation and maintenance cost of \$17,100, which includes an estimated annual credit of \$900 from the revenue generated from the sale of the paper by the County. Total average annual cost of capital and operation and maintenance is \$18,100, or about \$60 per ton of material recycled.

#### Recycling Special Wastes

Only one set of options has been considered for recycling special wastes generated at the County's internal facilities. The recommended plan is based upon review and refinement of currently ongoing programs expanded to include consideration of additional materials.

For scrap iron and steel, used oil, batteries, tires, and wood wastes, it is recommended that the existing system be continued in a refined manner. Most of these materials are generated by the County Highway Department. Hence it is recommended that the existing storage system, consisting of an oil storage tank, bins, and indoor storage sites, be utilized for these materials. This would provide bins for the storage of scrap iron and steel, tires, and wood waste; the continued use of the 2,000-gallon used tank for used oil storage; and indoor storage of batteries. It is recommended that any such wastes generated at County facilities outside the County Highway Department be transported to the storage facilities operated by the Highway Department after communication with the Highway Department personnel. It is recommended that the overall Countywide educational program be used to stress the importance of placing only clean wood waste at the storage site at the Highway Department at a location separate from the one where brush is stored by the Department. Improved signage, coupled with the educational program for the County Department personnel on the importance of keeping the materials separated, should provide for an adequate recycling program utilizing the existing system. Since this system currently serves the County facilities effectively and needs only minor revisions, there is no need to evaluate other options in this regard.

With regard to the recycling of miscellaneous paper and polystyrene products and toner cartridges, the only recommendations in this regard are included under the waste reduction recommendations set forth in the previous section. Waste reduction measures,



Table 58

**COST ANALYSIS FOR RECOMMENDED PLAN: CONVENTIONAL RECYCLABLE SEPARATION  
WITH LIMITED COUNTY PARTICIPATION IN MARKETING AND EQUIPMENT OWNERSHIP**

Item	Initial Capital Cost	Operation and Maintenance Cost and Contract Charges
Internal Generation Center Storage and Collection System at Generation Centers . . . . .	\$7,000	- _a
External Storage System at Generation Centers Paper, Aluminum, Bi-Metal, Plastic, and Glass . . . . .	- -	- _b
Cardboard . . . . .	- -	\$ 2,500 <sup>c</sup>
Centralized Storage System for Paper and Paper Collection System . . . . .	- -	- _d
Transportation and Contract Charges		
Paper . . . . .	- -	\$ 4,100
Aluminum, Bi-Metal, Plastic, and Glass . . . . .	- -	6,600
Cardboard . . . . .	- -	4,800
Recyclable Revenue		
Paper . . . . .	- -	\$ -900
Aluminum, Bi-Metal, Plastic, and Glass . . . . .	- -	- -
Cardboard . . . . .	- -	- -
Total	\$7,000	\$17,100

<sup>a</sup>Internal costs assumed to be similar for all alternatives.

<sup>b</sup>Cost of containers is included in contract charges.

<sup>c</sup>Includes rental of 40-cubic-yard storage bin and two-cubic-yard compactor for Lakeland Nursing Home.

<sup>d</sup>Program to be carried out to the extent practical with existing personnel.

Source: SEWRPC.

including changes in purchasing practices, could reduce the amounts of paper and polystyrene products. Additionally, the ability for laser printer and photocopy machine toner cartridges to be refilled rather than discarded is increasing. As purchasing decisions are made for equipment and service contracts, consideration should be given to machines and services which use refillable cartridges.

As for lamps and bulbs, it is recommended that the County Solid Waste Management Department staff, through an educational program, communicate to each Department responsible for installation and replacement of lamp tubes and bulbs which types of lamps and bulbs, under current Wisconsin Department of Natural Resources regulations, cannot be disposed of in sanitary landfills and indicate the hazardous nature of the lamps and bulbs. For those

types of bulbs which can currently be recycled at this time, fluorescent and mercury-vapor lamps and bulbs, it is recommended that used bulbs be placed in the cardboard sleeve or box in which replacements arrive, and be stored in a location where they will not be mixed with other solid waste materials. Storage areas should be appropriately labeled. At this time, only fluorescent and mercury-vapor lamps would be handled in this manner, since recycling options do exist for those types of bulbs. It is recommended that the Solid Waste Department negotiate with a recycler to transport and recycle fluorescent and mercury-vapor lamps. The cost of this recycling is expected to be about \$1.00 per bulb or lamp. Broken lamps and tubes have to be stored in a covered plastic or plastic-lined container and disposed of through proper recycling or hazardous waste disposal means. These requirements may be extended to

incandescent and other light bulbs at such time as a recycling option has become available for these bulbs. It is further recommended that purchasing practices be directed, to the extent practical, toward the purchase of bulbs which are not considered hazardous waste.

#### **YARD WASTE MANAGEMENT CONSIDERATIONS**

Currently, all of the yard waste generated at the County facilities is brought to either the County Highway Department, as in the case of brush, or to the City of Elkhorn compost site located on County grounds at the southeast portion of the Lakeland Complex. It is recommended that this practice be continued, but refined to provide for improved operation, signage, and housekeeping practices.

It is recommended that all brush be brought to the County Highway Department for periodic chipping and that a special designated area be provided for the brush, spatially separated from the storage area for wood waste which cannot be chipped. Under current State regulations, brush can no longer be incinerated. If this material is commingled with large wood waste, it may be impractical to chip and, historically, occasionally has been burned in the County's air curtain destructor. Thus, it is recommended that improved signage and education programs be developed to provide a separate storage location for brush. The brush can be periodically chipped by the County's currently available chipping equipment and the material can be used for County purposes. If adequate supplies exist, it may be desirable to make the chipped brush available for other users.

With regard to leaves, grass clippings, and other small yard waste, it is recommended that these materials continue to be brought to the City of Elkhorn compost site. It is, however, recommended that improved storage and handling practices be incorporated into that site and that the City and County staffs work together to develop these procedures. It is recommended that proper signage and storage area locations be provided to separate any wood chips, grass, or leaves in designated locations and that the access roadway to the site be improved.

#### **UNRECYCLED SOLID WASTE**

Even with full implementation of the recycling program recommended above, it is expected that there

will continue to be wastes which are not recycled and which must be disposed of by landfilling or other means. It is expected that, upon full implementation of the recycling program, the quantity to be disposed of will be reduced to about 70 to 75 percent compared to the current amount. It is recommended that the wastes continue to be disposed of by contract with a solid waste hauler. Special wastes, such as medical wastes, would continue to be handled as currently is the practice, using primarily the existing sterilizer system at the Lakeland Medical Center, with special contracting for specialized medical wastes. It is recommended that consideration be given to keeping the medical wastes separated, to the extent possible, from the other wastes generated at the Lakeland Medical Center. This may potentially reduce the costs for disposal, since all wastes mixed with the medical wastes require special landfilling procedures.

#### **IMPLEMENTATION RECOMMENDATIONS**

It is recommended that the County Solid Waste Management Department take the lead in implementing the Countywide program, including the communication and education element of the program. In order to do so, it will initially be necessary to communicate with the appropriate County department personnel and the maintenance and housekeeping representatives to describe the program in general and the program goals. Subsequently, a separate meeting with each department and its associated maintenance and housekeeping personnel will be necessary to detail and refine the plan recommendations for each department. It is recommended that, as appropriate, staff meetings, employee newsletters, and program reminders be utilized, including visual reminders and descriptive flyers, to help carry out the program. It is also recommended that the program use pilot, or demonstration, projects, rather than implementing the full-scale program immediately. The demonstration program would be designed, as generally described herein, for selected buildings, but would be implemented at perhaps two locations. The demonstration program could also be expanded through 1994 to include all of the County facilities by January 1995, as required by State regulations. Locations which may be appropriate would be the County Courthouse and the Lakeland Medical Center.

It is also recommended that the County ultimately incorporate all solid waste management for both recycled and unrecycled solid waste under one

umbrella contract to cover all the County facilities. This could be handled by the Solid Waste Management Department. Combining the contract into facilitywide umbrella agreements should provide a means for reducing the cost of services because of the larger scale and the ability of haulers/recyclers to collect materials more efficiently, since the location of the materials from all the facilities are grouped into two locations. The use of single agreements may also improve competition for the services.

The plan presented herein represents a long-term solution to the handling of recyclable materials for

the County's internal facilities and the selected plan is deemed to be compatible with the goals established for the program. The implementation of the plan is related to many factors, including the availability of local funds, market value of recyclables, costs of alternative disposal methods, and pending State and Federal regulations and policies. All of these factors are dynamic in nature and subject to both short-term and long-term changes. Because of the relationship of the plan components to these constantly changing conditions, it is recommended that the plan be constantly monitored and reevaluated and refined regularly.

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## Chapter X

### SUMMARY

#### INTRODUCTION

Since the completion of the initial solid waste management plan for Walworth County in 1982, significant changes have taken place with regard to solid waste management in the County. These changes have included a shift toward increased recycling of materials, the abandonment of eight landfills once used for disposal of Walworth County solid waste, the siting of a new major landfill in the County, and new State regulations relating to disposal of solid waste, incineration facilities, and recycling. At the request of the County Solid Waste Management Board, this update of the solid waste management plan for Walworth County was prepared by the Regional Planning Commission staff in cooperation with the County Solid Waste Management Department to address these and other relevant changes affecting solid waste management within the County and including updating the plan to a new design year 2010.

After the completion of the initial solid waste management plan, the County Solid Waste Management Board (SWMB) was created in 1983, as recommended in the initial plan. Since that time, the Board has taken several steps toward implementation of the initial plan. In 1984 the Board created and funded a recycling trailer program which served to help initiate local recycling operations within the County. The subsequent implementation of recycling programs by individual municipalities led to the abandonment of the trailer program in 1992. In 1991 a composting facility was established at the County Lakeland Complex through the joint efforts of the Board and the City of Elkhorn. Household and agricultural hazardous waste collection programs were conducted by the County Solid Waste Department in 1992 and 1993, respectively. In addition, the Board has been actively involved in public education efforts regarding recycling and composting, including the development of a County recycling directory and provision of technical advice and assistance to municipalities in designing and implementing recycling and yard waste composting programs.

With regard to landfill siting, the Board brought legal action to challenge the State landfill siting law of 1983, which permitted the siting or expansion of

a landfill in conflict with local zoning if the landfill or the expansion was found technically feasible by the Wisconsin Department of Natural Resources (DNR). This challenge was dismissed by the Court in 1993. The Board also objected to the development of the Troy Area Landfill, which was in conflict with the recommendations in the initial solid waste management plan. Despite County opposition, the landfill was approved by the Wisconsin Department of Natural Resources and opened.

The purpose of this plan update effort is to review, reevaluate, and revise, as may be found necessary, the findings and recommendations of the initial County solid waste management plan and to address any relevant changes that have taken place with regard to solid waste management planning since the completion of the initial plan. To this end, the plan provides an updated assessment of solid waste management needs in the County and develops and evaluates alternatives for Countywide solid waste management facilities in a manner compatible with the roles of the local units of government operating in the County. The current interrelated roles of the private and public sector and of the State of Wisconsin in solid waste management severely limit the ability of the County or other local units of government to implement certain elements of a solid waste management system effectively. Those elements most significantly affected relate to collection and transportation and to landfill disposal. Because of this constraint, this plan update emphasizes those aspects of solid waste management which the County can significantly influence or control. Such aspects include options for recycling, toxic and hazardous household waste collection and disposal, yard waste composting, and public education. Other solid waste management plan elements, including landfilling and incineration, are addressed in less detail.

#### LAWS AND REGULATIONS CONCERNING SOLID WASTE

There have been significant changes in the laws regulating solid waste management since the initial plan was completed. These changes have placed more stringent requirements on such solid waste disposal facilities as landfills and incineration systems and required increased recycling of materials.

In 1989, Wisconsin Act 335, known as "The Recycling Law," set forth in Chapter 159 of the Wisconsin Statutes, was enacted to reduce the amount of waste being deposited in Wisconsin landfills by banning recyclable materials from landfills and requiring communities to initiate recycling programs. Subsequent to the passage of Wisconsin Act 335, Chapter 159 of the State Statutes was prepared, prohibiting the landfilling or incineration of certain recyclable materials by specified dates. These materials and the corresponding schedules which ban these materials from disposal are as follows.

- January 1, 1991: Lead-acid batteries and appliances may not be landfilled or incinerated, waste oil may not be landfilled or incinerated without energy recovery
- January 3, 1993: Yard wastes may not be landfilled or incinerated without energy recovery
- January 1, 1995: Newspapers and other materials printed on similar paper, magazines, and other materials printed on similar paper; corrugated paper; office paper; aluminum, glass, steel, plastic, and bi-metal containers; and foam polystyrene packaging may not be landfilled or burned with or without energy recovery. In addition, waste tires may not be landfilled or burned without energy recovery

Chapter 159 of the Wisconsin Statutes also designates municipalities as "responsible units for recycling" and requires the municipalities to develop recycling programs for the materials banned from landfills. Such programs must meet certain minimum standards in order to be considered as effective programs and retain grant funding under the provisions of Chapter NR 544 of the Wisconsin Administrative Code. The municipalities may designate, by contract, another unit of government, such as the County, to be the responsible unit of government for recycling. The contract governing such designation must cover all duties of a responsible unit, including enforcement. However, the County is not currently a responsible unit and has not been contractually designated by any municipality to be the responsible unit.

The current regulations relating to landfills, including the U. S. Environmental Protection Agency Subtitle D regulations and Wisconsin Department of Natural Resources rules, set forth six criteria governing the siting of municipal solid waste landfills: criteria relating to location, operation, design,

groundwater monitoring and corrective action, closure and post-closure care, and financial assurance. These regulations are more comprehensive than those existing when the initial plan was completed. The rules have contributed to higher landfill costs and to the trend toward fewer and larger landfills. Similarly, the Federal and State regulations relating to incineration system air emissions and ash disposal have become more stringent and have resulted in higher costs for solid waste incineration systems than when the initial County solid waste plan was prepared.

## INVENTORY AND ANALYSES

The man-made and natural features which together form the environment of Walworth County are important considerations in solid waste management planning. As these elements were described in the solid waste management plan prepared in 1982, this update includes information only on those elements which have changed significantly since the initial plan preparation and which are directly related to solid waste management, including resident population, household, and employment levels; land use patterns; and selected transportation and public utility systems. In addition, new data on the existing solid waste sources, on the quantity and composition of the solid wastes generated, on the existing and planned solid waste management systems and activities, and on related constraints were developed under the planning effort.

The geographic study area considered in the Walworth County solid waste management plan update is the same as considered in the initial solid waste management plan: all of Walworth County plus that portion of the City of Whitewater located in Jefferson County. The study area encompasses 577.5 square miles, of which Walworth County proper comprises 576.5 square miles.

### Population and Economic Activity

Resident population and household levels and associated commercial and industrial activity bear a direct relationship to the demand for solid waste collection, transportation, handling, and disposal services. As of 1990, the resident population of Walworth County study area was 77,400 persons, of which 75,000 persons reside in Walworth County proper. The study area population represents an increase of about 3,400 persons, or about 4.6 percent, over the 1980 population level. As of 1990, there were 37,100 jobs in the County, an increase of about 6,000, or about 19 percent, over the 1980 level.

Because of the structure of the economy of Walworth County, seasonal population levels are a significant factor to be considered in any solid waste management planning effort for the County. Because of its highly attractive recreational resources, Walworth County experiences a significant seasonal and weekend increase in population. This pattern of population influx is associated chiefly with lake-oriented recreational activities and associated resort businesses. While the largest seasonal and weekend population influxes occur during the summer months, visitors are increasingly seeking fall and winter recreational activities in the County as well. In 1990, approximately 7,700 households, or about 22 percent of the 35,300 housing units in the County, were seasonal or occasional use units. This compares to about the same number of seasonal households in 1980, then representing about 21 percent of the total number of households. The 1990 seasonal population is estimated to be 23,000 persons.

#### Land Use

The type, intensity, and spatial distribution of the various urban and rural land uses are important determinants of the solid waste management needs of an area. As of 1990, approximately 61 square miles, or about 11 percent of the 576.5 square miles in the County, were devoted to urban land uses, with rural land uses still comprising about 515.5 square miles, or 89 percent of the County. Lands devoted to urban uses in 1990 represent an increase of about three square miles over the 1980 level of about 58 square miles.

#### Natural Resource Base

The natural resource base is a major factor in the economy of Walworth County and is a primary determinant of the continued development potential of the County, as well as its ability to provide a pleasant and habitable environment for all forms of life. Accordingly, the natural resource base must be carefully considered in any solid waste management planning effort to ensure the environmentally safe, as well as economically feasible, disposal of solid wastes. Chapters II and VIII in this report include descriptions of primary environmental corridors, floodlands, wetlands, and surface waters, all of which are important considerations in the siting of solid waste facilities. The principal elements of the natural resource base pertinent to solid waste management planning have remained largely unchanged since the completion of the initial plan, with the exception of air quality. General improvements in monitored ambient air quality have been noted at a monitoring site in Lake Geneva. However, certain pollutant species still exhibit ambient levels which remain of

concern, including specifically ozone levels. In 1988 Walworth County was designated as an ozone non-attainment area; however, the County is not designated as a nonattainment area for particulate matter, nitrogen oxide, or lead. These air quality conditions must be considered in any solid waste management planning effort.

#### Public Utility and Transportation Systems

Urban development is highly dependent upon public utility systems which serve land uses with power, light, communications, heat, water, sewerage and transportation. Sanitary sewerage systems are of particular importance to solid waste management planning, since solid waste landfill siting requires consideration of leachate treatment and disposal, which may involve conveyance to a municipal treatment plant. Similarly, transportation systems are of particular importance to solid waste management planning, because of their impacts on the siting of solid waste disposal facilities and on the analysis of alternative solid waste management plans. Transportation systems are considered important elements in determining feasible, cost-effective, and efficient means for transporting solid waste to disposal facilities. As described in Chapter II, only minimal changes have been made to the public utility and transportation systems since the completion of the 1982 solid waste management plan. There have been expansions of the areas served by public sanitary sewer service to accommodate new urban development. However, these expansions do not directly impact solid waste management except in two cases. The changes which directly relate to solid waste management involve the Village of East Troy sewerage system, from which a sewer was extended south to allow for conveyance of leachate to the Village's sewage treatment plant, and the Walworth County Metropolitan Sewerage District sewerage system, which was expanded to allow for a pumping station and force main for conveying leachate from the Mallard Ridge Recycling and Disposal facility. The latter sewerage system expansion was recommended in the initial plan.

#### Solid Waste Sources.

##### Quantification, and Composition

A knowledge of the amount, characteristics, and sources of solid waste is essential for the development of an efficient and environmentally sound solid waste management plan. The major focus of this solid waste management planning update effort is directed at residential solid wastes generated within the County. In 1992, about 40,600 tons of mixed residential solid waste, or about 2.8 pounds per

capita per day (ppcpd), were generated in the study area. This can be compared to a generation of about 34,600 tons of residential solid waste, and a per capita generation rate of about 2.6 pounds per day in 1980. As can be seen by review of Figure 32, the 1992 residential solid waste generated in the study area closely approximates the quantity of solid waste projected in the initial plan.

The 1992 residential solid waste stream was estimated to include about 37,300 tons of mixed solid waste, or approximately 2.6 ppcpd, and about 3,300 tons of recycled solid waste, or approximately 0.2 ppcpd. The materials currently recycled are primarily paper, glass, and metal. Figure 33 summarizes the current residential solid waste generated in the study area compared to the projected year 2010 solid waste quantities, including the current recycled quantities compared to the planned year 2010 recycled amounts based upon the plan objectives.

Seasonal variations in residential solid waste production were also evaluated and indicate that residential solid waste generation varies from a low of about 2,700 tons per month during the winter months to about 4,200 tons per month during the spring and summer months. These seasonal variations are attributable primarily to two factors in Walworth County. The first factor is the added quantity of solid waste generated by the seasonal and weekend populations during the summer months of May through August. The second factor is the normal changes in solid waste generation from increased yard work and outside activity from April through October.

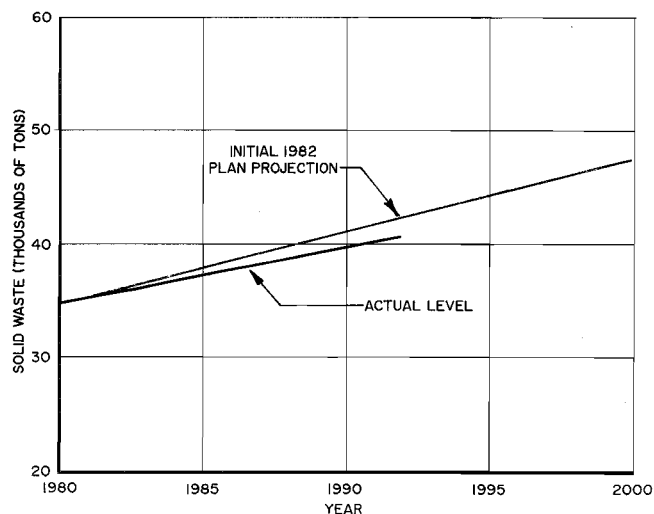
#### Existing Solid Waste Management Systems

There have been significant changes since the preparation of the 1982 solid waste management plan in the solid waste management systems operating in Walworth County. Source-separation and recycling are now significant elements of the existing solid waste management functions in Walworth County. Pre-collection programs in the County entail the separation of recyclable solid waste from other waste components before these materials are collected. Post-collection programs, which entail the recovery of materials after they have been mixed in collector vehicles, have higher technology requirements and higher costs. A summary of the 1993 solid waste management systems in the County by community is included in Table 59.

In 1993, residential recycling programs existed in all 27 communities in the County. Of the 27 community

**Figure 32**

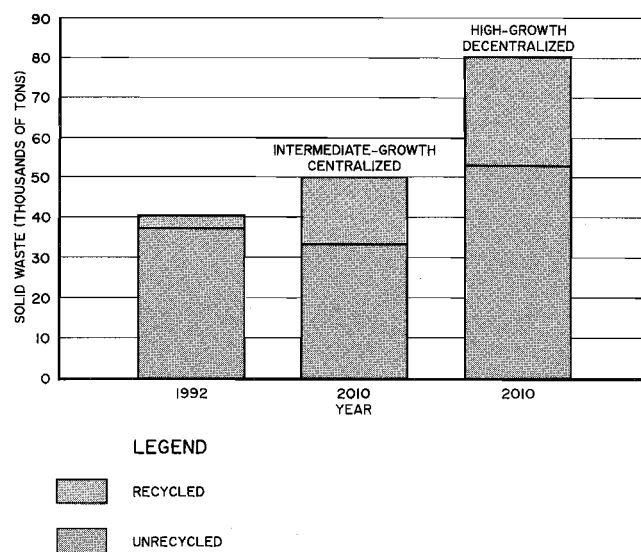
#### **RESIDENTIAL SOLID WASTE QUANTITIES GENERATED IN THE WALWORTH COUNTY STUDY AREA: 1980-2000**



Source: Walworth County Solid Waste Management Department and SEWRPC.

**Figure 33**

#### **EXISTING AND FORECAST WALWORTH COUNTY RESIDENTIAL SOLID WASTE QUANTITIES: 1992 AND 2010**



Source: Walworth County Solid Waste Management Department and SEWRPC.

recycling programs, 11 communities used curbside collection, 15 communities used drop-offs, and one community used both. It is estimated that 3,300 tons of residential solid waste were recycled through these municipal programs in the Walworth County study area in 1993. This accounted for about 8 percent of



Table 59

**SUMMARY OF EXISTING SOLID WASTE MANAGEMENT  
SYSTEMS IN THE WALWORTH COUNTY STUDY AREA: 1993**

Civil Division	Estimated Amounts of Solid Waste Generated per Year <sup>a</sup>		Unrecycled Mixed Solid Waste Services		Recycled Solid Waste Services		Yard Waste Services		
	Unrecycled Mixed Solid Waste (tons)	Recycled Solid Waste (tons)	Curbside Collection	Drop-Off Site	Curbside Collection	Drop-Off Site	Curbside Collection <sup>b</sup>	Drop-Off Site	Chipping Equipment Available
<b>Cities</b>									
Delavan .....	3,382	222	-- <sup>c</sup>	--	X <sup>d</sup>	--	X	X	X
Elkhorn .....	2,555	313	X	--	X	--	X	X	X
Lake Geneva .....	2,384	450	-- <sup>c</sup>	--	X	--	X	X	X
Whitewater .....	3,469	757 <sup>e</sup>	X	--	X	X	X	X	X
<b>Villages</b>									
Darien .....	580	54 <sup>e</sup>	X	--	X	--	--	X	--
East Troy .....	1,920	194	X	--	X	--	--	--	--
Fontana-on-Geneva Lake .....	1,300	152	X	--	--	X	X	X	X
Genoa City .....	780	95 <sup>e</sup>	X	--	--	X	--	--	X
Sharon .....	728	44 <sup>e</sup>	X	--	X	--	--	--	X
Walworth .....	622	127 <sup>e</sup>	X	--	X	--	X	--	X
Williams Bay .....	1,000	114	X	--	--	X	X	X	X
<b>Towns</b>									
Bloomfield .....	1,461	-- <sup>f</sup>	X	--	X	--	--	--	X
Darien .....	680	89	X	X	--	X	--	--	X
Delavan .....	3,265	226	X <sup>g</sup>	--	-- <sup>h</sup>	X	-- <sup>h</sup>	--	X
East Troy .....	2,000	297	X <sup>d</sup>	--	X	--	--	X	X
Geneva .....	1,303	127	X	--	--	X	--	--	--
Lafayette .....	582	18	-- <sup>c</sup>	--	--	X	--	X	--
LaGrange .....	1,360	85	X	--	-- <sup>h</sup>	X	--	X	X
Linn .....	1,486	23 <sup>e</sup>	X	--	--	X	--	--	--
Lyons .....	1,175	30 <sup>e</sup>	-- <sup>c</sup>	--	--	X	--	--	X
Richmond .....	1,040	109	X	--	X	--	--	--	--
Sharon .....	464	37	-- <sup>c</sup>	--	--	X	--	--	X
Spring Prairie .....	799	64	-- <sup>c</sup>	--	--	X	--	--	--
Sugar Creek .....	1,214	23	-- <sup>c</sup>	--	-- <sup>h</sup>	X	X <sup>i</sup>	--	X
Troy .....	552	47	X	X	--	X	--	--	--
Walworth .....	661	-- <sup>e</sup>	-- <sup>c</sup>	--	--	X	--	--	X
Whitewater .....	578	101	X	--	X	--	--	--	--
<b>Total</b>	<b>37,340</b>	<b>3,277</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>

<sup>a</sup>Based upon 1992 data except where noted.

<sup>b</sup>Public curbside collection of yard waste is for leaves only, with the exception of the Village of Fontana-on-Geneva Lake, which accepts leaves and grass.

<sup>c</sup>Type of collection varies. Residents contract privately for mixed solid waste disposal.

<sup>d</sup>Backyard collection service also available.

<sup>e</sup>Based upon 1993 data.

<sup>f</sup>Collection of recycled solid wastes was initiated in 1993.

<sup>g</sup>Backyard collection services.

<sup>h</sup>Curbside collection began in 1994.

<sup>i</sup>Contract with the Town of LaGrange for yard waste collection.

Source: Walworth County Solid Waste Management Department and SEWRPC.

the total residential solid waste generated within the study area. This can be contrasted to conditions in 1981, when the only significant residential recycling programs in the County were part-time drop-off centers, generally operated by nonprofit civic organizations.

Yard waste in Walworth County is usually recycled by composting or by woodchipping the brush and trees. In 1993 there were eight municipalities in the County which were operating composting programs and 11 community woodchipping programs operating.

Household hazardous wastes should be collected separately from the other components of the waste stream. Walworth County held its first Clean Sweep Household Hazardous Waste Collection in 1992 at two locations: at the County Lakeland Complex near Elkhorn and in the City of Whitewater. The program was organized by the Walworth County Solid Waste Management Department and was designed to provide a safer disposal alternative for household hazardous waste and also educate County residents regarding the dangers of hazardous materials. The program was considered successful for a first-time collection, with a participation rate of about 1.2 percent of the Walworth County households, well above the State average of 0.76 percent participation. In 1993, the Walworth County Solid Waste Department conducted an agricultural hazardous waste collection program with one collection station at the County Lakeland Complex. A total of 114 farms participated in the program and about 12,000 pounds of material were collected. The agricultural waste material collected is estimated to range from 40 to 60 percent of the unwanted agricultural materials of this type in storage at that time. Thus, there is a potential for collection and disposal of 8,000 to 18,000 pounds of material currently in storage, largely pesticides and herbicides.

Collection and transportation includes picking up solid wastes from various sources and hauling these wastes to where the collection vehicles are emptied. Private collection services, provided either through municipal or individual contract with the waste hauler, and individual hauling of wastes are the two methods of collection and transportation presently utilized in the study area. In 1992 there were six licensed private collection services for residential wastes and seven licensed collection services for commercial and industrial wastes operating in the Walworth County study area. This compares to 21 licensed collection services operating in 1982. Five of these collection services provide collection and transportation services for both residential and commercial and industrial wastes.

Transfer and transportation of solid wastes refer to the means, facilities, and related equipment used to transfer wastes from small collection vehicles to larger vehicles and to transport them to either processing centers and markets, as is the case with recyclables, or to processing centers and disposal sites, as is the case with most mixed solid waste. Transfer operations occur at transfer stations. In 1993 there was one transfer station in Walworth County for mixed residential solid wastes, the station

operated in the Town of Bloomfield by the Otto Jacobs Company and used by private contractors and local residents who drop off both mixed solid waste and recyclables. The Town of Troy utilizes a roll-off container where residents can drop off mixed solid wastes and which serves as a short-term storage and transfer station. In addition, there are drop-off centers located within the County for recycled residential solid waste which act as transfer stations for the recycled materials until such time as a large enough quantity for transport of a certain type of recyclable is collected, or a market price is achieved for a certain recyclable. In 1981, there were two transfer stations in the County: the Otto Jacobs Company and a station operated by the Town of Whitewater at its Town Hall.

Processing solid wastes refers to the transformation of the physical or chemical characteristics of solid waste by mechanical, chemical, or biological processes. Processing is used to improve the efficiency of hauling and disposing of wastes, to recover recyclable materials, and to convert combustible organic materials into intermediate products or into energy by incineration or biodigestion. In 1981 a limited amount of waste processing was conducted by incineration at the Lakeland Hospital. In 1993 there were no known incineration facilities operating in the County. Medical wastes generated at the County's Lakeland Complex, including wastes from the Lakeland Hospital and the Lakeland Nursing Home, were processed through a compactor and sterilization system.

Disposal of solid wastes in Walworth County is primarily accomplished by landfilling. Many of the landfills that received waste from Walworth County at the time of the 1982 plan have now been closed. The 1982 solid waste management plan recorded seven active landfills within the County and three active landfills outside the County receiving solid wastes generated within Walworth County. As of 1992, only three of these landfills, the Valley Sanitation landfill; the Greidanus landfill, renamed the Mallard Ridge Recycling and Disposal Facility; and the Mann Brothers Sand and Gravel Company landfill, remained open and received wastes from Walworth County. Since the completion of the initial plan, one new landfill which receives wastes from Walworth County has been developed in the County. In addition, wastes from the County have been directed to other landfills outside the County.

Currently, three landfills in Walworth County and three landfills outside Walworth County receive

Table 60

**SUMMARY OF COSTS FOR RESIDENTIAL SOLID WASTE MANAGEMENT IN WALWORTH COUNTY: 1980 AND 1992**

Selected Years, Adjusted	Total Cost	Cost per Ton	Cost per Capita	Cost per Household
1980	\$ 840,000	\$24.40	\$11.50	\$33.88
1992	2,984,000	73.47	37.55	99.94
1992 Adjusted to Constant 1980 Dollars	1,701,000	41.90	21.40	56.97

Source: Walworth County Solid Waste Management Department and SEWRPC.

wastes from the County. The three landfills within Walworth County include the Mallard Ridge Recycling and Disposal Facility, the Troy Area landfill, and the Mann Brothers Sand and Gravel Company landfill. The Mallard Ridge Facility in the Town of Darien currently has a remaining service life of about seven years, based upon an expansion plan which was approved early in 1994. Mallard Ridge currently accepts wastes from three additional counties in Wisconsin and three counties in Illinois. The Troy Area landfill, located in the Town of East Troy, currently has a remaining service life of about two years, with plans for an expansion which would extend the site life an estimated 10 to 14 years. The service area of the landfill includes portions of Walworth, Milwaukee, Waukesha, Jefferson, Racine, and Kenosha counties. The Mann Brothers Sand and Gravel Company landfill is a private-use landfill for exclusive disposal of wastes generated by the Mann Brothers Sand and Gravel Company. At current loading rates, the landfill has a remaining service life of about 50 years.

The three landfills outside Walworth County that accept wastes from the County include Deer Track Park landfill, Pheasant Run landfill, and Valley Sanitation landfill. The Deer Track Park landfill, located in Jefferson County, has a remaining service life of about 12 years at current loading rates. The Pheasant Run landfill, located in the Town of Paris in Kenosha County, has a remaining service life of 13 years with a service area including portions of Walworth, Racine, and Kenosha Counties in Wisconsin and Lake and McHenry Counties in Illinois. The Valley Sanitation landfill in Jefferson County has a remaining site-life of about eight years. In 1992 an initial site inspection regarding expansion of the landfill was performed.

#### Cost of Solid Waste Management

On the basis of the inventory data collected, it was estimated that as of 1992 the public cost for collec-

tion, transportation, and disposal of residential solid wastes in the study area was \$2,984,000, about \$38 per capita per year, \$100 per household per year, and about \$73 per ton. Approximately \$2,648,000, or about 89 percent of the total cost of residential solid waste management in the study area, was incurred for the management of mixed nonrecycled solid waste, some \$33 per capita per year. The remaining 11 percent of the total cost of residential solid waste management, \$336,000, was incurred for the residential recycled solid waste management of the study area. It was further estimated that 50 percent of the total cost of residential solid waste management in the study area was paid under municipal contract and the other 50 percent was paid under individual contracts. The 1992 costs for solid waste management can be compared to the cost of solid waste management in 1980, at which time it was estimated that the total cost for solid waste management was \$840,000, or about \$12 per capita per year, \$34 per household, and \$24 per ton. As can be seen by review of Table 60, the costs for solid waste management have increased by about 60 to 80 percent in terms of constant dollars.

Additional costs incurred in solid waste disposal included the Clean Sweep Household Hazardous Waste Collection Program in 1992. The total cost of the program was about \$35,000. However, through a grant from the Wisconsin DNR and contracted assistance from the City of Whitewater, the total cost of the program for Walworth County was about \$15,700.

#### ANTICIPATED GROWTH AND CHANGE

The Walworth County solid waste management planning effort is intended to address the anticipated solid waste management needs of the County through the year 2010 and to reevaluate the means of meeting those needs, with emphasis on recycling

and on yard and household hazardous waste disposal. This requires information regarding anticipated population, household, land use, and employment levels in the study area in order to assess the probable composition, quantity, and spatial distribution of the solid wastes generated and the size, characteristics, and location of the facilities necessary to properly manage these wastes.

Population, household size and distribution, land use, and employment forecasts are based upon information presented in the new regional land use plan for the Southeastern Wisconsin Region for the design year 2010. In the preparation of that plan, the Southeastern Wisconsin Regional Planning Commission incorporated the use of "alternative futures" to deal with the high degree of uncertainty that exists with regard to historic trends. Under this approach, the development and evaluation of alternative land use plans is based, not upon a single most probable forecast of future socio-economic conditions, but rather upon a number of alternative futures chosen to represent a range of conditions which may be obtained over the plan design period.

As was done in the 1982 solid waste management plan, the alternative solid waste management options developed in the current plan were based upon the intermediate-growth centralized land use pattern. However, in order to evaluate the performance of the alternative solid waste plans under a likely range of future possible conditions, consideration was also given to those conditions generated under the high-growth decentralized land use pattern.

#### Population, Households, Employment, and Urban Land Use Levels Considered in the Design of Alternative Solid Waste Management Plans

Under the intermediate-growth centralized land use future, the resident population of the study area would increase by about 16 percent, from 77,500 persons in 1990 to about 89,600 persons by 2010. Under the high-growth decentralized land use future, the resident population would increase by about 83 percent, from 77,500 persons in 1990 to about 141,400 persons by 2010. The number of households would increase by about 29 percent, from about 27,900 in 1990 to about 35,900 in 2010 under the intermediate-growth future and by about 87 percent, to about 52,100 in 2010 under the high-growth future. Total employment in Walworth County would increase by about 9 percent, from about 37,100 jobs in 1990 to about 40,500, under the intermediate-growth future and by about 50 percent, to 55,500 jobs, under the high-growth future.

The expected changes in population and economic activity by the year 2010 will require the conversion of additional land within the study area from rural to urban use in order to provide for the urban development and associated support facilities required by such development. Accordingly, it is estimated that lands devoted to urban use will increase by 9 percent, from 61.3 square miles to about 66.8 square miles, under the intermediate-growth scenario and by about 28 percent, to 78.5 square miles, under the high-growth scenario, between 1990 and the year 2010.

#### Solid Waste Types, Quantities, and Sources Utilized in Alternative Plan Design

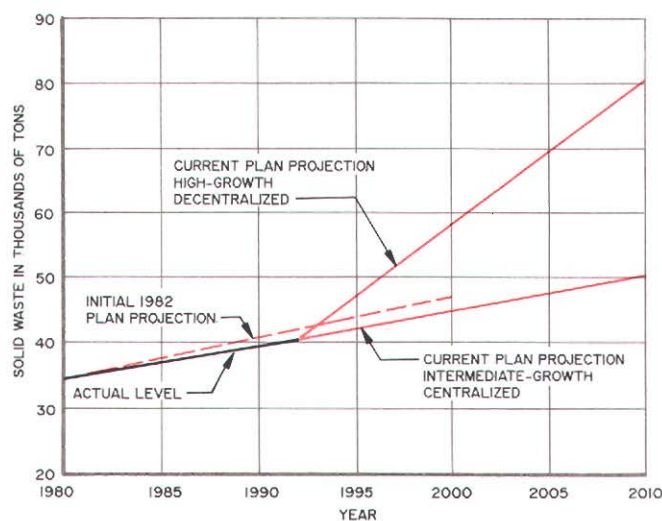
Estimates of the quantities of solid wastes which may be expected to be generated in the study area through the year 2010 were developed. The estimates were based upon anticipated solid waste generation rates and assumed future population and economic activity levels under the intermediate-growth centralized and the high-growth decentralized land use scenarios. The total amounts of residential solid waste generated within the study area may be expected to increase from about 40,600 tons per year in 1992 to about 50,400 and 80,700 tons per year under the intermediate-growth centralized and high-growth decentralized scenarios, respectively. This equals about 3.1 pounds per capita per day under both future conditions. This represents an increase of about 9,800 tons per year, or about 24 percent, or slightly more than 1 percent a year over the 1992 level, under the intermediate-growth scenario and an increase of about 40,000 tons per year, or about 99 percent, or slightly more than 5 percent per year over the 1992 level, under the high-growth scenario. The total quantities were also estimated to include 33,400 and 53,500 tons per year of unrecycled mixed solid waste, or approximately 2.0 ppcpd, and about 17,000 and 27,200 tons per year of recycled solid waste, or approximately 1.0 ppcpd, under the two future development scenarios, respectively. These future solid waste loadings are compared to 1992 condition loadings in Figure 33. Figure 34 compares the updated year 2010 residential solid waste forecast with the forecasts developed in the initial plan.

The per capita generation rate of recycled solid waste may be expected to increase by about 350 percent between 1992 and the year 2010, from about 0.2 ppcpd in 1992 to approximately 1.0 ppcpd. Of this increase, approximately 0.3 ppcpd may be attributed to the yard waste component of the residential waste stream being banned from landfills as of January 1993. The remaining increase in per capita recycled



Figure 34

**ACTUAL AND PROJECTED RESIDENTIAL SOLID WASTE QUANTITIES GENERATED IN THE WALWORTH COUNTY STUDY AREA: 1980-2010**



Source: Walworth County Solid Waste Management Department and SEWRPC.

materials of about 0.5 ppcpd is attributed to the expected increase in recycling due to the other material landfill disposal bans proposed to be implemented. It is also estimated that paper will remain the largest component of the waste stream in 2010, representing about 36 percent of the total.

The amount of commercial and industrial solid wastes generated may be expected to increase from about 47,000 tons per year in 1992 to about 63,000 and 84,000 tons per year by the year 2010 under the intermediate-growth and high-growth future scenarios, respectively, increases of about 35 and 80 percent. The remaining solid wastes, which include bulky wastes, trees and brush, and construction and demolition wastes are anticipated to increase from about 22,000 tons per year to about 26,000 and 42,000 tons per year under the intermediate-growth and high-growth future scenarios, respectively, increases of about 18 and 91 percent.

## RECYCLED MATERIAL MARKET CONSIDERATIONS

The existence of adequate markets for collected materials is a necessary component of any effective recycling program. Many recycling programs have experienced problems because of a faltering of one or more markets. Thus, successful recycling depends, in part, upon the analysis of market conditions for recyclables. Factors such as the costs of processing,

in terms of time, money, and resources, should be weighed against the benefits of marketing the material, such as return for the product and landfill diversion. Long-term average and current market prices for recyclable materials are set forth in Table 61.

## DEVELOPMENT AND EVALUATION OF ALTERNATIVE SOLID WASTE MANAGEMENT PLANS

In the development of this year 2010 Walworth County solid waste management plan, alternative management systems were identified and evaluated for residential recyclable material management, yard waste management, household hazardous materials management, and for the County facility internal waste recyclables management. The development of solid waste management plans required an evaluation of potential techniques for each solid waste management function, including source-reduction, source-separation, storage, collection, transfer, transportation, processing, treatment, resource recovery, and disposal, which may be applicable within the study area. The solid waste management functions and techniques considered viable for application in Walworth County and the alternative plans for each management system are set forth below.

### Residential Recyclable Material Management Measures

The following measures were found to be potentially viable for use in developing alternatives for material recycling:

- Pre-collection source-separation and storage systems similar to the existing practices incorporating rigid plastic recycling bins and bags
- Collection systems similar to existing practices, relying principally on private collection operations and incorporating both curbside and drop-off collection methods
- Transfer stations where recyclable materials are transferred from smaller collection vehicles or containers to larger vehicles or containers prior to transport of materials to a processing facility or markets
- Processing facilities, including the use of low-level and minimal-level material recovery facilities
- Selected marketing strategies



Table 61

## AVERAGE MARKET PRICES FOR RECYCLABLES

Material	Long-Term Price Range per Ton (1990 through 1993)	Short-Term Price Range <sup>a</sup> per Ton (December 1994 and January 1995)	Value Assumed for Planning Purposes <sup>a</sup> (per ton)
Newsprint . . . . .	\$0 to \$20	\$50 to \$80	\$ 10.00
Glass Containers			
Clear or Brown . . . . .	\$15 to \$50	\$15 to \$50	\$ 15.00
Green . . . . .	\$0 to \$15	\$0 to \$15	5.00
Mixed . . . . .	\$0 to \$2.00	\$0 to \$2.00	0.00
Aluminum Beverage Cans . . . . .	\$500 to \$760	\$800 to \$1,400	\$600.00
Ferrous Cans . . . . .	\$44 to \$77	\$40 to \$80	\$ 50.00
Plastics			
PET/HDPE . . . . .	\$40 to \$240	\$200 to \$450	\$ 80.00
Mixed . . . . .	N/A	N/A	10.00
Mixed Paper . . . . .	\$0 to \$15	\$10 to \$20	\$ 0.00
High-Grade Office Paper			
Sorted White Ledger . . . . .	\$50 to \$210	\$130 to \$150	\$ 50.00
Computer Printout . . . . .	\$20 to \$280	\$160 to \$180	20.00
Colored Ledger . . . . .	\$20 to \$70	\$50 to \$70	20.00
Corrugated Cardboard . . . . .	\$10 to \$35	\$50 to \$70	\$ 20.00
Polystyrene . . . . .	N/A	N/A	\$ 0.00

NOTE: The following abbreviations were used: HDPE = high-density polyethylene and PET = polyethylene terephthalate.

N/A indicates data not available.

<sup>a</sup> Values do not include reduction for cost of transportation.

Source: Wisconsin Department of Natural Resources; University of Wisconsin-Extension; University of Wisconsin-Green Bay; *Recycling Times*, June 1993; and SEWRPC.

Using these techniques and options, six alternative recyclable material management plans consisting of various combinations of applicable techniques for residential recycling were developed and evaluated, as summarized in Table 62.

The evaluation of the alternative plans for residential recyclable material management systems considered costs, practicality of implementation, program flexibility, and the ability to meet changing market conditions and regulations. On the basis of these factors, the development of a major new centralized material recovery recycling facility for Walworth County is not recommended at this time. A review of the alternatives indicates that there may be certain advantages in establishing a centralized, low-level processing facility at a site near the County's Lakeland Complex if the facility could serve multiple purposes, including functioning as a storage processing site for the County's own recyclables and for other uses to be developed by a private operator

of the site. At the present time, it is recommended that the current system, in which individual communities contract individually or jointly with private contractors, be continued. County involvement is recommended to be limited to further evaluating the potential ownership of a centralized processing site which would be constructed and operated by a private business and to assisting the local units of government in implementing a public information and education program.

#### Yard Waste Management Measures

The following measures were found to be potentially viable for use in developing alternatives for yard waste recycling:

- Pre-collection separation and storage of materials in a manner similar to the existing practices, incorporating cans, bags, and rigid containers

Table 62

## SUMMARY OF COST ANALYSES FOR ALTERNATIVE RECYCLING PLANS FOR WALWORTH COUNTY

Alternative Plan	Total Cost of Capital, Operation and Maintenance	
	Total Annual Cost <sup>a</sup>	Cost per Ton of Recycled Material
No. 1: Use of a System for Recycling Similar to the Existing Recyclable Waste Management Systems	\$586,000	\$54.00
No. 2: Processing the Drop-Off Collected Portion of Recyclable Waste at a Transfer Station-Sorting Facility Incorporating a Minimal Degree of Technology	\$648,000	\$59.00
No. 3A: Processing All of the Collected Recyclable Waste at a Processing Facility Incorporating a Low Degree of Technology	\$649,000	\$64.00
No. 3B: Continued Use of Two Material Recovery Facilities Currently Serving the County, with All Other Material Processed at Processing Facility Incorporating a Low Degree of Technology	\$671,000	\$62.00
No. 4A: Processing All of the Collected Recyclable Waste at a Processing Facility Incorporating a Medium Degree of Technology	\$719,000	\$66.00
No. 4B: Continued Use of Two Material Recovery Facilities Currently Serving the County, with All Other Material Processed at the Processing Facility Incorporating a Medium Degree of Technology	\$687,000	\$63.00

<sup>a</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 20-year period.

Source: SEWRPC.

- Collection systems using both drop-off collection and selected curbside collection of materials and including the household management of yard waste where the yard waste is not collected but processed at the point of generation
- Centralized yard waste processing by a private firm
- Yard waste processing utilizing home composting and centralized windrow composting systems
- Land application of yard waste
- Trees and brush yard waste processing using chipping systems
- Selected marketing strategies

Four alternative plans for managing yard wastes were considered, on the basis of a review of the existing processing operations and the potential options considered to be applicable in Walworth County, as summarized in Table 63.

The evaluation of the alternative plans for yard waste management systems considered costs, practicality of implementation, program flexibility, and the ability to meet changing conditions and regulations. On the basis of these factors, it was concluded that an adequate number of compost operations exist within the County. It is further recommended that consideration be given to expanding the compost operation located at the County Lakeland Complex and that it be made available to the communities in the County for an appropriate fee. It is also recommended that at such time as the County's curtain destructor can no longer be operated, consideration be given to purchasing a tub grinder for large wood

Table 63

**SUMMARY OF COST ANALYSES FOR ALTERNATIVE YARD  
WASTE MANAGEMENT PLANS FOR WALWORTH COUNTY**

Alternative Plan	Total Cost of Capital, Operation and Maintenance	
	Total Annual Cost <sup>a</sup>	Cost per Ton of Yard Waste
No. 1: Use of Yard Waste Management Systems Similar to the Existing System	\$ 67,000	\$24.80
No. 2: Expansion of the Composting Operation at the County Lakeland Complex	\$ 81,600	\$30.20
No. 3: Contracting with a Compost Manufacturer to Process Yard Waste	\$151,400 <sup>b</sup>	\$56.00 <sup>b</sup>
No. 4: Land Application of a Portion of the Yard Waste Generated in the County	\$ 65,700	\$24.30

<sup>a</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 20-year period.

<sup>b</sup>Costs based upon a 50-mile haul. Costs would be reduced to about \$40 per ton if distance were reduced to 15 miles.

Source: SEWRPC.

wastes. In addition, it is recommended that the Walworth County Solid Waste Department and the University of Wisconsin Extension staff evaluate the potential for disposal of yard wastes by land application on the County Farm through the use of demonstration plots and testing. Finally, it is recommended that the County Solid Waste Department and the University of Wisconsin Extension staffs assist the local units of government in implementing a public information and education program designed to promote the use of onsite yard waste management measures.

**Household Hazardous Waste Management Measures**

The following measures were found to be potentially viable for use in developing alternatives for household toxic and hazardous waste management:

- Temporary drop-off "Clean Sweep" programs
- Fixed drop-off programs
- Collection at retail establishments

A review of the existing processing operations and the potential options considered to be applicable in Walworth County indicates that four alternative plans for managing household toxic and hazardous wastes should be considered, as summarized in Table 64.

The evaluation of the alternative plans for household toxic and hazardous waste management systems considered costs, practicality of implementation, program flexibility, and level of effectiveness with regard to participation. On the basis of these factors, it was concluded that the County should consider the institution of a mobile collection program which could be operated at about six locations in the County over a one-week to two-week period at either an annual or biannual frequency. It is further recommended that the Walworth County Solid Waste Department work cooperatively with the University of Wisconsin Extension and the Land Conservation Department to conduct a survey to determine the amounts of stored agricultural hazardous waste and potential participation in an agricultural hazardous waste program. The survey would also develop information on the potential for waste exchange to be developed as part of an agricultural hazardous waste management program. Finally, it is recommended that the Walworth County Solid Waste Management Department and the University of Wisconsin Extension develop a program directed toward reducing household hazardous wastes through public education and information directed to encourage purchasing practices and uses of materials which do not leave residual materials in storage and encourage greater use of nonhazardous material alternatives with the long-term goal of greatly reducing the dependence on hazardous products.

Table 64

**SUMMARY COST ANALYSES FOR ALTERNATIVE HOUSEHOLD  
HAZARDOUS WASTE MANAGEMENT PLANS FOR WALWORTH COUNTY**

Alternative Plan	Total Cost of Capital, Operation and Maintenance <sup>a</sup>	
	Total Average Annual Cost <sup>b</sup>	Cost per Pound of Household Hazardous Waste
No. 1: Annual Household Waste Collection at Two Locations with No Material Limitations	\$43,000	\$3.58 to \$5.97 <sup>c</sup>
No. 2: Biannual Refined Household Waste Collection with Material Limitation	\$23,000	\$5.11 <sup>d</sup>
No. 3: Establishment of a Permanent Household Waste Collection Facility with Material Limitations	\$67,000	\$6.70 <sup>e</sup>
No. 4: Mobile Collection Program for Household Hazardous Wastes with Material Limitations	\$76,500 <sup>f</sup>	\$5.06 <sup>g</sup>

<sup>a</sup>Costs are total costs. There is potential for State grants to reduce the local cost.

<sup>b</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 10-year period.

<sup>c</sup>Cost for all material is \$3.58 per pound for 12,000 pounds. Cost per pound for material excluding latex paint, used oil and antifreeze, batteries is \$5.97 per pound for 7,200 pounds.

<sup>d</sup>Material collected does not include latex paint, used oil and antifreeze, and used batteries. Total amount collected is estimated to be 9,000 pounds.

<sup>e</sup>Material collected does not include latex paint, used oil and antifreeze, and batteries. Total amount of material collected is estimated to be 10,000 pounds.

<sup>f</sup>If mobile collection were reduced frequency to once biannually, the average annual cost would be about \$40,000.

<sup>g</sup>Material collected does not include latex paint, used oil and antifreeze, and batteries. Total amount collected is estimated to be 15,000 pounds.

Source: SEWRPC.

**Alternative County Facility Internal  
Waste Recycling Management Systems**

The requirements of Chapter NR 544 of the Wisconsin Administrative Code provide for nonresidential buildings and facilities to institute recycling programs which will provide for the recycling of materials banned from landfilling. As part of the Walworth County solid waste management updating process, a review was conducted of existing solid waste management practices being carried out internally at Walworth County facilities in order to examine potential means of reducing the existing and probable future costs of solid waste management at these facilities. Four alternative plans were formulated and evaluated for the management of solid waste for Walworth County facilities.

Currently, there are nine locations in the study area where significant amounts of solid waste are generated by County operations: the Walworth County Courthouse, Lakeland School, Walworth County Highway Department Complex, Huber Dorm and Jail Annex, Human Services Center and Administration Buildings, Lakeland Medical Center, Lakeland Nursing Home, Walworth County Courthouse Annex, and Lakeland Agricultural Complex. Together, these facilities generate approximately 1,400 tons of solid waste which are collected and disposed of by landfilling. The current recycling programs at the County facilities consist of an office paper recycling program carried out by the Walworth County Solid Waste Department, a corrugated paper recycling program at the Lakeland Medical Center, limited aluminum

Table 65

## SELECTED COST ANALYSES FOR ALTERNATIVE RECYCLING PLANS FOR WALWORTH COUNTY FACILITIES

Alternative Plan	Total Cost of Capital, Operation and Maintenance <sup>a</sup>	
	Total Annual Cost	Cost per Ton of Recycled Material
No. 1: High Level of Separation with High Level of County Participation in Marketing and Equipment Ownership	\$32,200	\$108.00
No. 2: High Level of Separation with Limited County Participation in Marketing and Equipment Ownership	\$19,600	\$ 65.00
No. 3: Low Level of Separation with High Level of County Participation in Marketing and Equipment Ownership	\$32,800	\$109.00
No. 4: Low Level Separation with Low Level of County Participation in Marketing and Equipment Ownership	\$19,700	\$ 66.00

<sup>a</sup>Total annual cost is based upon amortization of the capital cost at a 6 percent interest rate over a 10-year period.

Source: SEWRPC.

can recycling at some County facilities, limited composting of County-generated yard wastes at the City of Elkhorn compost facility, and recycling of a number of materials by the County Highway Department. The total estimated cost for solid waste collection and disposal for the County facilities is \$64,000, or about \$46 per ton of waste. The cost of solid waste management practices at Walworth County facilities has increased rapidly in recent years and may be expected to continue to increase, in part because of requirements to implement recycling programs.

The primary goals of the County's internal solid waste management program is to reduce the amount of solid waste generated at the County facilities which must be disposed of by landfilling through a cost-efficient program which meets the requirements of the State recycling law. To this end, four alternative plans were considered, as summarized in Table 65.

The evaluation of the four alternative plans considered economics, practicality of implementation, program flexibility, the degree of County personnel involvement required, space requirements, program flexibility to meet changing market conditions and regulations, and the value received for recyclable materials. Based upon these considerations, a combination of Alternative Plans 1 and 2 is recommended to be implemented. This combination would offer the flexibility to provide a high level of separation of recyclables. In addition, the internal storage

and collection system is recommended to be owned by the County, with only limited County involvement in marketing and equipment ownership of the external storage, transportation, and marketing. It is recommended that, initially, the level of separation of the materials be coordinated with the requirements of the current contractor for each building. However, it is recommended that the system be designed to provide ultimately for a high level of separation in order to allow for future growth.

It is also recommended that source-reduction measures be carried out at the County facilities as part of the County's solid waste management program through procurement policies, selected equipment and material installation and use, office practices, and staff educational programs. The source-reduction measures which are considered applicable for use at each of the County's facilities are listed in Chapter IX.

Only one set of options was considered for recycling special wastes generated at the County's internal facilities. The recommended plan is based upon review and refinement of ongoing programs expanded to include consideration of additional materials. For scrap iron and steel, used oil, batteries, tires, and wood wastes, it is recommended that the existing system be continued in a refined manner. Most of these materials are generated by the County Highway Department and it is recommended that the existing storage system consisting of an oil storage



tank, bins, and indoor storage sites be utilized for these materials. This would provide bins for the storage of scrap iron and steel, tires, and wood waste; the continued use of the 2,000-gallon tank for used oil storage; and indoor storage of batteries. It is recommended that any such wastes generated at County facilities outside the County Highway Department be transported to the storage facilities operated by the Highway Department after communication with the Highway Department personnel. It is recommended that the overall county educational program be used to stress the importance of placing only clean wood waste at the storage site at the Highway Department, a location separate from where brush is brought to the Department.

With regard to electric lamps and bulbs, it is recommended that the County Solid Waste Department staff, through an educational program, advise departments responsible for installing and replacing lamp tubes and bulbs of the types of lamps and bulbs which, under current Wisconsin Department of Natural Resources regulations, cannot be disposed of in sanitary landfills and the hazardous nature of the lamps and bulbs. For those types of bulbs which can currently be recycled at this time, fluorescent and mercury-vapor lamps and bulbs, it is recommended that used bulbs be placed in the cardboard sleeve or box in which replacement tubes or bulbs arrive and stored where they will not be mixed with other solid waste materials.

Currently, all yard waste generated at the County facilities is brought to either the County Highway Department, as in the case of brush, or to the City of Elkhorn compost site on County grounds at the southeast portion of the Lakeland Complex. It is recommended that this practice be continued, but refined to provide for improved operation, signage, and housekeeping practices.

Even with full implementation of the recycling program recommended above, it is expected that there will continue to be wastes which are not recycled and which must be disposed of by landfilling or other means. It is expected that the quantity to be disposed of will be reduced to about 70 to 75 percent compared to the current amount upon full implementation of the recycling program. It is recommended that the wastes continue to be disposed of by contract with a solid waste hauler. Special wastes, such as medical wastes, would continue to be disposed of as currently is the practice, using primarily the existing sterilizer system at the Lakeland Medical Center, with special contracting for specialized medical wastes. It is

recommended that consideration be given to keeping the medical wastes separated, to the extent possible, from the other wastes generated at the Lakeland Medical Center. This potentially reduces the costs for disposal since all wastes mixed with the medical wastes require special landfilling procedures.

It is also recommended that the County Solid Waste Management Department take the lead in implementing the countywide program, including the communication and education element of the program. In order to do so, it will initially be necessary to communicate with the appropriate County department personnel, as well as the maintenance and housekeeping representatives, to describe the program in general, including the program goals, and to refine the program to meet the needs of each department.

It is also recommended that the County ultimately incorporate all recycled and unrecycled solid waste management under one umbrella contract covering all County facilities. This could be handled by the Solid Waste Management Department.

## LANDFILL AND INCINERATION PLAN ELEMENT CONSIDERATIONS

### Landfill Element Considerations

The 1982 Walworth County solid waste management plan included a generalized landfill siting analysis and recommendations about the need for additional landfill capacity to serve the residents, industry, and commerce of Walworth County. It also brought recommendations with regard to the potential future use of solid waste incineration facilities incorporating energy recovery in the County. As part of the 1992 solid waste management plan, it was estimated that the average annual quantity of unrecycled solid waste from residential, commercial, and industrial sources in Walworth County, is between 71,000 and 103,000 tons per year. This would require from about 140,000 to 210,000 cubic yards of landfill capacity per year, or between 2,200,000 and 3,400,000 cubic yards of capacity through the year 2010. The current available landfill capacity at the five general-use landfills accepting wastes from Walworth County is about 14,000,000 cubic yards. The total loading to these five landfills is about 2,000,000 cubic yards per year. Because of these large volumes of loading and capacity, factors external to Walworth County may be expected to have a significant impact on the landfill capacity available for use by Walworth County, including the amounts of solid waste generated in areas outside of Walworth County in Southeastern Wisconsin and in northeastern Illinois. At the

present time there appears to be adequate landfill capacity available or planned at the landfills receiving Walworth County solid waste, assuming the current loadings to those landfills are not significantly increased.

The potential for siting of landfills in the County was examined through the conduct of a generalized siting analysis. That analysis concluded that about 387 square miles, or about 70 percent of the County, was characterized as having no potential for landfill siting. This compares to about 299 square miles, or 52 percent of the County, with no potential for landfilling in a similar analysis conducted under the initial 1982 County plan.

While it appears there is adequate landfill capacity available or planned at the landfills receiving Walworth County solid waste at this time, the potential exists that the approved landfill capacity for disposal of nonrecycled solid waste may become inadequate in the future. It may therefore become necessary for the County to assume a more direct role in the construction and operation of a new sanitary landfill for the disposal of solid waste generated in Walworth County. Should this become necessary, it is recommended that a County-owned facility operated under contract by a private operator be considered. In the absence of a demonstrated problem with available landfill capacity within the County, however, it is not now recommended that the County proceed with further actions leading to acquisition and site approval for a new landfill.

It is further recommended that the County proceed with the preparation and adoption of an ordinance providing regulations pertaining to landfills. In addition, because of the potential impact of solid waste generated in other counties on landfill capacities available for Walworth County, it is recommended that the capacities available and the total loadings be monitored annually by the County Solid Waste Management Department. In this regard, it is recommended that this department work with the Wisconsin Department of Natural Resources to monitor transport into the County of solid waste generated outside the State and outside the County.

#### Incineration Element Considerations

The 1982 County solid waste management plan recommended that the County undertake a feasibility study of the construction and operation of a waste-to-energy incineration system envisioned in the initial plan. The study was completed in 1985 and at that time it was concluded by the County that the pro-

posed solid waste resource recovery facility was not economically viable. For the preparation of this plan, updated cost analyses were conducted for a waste-to-energy incineration system. On the basis of the results, it was again concluded that the construction and operation of a waste-to-energy incineration facility would be more costly than landfilling. Should landfill costs and energy costs escalate at rates significantly greater than the rate of general price inflation, this conclusion could change late in the planning period.

#### **PUBLIC INFORMATIONAL MEETING**

A public informational meeting and hearing on the preliminary draft of the new solid waste management plan for Walworth County was held on July 27, 1994, in the County Courthouse Annex Auditorium in the County Lakeland Complex near Elkhorn. This public meeting was attended by a total of 25 persons representing local units of government, private businesses, and concerned citizens. In addition, the County Solid Waste Management Board and County Solid Waste Management Department and Regional Planning Commission staff were in attendance. The public hearing was announced in news releases issued to area newspapers; by placement of a formal notice in the Whitewater Register, the County's official newspaper; and through transmission of a notice of the meeting and a summary of the draft plan to all of the 27 general-purpose units of government in the study area, to all County Board members, to the private solid waste haulers and recyclers serving the area, to organizations interested in environmental matters, and to a list of citizens and businesses who had indicated an interest in solid waste management over the past several years.

The public informational meeting was conducted in two phases, the first was a presentation of the preliminary findings and recommendations of the County solid waste plan update and the second was a period for public comment. To assist in the plan presentation, a brochure summarizing the proposed new plan was distributed at the public hearing to all attending. The brochure included a description of the existing solid waste management situation in Walworth County, of the alternative solid waste management plans considered, and of the preliminary plan recommendations.

The meeting agenda, summary, and copies of newspaper articles and the legal notice of the meeting are included in Appendix H. Also included are copies of

correspondence regarding the plan submitted following the public meeting.

The specific items discussed which bear directly on the plan recommendations included the following:

- There was testimony of a need for additional information on the best means of developing effective recycling programs in areas which have seasonal and part-time residents
- There was general support for the County to continue carrying out a household hazardous waste collection program, incorporating either a mobile program or satellite collection locations in order to make the program more convenient and accessible. It was noted that in order to make this recommendation fully implementable, there would need to be changes in current grant policies and procedures and in regulations regarding the storage and handling of the collected wastes
- There was support for the County taking over the operation of the compost site at the Lakeland Complex and making it accessible to the municipalities in the County
- A need to have information more accessible on solid waste management practices, costs, contracts, and ordinances was stated.
- A need was stated for a high level of public information and education in order to fully implement programs for recycling which will meet the 1995 requirements

The Walworth County Solid Waste Board carefully considered the oral and written comments submitted at the public informational meeting and hearing on the preliminary plan and accordingly made the following revisions to the recommended plan.

1. It is recommended that the proposed public information and educational program specifically include an element directed toward the part-time and seasonal residents of the County. The program would recognize that the use of curbside collection may not be the most effective for areas dominated by weekend users and that specially designed informational materials or other media would be developed to inform such residents of the need for proper procedures to be used to meet recycling goals and regulatory requirements.

2. It is recommended that the County Solid Waste Management Department obtain copies of sample ordinances and contract hauler specifications which have been used effectively, such as the ones prepared by the Town of Sugar Creek. These materials could then be made available for use as a reference by other communities who will be developing or revising such documents.
3. It is recommended that the County Solid Waste Management Department work with the Wisconsin Department of Natural Resources and other regional, county, and local solid waste managers to develop changes in the current regulations which would improve the cost-effectiveness of decentralizing the collection of household hazardous waste by using mobile or satellite collection programs while maintaining the environmental integrity of such programs.

#### SUMMARY OF RECOMMENDED ROLE OF THE WALWORTH COUNTY SOLID WASTE MANAGEMENT BOARD AND DEPARTMENT IN SOLID WASTE MANAGEMENT

The updated plan is intended to identify those solid waste management functions which the County should perform in a manner compatible with the roles of the local units of government operating in the County. The following management functions, based upon the inventories and analyses conducted, have been recommended for implementation by Walworth County:

1. Implementation of a public information and education program: Public participation is an important element in the success of solid waste management programs within the County. This participation depends, in part, on increased education and awareness about solid waste management. It is recommended that the County Solid Waste Management Department and the University of Wisconsin Extension staffs assist the local units of government in developing, coordinating, and implementing a public information and education program which would be directed toward integrated solid waste programs considered as viable alternatives to landfill disposal. Such programs would include waste reduction and recycling, promotion of the use of onsite yard waste management measures, and pro-

motion of the use of nontoxic alternatives for, and the proper disposal of, household wastes. The techniques and media to be considered in the public information and education programs are described in Chapters IV, V, VI, and VIII. It is recommended that these programs specifically include an element directed toward part-time and seasonal residents. The programs should recognize that conventional curbside collection may not be the most effective for areas dominated by weekend users.

2. **Implementation of a County facility internal recycling program:** It is recommended that the County Solid Waste Management Department undertake the development of a recycling program for the County's own facilities, including programs for source reduction, conventional material recycling, yard wastes management, and special wastes management, as described in Chapter IX. The program would include an information and education element for County employees using the County facilities.
3. **Solid waste management contracting for the County's facilities:** It is recommended that the County Solid Waste Management Department coordinate the process of ultimately incorporating all solid waste management of both recycled and unrecycled solid waste under one umbrella contract to cover all County facilities.
4. **Landfill ordinance:** It is recommended that the County proceed with the preparation and adoption of an ordinance providing regulations pertaining to landfills.
5. **Landfill capacity monitoring:** Because of the potential impact of solid waste generated in other counties on landfill capacities available for Walworth County, it is recommended that the capacities available and the total loadings be monitored annually by the County Solid Waste Management Department. In addition, it is recommended that the County Solid Waste Management Department work with the Wisconsin Department of Natural Resources to monitor transport into the County of solid waste generated out of State and out of County.
6. **Composting site operation:** It is recommended that consideration be given to expanding the existing compost operation at the County Lakeland Complex and that it be made available to the communities in the County for an appropriate fee. The County should consider taking over the operation of the compost site.
7. **Yard waste and application evaluation:** It is recommended that the Walworth County Solid Waste Management Department and the University of Wisconsin Extension staffs evaluate the potential for disposal of yard wastes by land application on the County Farm through the use of demonstration plots and testing.
8. **Household hazardous waste program:** It is recommended that the County Solid Waste Management Department continue a program for the collection of household hazardous wastes. The program is recommended to be carried out every one to two years at multiple locations in the County over a one-week or two-week period if interest is shown by local unit of government cooperators. The implementation of this component will be dependent upon the availability of adequate State grant funding. It is recommended that the County Solid Waste Management Department work with the Wisconsin Department of Natural Resources and other regional, county, and local solid waste managers to develop changes in the current regulations which would improve the cost-efficiency of decentralizing the collection of household hazardous waste through the use of mobile or satellite collection programs while maintaining the environmental integrity of such programs.
9. **Agricultural hazardous waste program:** It is recommended that the Walworth County Solid Waste Management Department work cooperatively with the University of Wisconsin Extension and the Land Conservation Department to conduct a survey to determine the amounts of stored agricultural hazardous waste and to measure potential participation in an agricultural hazardous waste program, including the potential for waste exchanges.
10. **Clearinghouse for solid waste management technical data:** It is recommended that the County Solid Waste Management Department obtain copies of sample ordinances and contract hauler specifications which have been used effectively, such as the ones prepared by the Town of Sugar Creek. These materials could be made available as a reference to

Table 66

**COST OF PLAN COMPONENTS RECOMMENDED TO BE IMPLEMENTED  
BY THE WALWORTH COUNTY SOLID WASTE MANAGEMENT DEPARTMENT**

Plan Element	Total Average Annual Cost	Cost per Ton of Solid Waste	Cost per Household per Year
<b>To Be Implemented by County</b>			
Public Education and Information Program .....	\$ 3,000	--	--
Recycling Program for County Facilities .....	20,000	\$ 66	--
Contract for Management of Unrecycled Waste from County Facilities .....	-- <sup>a</sup>	-- <sup>a</sup>	--
Landfill Ordinance and Monitoring .....	-- <sup>b</sup>	-- <sup>b</sup>	--
Yard Waste Compost Site Operation .....	-- <sup>c</sup>	-- <sup>c</sup>	--
Yard Waste Land Application Evaluation .....	1,000	--	--
Household Hazardous Waste Program .....	40,000 to 70,000 <sup>d</sup>	-- <sup>d</sup>	--
Agricultural Hazardous Waste Program .....	-- <sup>b</sup>	-- <sup>b</sup>	--
<b>Total</b>	<b>\$64,000 to \$94,000</b>	<b>--</b>	<b>--</b>
<b>To Be Implemented by the Other Local Units of Government and Private Sector</b>			
Residential Solid Waste Recycling .....	\$1,190,000	\$110	\$ 35
Yard Waste Management .....	224,000 <sup>e</sup>	83 <sup>e</sup>	7 <sup>e</sup>
Unrecycled Solid Waste Landfilling .....	2,650,000	75	78
<b>Total</b>	<b>\$4,064,000</b>	<b>--</b>	<b>\$120</b>

<sup>a</sup>Estimated to be \$60,000 for about 1,100 tons per year, or \$55 per ton. Represents costs currently incurred by the County.

<sup>b</sup>Item which is expected to be funded through current operating budget of the Walworth County Solid Waste Department.

<sup>c</sup>Cost which can be recovered by fees for use of compost site at Lakeland Complex. Costs dependent upon number of municipalities using facility.

<sup>d</sup>Costs vary depending on the number of cooperating communities and the frequency of collection, once per year or once per two years. Cost estimate is total cost. State funds will be provided to partially fund the collection. Currently, grants are available in the amount of \$15,000 per collection.

<sup>e</sup>Assumes 50 percent of the yard waste is managed onsite, with no cost impact. Includes cost for collection of yard waste managed off site.

Source: Walworth County Solid Waste Management Department and SEWRPC.

other communities who will be developing or revising such documents.

continuing household hazardous waste management program and yard waste management activities. The costs of the programs recommended to be carried out by the County are summarized on Table 66 and are anticipated to cost between \$60,000 and \$90,000 per year over the planning period. The actual costs incurred will depend upon the frequency of the household hazardous waste collections and the degree of participation by local units of government and citizens in those programs. Of the total estimated County costs, \$8,000 to \$15,000 per year, is expected to be covered by State grant programs.

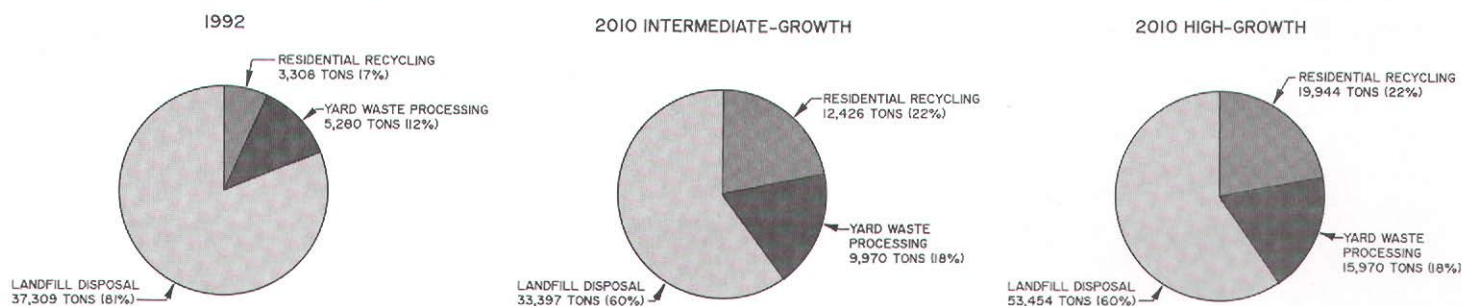
## RECOMMENDED PLAN COST SUMMARY

This Walworth County solid waste management plan update recommends that the County assume responsibility for the development of selected solid waste management programs, conducting a public information and education program, conducting a recycling program for the County's government facilities, and



Figure 35

SUMMARY OF DISPOSITION OF SOLID WASTE IN THE WALWORTH COUNTY STUDY AREA: 1992 AND 2010



Source: SEWRPC.

The costs for residential solid waste management programs recommended to be continued by the other local units of government and the private sector are also summarized in Table 66. These costs total just over \$4,000,000, or about \$120 per household on an average annual basis.

## CONCLUSION

As can be seen by review of Figure 35, the percentage of the Walworth County study area solid waste stream that is currently being landfilled is planned to decrease significantly by the year 2010 as a result of more stringent requirements on solid waste disposal facilities, new recycling requirements, and increased public awareness about waste reduction and recycling. Under 1992 conditions, about 19 percent of the solid waste generated in the County was

recycled through public or onsite yard waste management programs, with the remaining 81 percent of the solid waste stream being landfilled. Under planned conditions, the amount of solid waste recycled or managed through public or onsite yard waste management programs is expected to increase to about 40 percent of the total solid waste stream.

The solid waste management plan update for the Walworth County study area sets forth the recommended means for meeting the existing and forecast year 2010 solid waste management needs in the County. Adoption and implementation of this plan will provide for the sound management of solid waste in an efficient, environmentally safe, and cost-effective manner and will, at the same time, result in the recovery of valuable recyclable materials and the generation of energy from waste materials which would have otherwise required landfilling.

## **APPENDICES**

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**Appendix A**

**QUESTIONNAIRES USED IN THE  
INVENTORY OF LOCAL UNITS OF GOVERNMENT**

**MUNICIPAL SOLID WASTE SURVEY  
(May 1992)**

City/Village/Town of \_\_\_\_\_ Date \_\_\_\_\_

Information Prepared By \_\_\_\_\_ Title \_\_\_\_\_

To obtain the information needed to update the County solid waste management plan, you are being asked to provide the following information. Not all of this information requested may be readily available and some of the questions may not be applicable to all communities. In cases where questions are not applicable, please indicate "N/A". Should you have any questions concerning this matter, please contact Mr. Wade Scheel of the Walworth County Solid Waste Management Department at (414) 741-3394.

Please provide the following information when known or when an estimate can be made:

**PART 1. NON-RECYCLED SOLID WASTE (NRSW) (DO NOT INCLUDE RECYCLED WASTES)**

1. How much solid waste is produced in your community? Be sure to circle which type of unit (cubic yards or tons) is used to quantify the amounts of waste.

Residential _____	C.Y. or tons/year	Industrial _____	C.Y. or tons/year
Commercial _____	C.Y. or tons/year	Other _____	C.Y. or tons/year
		Total _____	C.Y. or tons/year

2. What type of solid waste collection service is used?

Residential wastes:	<u>Amount</u>
___ Municipal collection service (only)	___ C.Y. or tons/year
___ Privately owned collection service (only)	___ C.Y. or tons/year
___ Combination of both	___ C.Y. or tons/year

Multifamily residential wastes:	
___ Municipal collection service (only)	___ C.Y. or tons/year
___ Privately owned collection service (only)	___ C.Y. or tons/year
___ Combination of both	___ C.Y. or tons/year

Industrial wastes:	
___ Municipal collection service (only)	___ C.Y. or tons/year
___ Privately owned collection service (only)	___ C.Y. or tons/year
___ Combination of both	___ C.Y. or tons/year

Commercial wastes:	
___ Municipal collection service (only)	___ C.Y. or tons/year
___ Privately owned collection service (only)	___ C.Y. or tons/year
___ Combination of both	___ C.Y. or tons/year

3. Frequency and method of collection (check all that apply):

<u>Residential</u>		<u>Commercial</u>		<u>Industrial</u>	
Frequency	Method	Frequency	Method	Frequency	Method
<input type="checkbox"/> weekly	<input type="checkbox"/> curbside	<input type="checkbox"/> weekly	<input type="checkbox"/> curbside	<input type="checkbox"/> weekly	<input type="checkbox"/> curbside
<input type="checkbox"/> twice-weekly	<input type="checkbox"/> backyard	<input type="checkbox"/> twice-weekly	<input type="checkbox"/> backyard	<input type="checkbox"/> twice-weekly	<input type="checkbox"/> backyard
<input type="checkbox"/> monthly	<input type="checkbox"/> cart	<input type="checkbox"/> monthly	<input type="checkbox"/> cart	<input type="checkbox"/> monthly	<input type="checkbox"/> cart
<input type="checkbox"/> twice-monthly	<input type="checkbox"/> dumpster	<input type="checkbox"/> twice-monthly	<input type="checkbox"/> dumpster	<input type="checkbox"/> twice-monthly	<input type="checkbox"/> dumpster
<input type="checkbox"/> other	<input type="checkbox"/> other	<input type="checkbox"/> other	<input type="checkbox"/> other	<input type="checkbox"/> other	<input type="checkbox"/> other

4. Are special pickups conducted for bulk items, furniture, brush, etc.? \_\_\_\_\_  
 Frequency \_\_\_\_\_ By whom? ☐ municipal ☐ private

5. How many residences, commercial establishments, institutions, and industries are served by the municipal collection system?  
 Residences \_\_\_\_\_ Institutions \_\_\_\_\_ Commercial \_\_\_\_\_ Industries \_\_\_\_\_

6. What type of collection vehicles and how many vehicles of each type are used in your community for municipal collection services? (Some examples of vehicle types are: packer, closed body truck, open truck, and pick-up truck).

Vehicle Type and Capacity	Number
_____	_____
_____	_____
_____	_____

7. List all transfer stations or central collection stations utilized by your community.

Station Operator	Address
_____	_____
_____	_____

8. List all licensed solid waste landfill sites utilized by your community.

Landfill Operator	Location
_____	_____
_____	_____

9. Collection Services

Responsibility for solid waste material collections within municipality.

☐ municipality ☐ private hauler ☐ both

List private haulers: Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 Name \_\_\_\_\_  
 Address \_\_\_\_\_

10. If a private collection service is utilized for residential waste collection, how is the community charged? Indicate the annual cost where applicable below.

\_\_\_\_\_ \$/year per user charged to community  
 \_\_\_\_\_ \$/year per user charged to individual user  
 \_\_\_\_\_ \$/year per ton\_\_ or cubic yard\_\_ charged to community (please be sure to circle the unit used)  
 \_\_\_\_\_ \$/year lump sum charged to community  
 \_\_\_\_\_ \$/year other (please specify) \_\_\_\_\_



11. If used, what is the length of and expiration date of the contract governing private collection service? \_\_\_\_\_
12. List the cost of collection, transport, and disposal, and if applicable, transfer, and administration. Please be sure to include salaries, fringe benefits, and equipment operation and maintenance costs. List subtotal cost if components are unknown. List all administrative expenses. Other expenses (please specify \_\_\_\_\_)
- |            |               |
|------------|---------------|
| Collection | \$ _____/yr   |
| Transport  | _____/yr      |
| Disposal   | _____/yr      |
| Transfer   | _____/yr      |
| Subtotal   | \$ _____/year |
|            | _____/year    |
|            | _____/year    |
- Total Annual Cost \$ \_\_\_\_\_/year
- What year are costs based on \_\_\_\_\_.
13. If applicable, please list the cost per ton or per cubic yard for disposal of municipally collected refuse at an appropriate disposal site. \$ \_\_\_\_\_ per ton or cubic yard (please be sure to circle the unit used).
14. Please provide a summary, by year, of total solid waste generated, and collection and disposal costs over the last five years.
- |               |                   |               |                   |
|---------------|-------------------|---------------|-------------------|
| 1987 \$ _____ | C.Y. or tons/year | 1990 \$ _____ | C.Y. or tons/year |
| 1988 \$ _____ | C.Y. or tons/year | 1991 \$ _____ | C.Y. or tons/year |
| 1989 \$ _____ | C.Y. or tons/year |               |                   |
15. Please give an indication of the seasonal variation and any other fluctuations over the course of the year in solid waste production for your community.
- |                                    |              |
|------------------------------------|--------------|
| Weekly maximum quantity collected  | Month: _____ |
| Monthly maximum quantity collected | Month: _____ |
| Weekly minimum quantity collected  | Month: _____ |
| Monthly minimum quantity collected | Month: _____ |

## PART 2. RECYCLED SOLID WASTE (RSW) (RECYCLED SOLID WASTE ONLY)

1. Does your community have a waste recycling program? ☐ Yes ☐ No
2. What type of recycled waste collection is used?  
☐ curbside ☐ drop-off ☐ buyback ☐ compost dropoff site
3. How much recycled solid waste is collected in your community?
- |                             |                            |
|-----------------------------|----------------------------|
| Residential _____ tons/year | Industrial _____ tons/year |
| Commercial _____ tons/year  | Other _____ tons/year      |
4. If recycling is conducted, check the type of wastes recycled; and if known, the quantity of each material per year.
- |   |   |
|---|---|
| <input type="checkbox"/> General paper _____ tons/year  | <input type="checkbox"/> General glass _____ tons/year  |
| <input type="checkbox"/> newspaper _____ tons/year  | <input type="checkbox"/> clear glass _____ tons/year    |
| <input type="checkbox"/> office paper _____ tons/year   | <input type="checkbox"/> green glass _____ tons/year    |
| <input type="checkbox"/> mixed paper _____ tons/year  | <input type="checkbox"/> amber glass _____ tons/year    |
| <input type="checkbox"/> General plastic _____ tons/year  | <input type="checkbox"/> mixed glass _____ tons/year    |
| <input type="checkbox"/> polyethylene terephthalate (PET) bottles (example 2 liter) _____ tons/year   | <input type="checkbox"/> General metal _____ tons/year  |
| <input type="checkbox"/> high density polyethylene (HDPE) bottles (example milk jugs) _____ tons/year | <input type="checkbox"/> aluminum cans _____ tons/year  |
| <input type="checkbox"/> other plastics _____ tons/year   | <input type="checkbox"/> other aluminum _____ tons/year |
|   | <input type="checkbox"/> tin cans _____ tons/year       |
|   | <input type="checkbox"/> bi-metal cans _____ tons/year  |
|   | <input type="checkbox"/> ferrous scrap _____ tons/year  |
|   | <input type="checkbox"/> Batteries _____ number/year    |

General Yard Waste	tons/year	White goods	tons/year
leaves	tons/year	Tires	number/year
grass	tons/year	Motor Oil	gallons/year
brush	tons/year	Other	tons/year
other	tons/year	Other	tons/year

5. Who is responsible for initial separation of recycled solid waste (RSW) from non-recycled solid waste (NRSW)?  
\_\_ homeowner \_\_ municipality \_\_ private
6. Who is responsible for secondary separation of recycled solid waste (RSW) such as paper from plastic? \_\_ homoeowner \_\_ municipality \_\_ private
7. Who is responsible for tertiary separation of recycled solid waste such as PET plastic from HDPE plastic? \_\_ home owner \_\_ municipality \_\_ private
8. Does your community use composting and/or mulching/wood chipping to dispose of yard wastes?  
amount composted \_\_\_\_\_ tons/year mulch/woodchip amount \_\_\_\_\_ tons/year  
compost pile location \_\_\_\_\_ stockpile location \_\_\_\_\_
9. Location and type of waste oil collection center, if present \_\_\_\_\_
10. Who is the operator responsible for collection and initial storage of the recycled waste?  
\_\_ municipality \_\_ private hauler \_\_ private business \_\_ other \_\_\_\_\_  
Operator \_\_\_\_\_  
Address \_\_\_\_\_  
Operator \_\_\_\_\_  
Address \_\_\_\_\_
11. What is the frequency of collection and hours of operation?  
\_\_ twice weekly \_\_ weekly \_\_ twice monthly \_\_ monthly \_\_ other \_\_\_\_\_  
Days of the week/hours of the day \_\_\_\_\_
12. If private collection service is utilized for residential recycled waste collection or drop off, how is the community charged. Indicate the annual costs and the basis of these costs.

## PART 3. GENERAL

1. Please note any comments, additional information or particular concerns that you may want to express regarding solid waste disposal in your community or the County in the space below or attach additional pages as necessary.

## Appendix B

### REGIONAL MARKET LOCATIONS FOR RECYCLABLES: 1992

Table B-1

#### REGIONAL MARKETS FOR RECYCLED PAPER

Material Accepted	Number on Map B-1	Name	Address
ONP, OCC, OMG, MP	1	VIM Corporation	Hinsdale, Illinois
ONP, OCC, OMG	2	American Recycling Services, Inc.	Minneapolis, Minnesota
	3	Appleton Recycling Center	Appleton, Wisconsin
	4	Balco Metals, Inc.	Milwaukee, Wisconsin
	5	Bee-Line Auto	Edgar, Wisconsin
	6	Fort Howard Corporation	Green Bay, Wisconsin
	7	Golper Supply Company, Inc.	Appleton, Wisconsin
	8	Green Bay Recycling Center	Green Bay, Wisconsin
	9	J&M Fibers	Sun Prairie, Wisconsin
	10	Janesville Recycling Center	Janesville, Wisconsin
	11	Jefferson Smurfit Corporation	Carol Stream, Illinois
	12	Lochrie & Associates, Inc.	Milwaukee, Wisconsin
	13	Madison Recycling Center	Madison, Wisconsin
	14	Max Phillip & Son	Eau Claire, Wisconsin
	15	Milwaukee Recycling	Milwaukee, Wisconsin
	16	North America Micro Corporation	Denmark, Wisconsin
	17	Paper Processing, Inc.	Milwaukee, Wisconsin
	18	Recycling World, Inc., Division of Balco	Milwaukee, Wisconsin
	19	The Peltz Corporation	Milwaukee, Wisconsin
	20	Wisconsin Paperboard Corporation	Milwaukee, Wisconsin
	21	Wisconsin Tissue Mills	Menasha, Wisconsin
	22	Tomahawk Iron & Metal	Tomahawk, Wisconsin
	23	Smurfit Recycling	Carol Stream, Illinois
ONP, OCC	24	5R Processors	Catawba, Wisconsin
	25	American Quality Fibers, Ltd.	Menasha, Wisconsin
	26	Aronson Steel Products, Inc.	Beaver Dam, Wisconsin
	27	Aronson Steel Products, Inc.	Waupun, Wisconsin
	28	Beloit Box Board Company, Inc.	Beloit, Wisconsin
	29	Betten Processing Company	Green Bay, Wisconsin
	30	Donco Paper Supply Company	Green Bay, Wisconsin
	31	Globe Building Materials	Cornell, Wisconsin
	32	Golden Goat Machine	Sturgeon Bay, Wisconsin
	33	H. Samuels Company, Inc.	Portage, Wisconsin
	34	Midwest Steel Company	Madison, Wisconsin
	35	St. Marie Recycling	Green Lake, Wisconsin
	36	Silver, Harris & Sons	Belvidere, Illinois
	37	Smitty Salvage & Supply Company	Green Bay, Wisconsin
	38	Southern Lakes Recycle	Elkhorn, Wisconsin
	39	Standard Scrap Metal, Ltd.	Racine, Wisconsin
	40	Valley Sanitation Recycling Center	Fort Atkinson, Wisconsin
	41	Waldorf Corporation	St. Paul, Minnesota
	42	BFI of Wisconsin	Muskego, Wisconsin
	43	Advanced Environmental Products	Minneapolis, Minnesota
ONP, OMG	44	F. S. C. Paper Company, L. P.	Alsip, Illinois
	45	Bob Radzinski	Oconto, Wisconsin
OCC, OMG	46	Ecosource	Green Bay, Wisconsin
ONP	47	Agri-Paper Recycling	Mt. Horeb, Wisconsin
	48	Aluminum Recycling Center	Beloit, Wisconsin
	49	American Insulation	Bloomer, Wisconsin
	50	Cream City Recycling	Milwaukee, Wisconsin
	51	Formart Containers, Inc.	Cedarburg, Wisconsin
	52	InSul-Mor Manufacturing	Oregon, Illinois
	53	Midwest Recycling Company	Beloit, Wisconsin
	54	Milwaukee Pulp Productions	Milwaukee, Wisconsin
	55	Modern Insulation, Inc.	Spencer, Wisconsin
	56	Sheboygan Waste Material Company	Sheboygan, Wisconsin
	57	USG Interiors, Inc.	Cloquet, Minnesota

**Table B-1 (continued)**

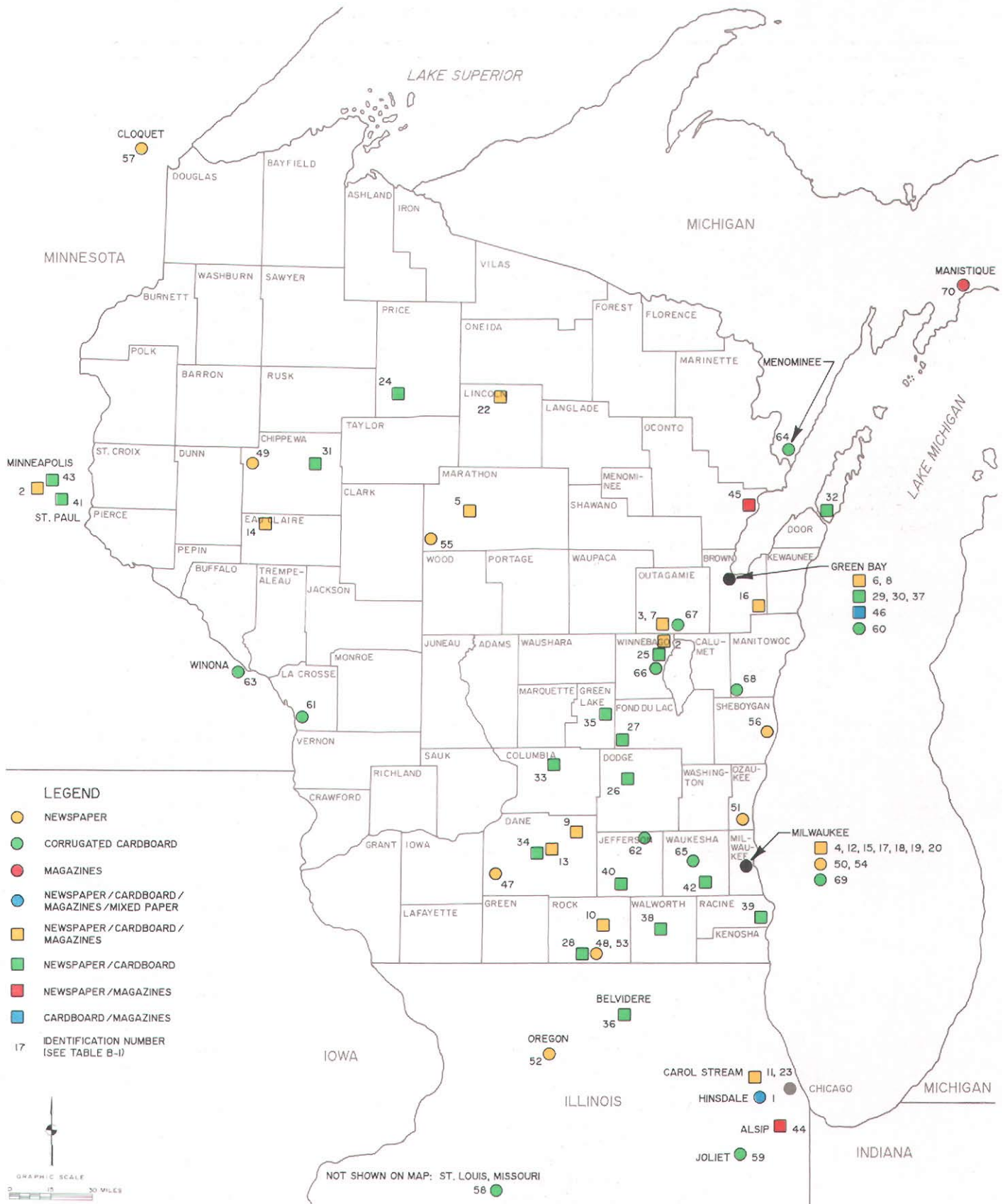
Material Accepted	Number on Map B-1	Name	Address
OCC	58	Central Paper Stock	St. Louis, Missouri
	59	Don Swiers & Associates	Joliet, Illinois
	60	Green Bay Packaging, Inc.	Green Bay, Wisconsin
	61	La Crosse Waste Paper Company	La Crosse, Wisconsin
	62	Loeb Metal Recycling Company	Watertown, Wisconsin
	63	Matejka Recycling	Winona, Minnesota
	64	Menominee Paper Company	Menominee, Michigan
	65	Mobile Shredding Services, Inc.	Waukesha, Wisconsin
	66	National Fiber Supply Company	Menasha, Wisconsin
	67	Riverside Materials	Appleton, Wisconsin
	68	Tri-County Electronics	Kiel, Wisconsin
	69	Goodwill Industries of Southeastern Wisconsin	Milwaukee, Wisconsin
OMG	70	Manistique Papers, Inc.	Manistique, Michigan

NOTE: The following abbreviations have been used: ONP—Old Newspapers; OMG—Old Magazines; OCC—Old Corrugated Containers; and MP—Mixed Paper.

Source: Wisconsin Department of Natural Resources and Walworth County Solid Waste Management Department.

Map B-1

MARKETS FOR RECYCLED PAPER FROM WALWORTH COUNTY



Source: Wisconsin Department of Natural Resources and Walworth County Solid Waste Management Department.



Table B-2

## REGIONAL MARKETS FOR PLASTIC

Material Accepted	Number on Map B-2	Name	Address
PET	1	Pacur	Oshkosh, Wisconsin
HDPE	2	Aluminum Recycling Center	Beloit, Wisconsin
	3	New Plastics	Luxemburg, Wisconsin
	4	New-Way Enterprises	Sharon, Wisconsin
	5	Rec Systems of Wisconsin, Inc.	East Troy, Wisconsin
	6	Smitty's Salvage & Supply Company	Green Bay, Wisconsin
	7	Young Rufus	Sharon, Wisconsin
	8	Tri-County Electronics	Kiel, Wisconsin
	9	Engineered Plastics Corporation	Menomonee Falls, Wisconsin
	10	M. J. Schmidt Company	Butler, Wisconsin
	11	Goodwill Industries of Southeastern Wisconsin	Milwaukee, Wisconsin
PVC	12	Vinyl Plastics, Inc.	Sheboygan, Wisconsin
LDPE	13	ITW Hi-Cone	Itasca, Illinois
	14	Shadow Plastics, Inc.	Rice Lake, Wisconsin
PS	15	Brown Sales Corporation	Madison, Wisconsin
	16	NGS Polystyrene Recycling Company	Kenosha, Wisconsin
	17	Reynolds Urethane Recycling, Inc.	Middleton, Wisconsin
PET, HDPE, PVC, LDPE, PP, PS, Mixed Plastic	18	Balco Metals, Inc.	Milwaukee, Wisconsin
	19	Excel Plastics	Oregon, Wisconsin
	20	Gar Plastics	Madison, Wisconsin
	21	Lochrie & Associates, Inc.	Milwaukee, Wisconsin
	22	Max Phillip & Son	Eau Claire, Wisconsin
	23	North America Micro Corporation	Denmark, Wisconsin
	24	Poly-Anna Plastic Products	Milwaukee, Wisconsin
	25	St. Marie Recycling	Green Lake, Wisconsin
	26	The Peltz Corporation	Milwaukee, Wisconsin
	27	VIM Corporation	Hinsdale, Illinois
	28	Woodland Plastic	Madison, Wisconsin
	29	Maine Plastics, Inc.	North Chicago, Illinois
	30	DLM American Plastics Corporation	Deerfield, Illinois
	31	National Recycling, Inc.	New Berlin, Wisconsin
PET, HDPE, PVC, LDPE, PP, PS	32	American Recycling Inc.	Minneapolis, Minnesota
	33	EOG Environmental, Inc.	Milwaukee, Wisconsin
	34	Riverside Materials	Appleton, Wisconsin
	35	Lavico Polymers (USA), Inc.	LaSalle, Illinois
PET, HDPE, PVC, LDPE, PP	36	Silver, Harris & Sons	Belvidere, Illinois
PET, HDPE	37	5R Processors	Catawba, Wisconsin
	38	American Iron & Supply Company	Minneapolis, Minnesota
	39	Appleton Recycling Center	Appleton, Wisconsin
	40	Aronson Steel Products, Inc.	Beaver Dam, Wisconsin
	41	Aronson Steel Products, Inc.	Waupun, Wisconsin
	42	Bee-Line Auto	Edgar, Wisconsin
	43	Betten Processing Company	Green Bay, Wisconsin
	44	Cream City Recycling	Milwaukee, Wisconsin
	45	GB Recycling Center	Green Bay, Wisconsin
	46	H. Samuels Company, Inc.	Portage, Wisconsin
	47	Janesville Recycling Center	Janesville, Wisconsin
	48	Kadinger Auto Salvage	Downing, Wisconsin
	49	Madison Recycling Center	Madison, Wisconsin
	50	Midwest Plastics	Edgerton, Wisconsin
	51	Midwest Recycling Company	Beloit, Wisconsin
	52	Midwest Steel Company	Madison, Wisconsin
	53	Paper Processors, Inc.	Milwaukee, Wisconsin
	54	Sheboygan Waste Material Company	Sheboygan, Wisconsin
	55	Valley Sanitation Recycling Center	Fort Atkinson, Wisconsin
	56	BFI of Wisconsin	Muskego, Wisconsin
	57	Tomahawk Iron & Metal	Tomahawk, Wisconsin

**Table B-2 (continued)**

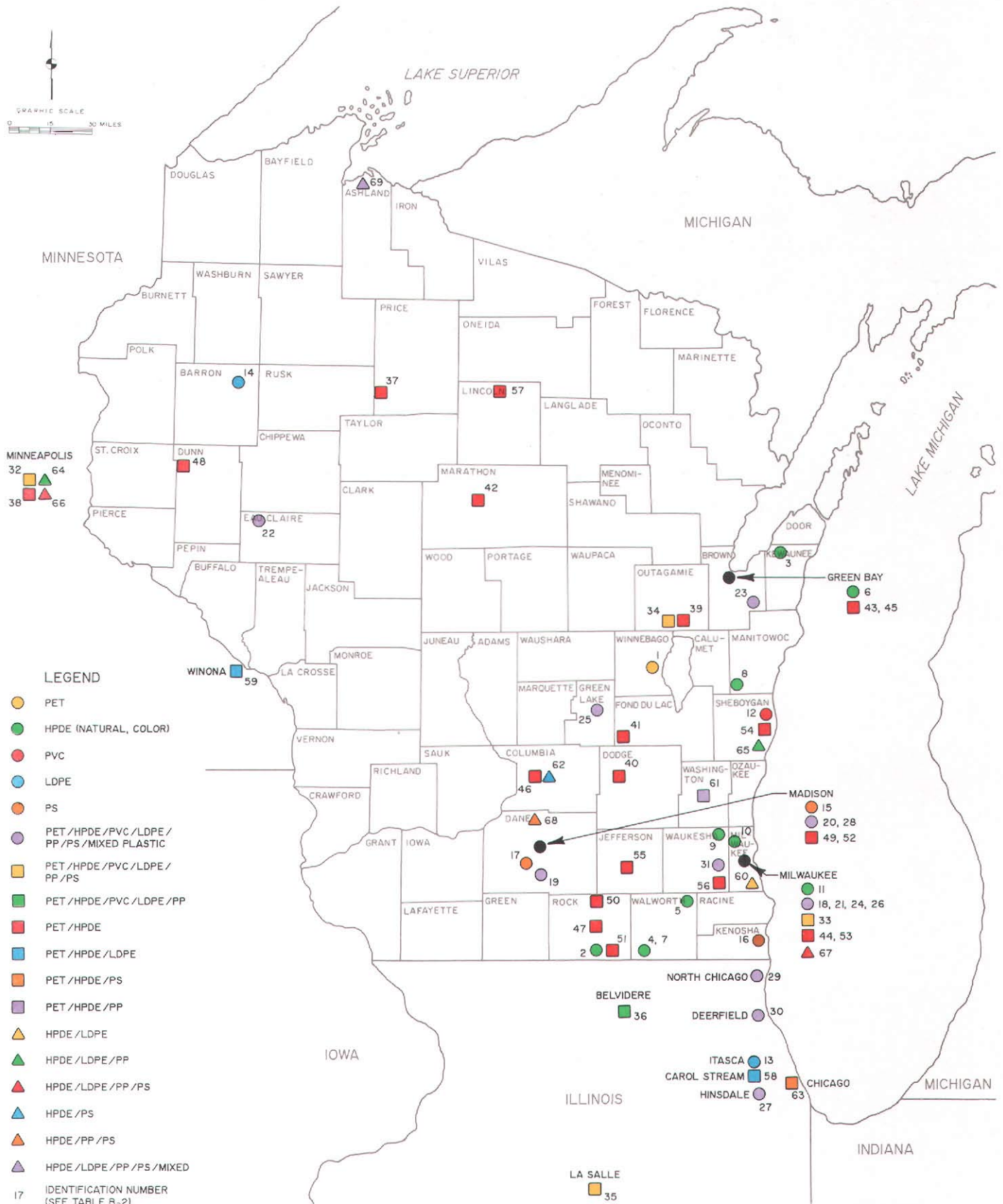
Material Accepted	Number on Map B-2	Name	Address
PET, HPDE, LDPE	58 59	Jefferson Smurfit Corporation Matejka Recycling	Carol Stream, Illinois Winona, Minnesota
HPDE, LDPE	60	Luetzow, Industries	South Milwaukee, Wisconsin
PET, HPDE, PP	61	Plastic Renewal, Inc.	West Bend, Wisconsin
HPDE, PS	62	Penda Corporation	Portage, Wisconsin
PET, HPDE, PS	63	Eagle Brook Plastics	Chicago, Illinois
HPDE, LDPE, PP	64 65	Shamrock Industries, Inc. Ametet/Plymouth Products Division	Minneapolis, Minnesota Sheboygan, Wisconsin
HPDE, LDPE, PP, PS	66 67	Discover Plastics, Inc. National Recycling	Minneapolis, Minnesota Milwaukee, Wisconsin
HPDE, PP, PS	68	Traex Division of Menasha Corporation	Dane, Wisconsin
HPDE, LDPE, PP, PS, Mixed Plastic	69	Delco of Wisconsin	Ashland, Wisconsin

NOTE: The following abbreviations have been used: HPDE—High-Density Polyethylene; LDPE—Low-Density Polyethylene; PET—Polyethylene Terephthalate; PP—Polypropylene; PS—Polystyrene Foam; and PVC—Polyvinyl Chloride.

Source: Wisconsin Department of Natural Resources and Walworth County Solid Waste Management Department.

Map B-2

MARKETS FOR RECYCLED PLASTIC FROM WALWORTH COUNTY



Source: Wisconsin Department of Natural Resources and Walworth County Solid Waste Management Department.

Table B-3

## REGIONAL MARKETS FOR METAL CANS

Material Accepted	Number on Map B-3	Name	Address
Aluminum	1	Foster Forbes Glass	Burlington, Wisconsin
	2	Insul-Mor Manufacturing	Oregon, Illinois
	3	Jefferson Smurfit Corporation	Carol Stream, Illinois
	4	Matejka Recycling	Winona, Minnesota
	5	Mobile Shredding Services, Inc.	Waukesha, Wisconsin
	6	Reynolds Aluminum Recycling	West Allis, Wisconsin
	7	Reynolds Aluminum Recycling	Madison, Wisconsin
	8	Reynolds Aluminum Recycling	Milwaukee, Wisconsin
	9	Schuster Metals, Inc.	Milwaukee, Wisconsin
	10	Standard Scrap Metal, Ltd.	Milwaukee, Wisconsin
Tin	11	Standard Barrel Company, Ltd.	Milwaukee, Wisconsin
	12	Toy Scrap & Salvage Corporation	Eau Claire, Wisconsin
	13	Goodwill Industries of Southeastern Wisconsin	Milwaukee, Wisconsin
Aluminum, Bi-Metal	14	Patricia's Aluminum Center	Janesville, Wisconsin
	15	Tri-Mil Services	Chicago, Illinois
Aluminum, Tin	16	Alter St. Pauls	St. Paul, Minnesota
	17	Appleton Recycling Center	Appleton, Wisconsin
	18	Aronson Steel Products, Inc.	Beaver Dam, Wisconsin
	19	Aronson Steel Products, Inc.	Waupun, Wisconsin
	20	Golden Goat Machine	Sturgeon Bay, Wisconsin
	21	G. B. Recycling Center	Green Bay, Wisconsin
	22	Junction Auto Parts	Caledonia, Illinois
	23	La Crosse Paper Company	La Crosse, Wisconsin
	24	Madison Recycling Center	Madison, Wisconsin
	25	Miller Compressing Company	Milwaukee, Wisconsin
	26	Paper Processing, Inc.	Milwaukee, Wisconsin
	27	Bob Radzinski	Oconto, Wisconsin
	28	Valley Sanitation Recycling Center	Fort Atkinson, Wisconsin
	29	BFI of Wisconsin	Muskego, Wisconsin
Aluminum, Tin, Bi-Metal	30	5R Processors	Catawba, Wisconsin
	31	Alfred Muchin Company	Manitowoc, Wisconsin
	32	Aluminum Recycling Center	Beloit, Wisconsin
	33	American Iron & Supply Company	Minneapolis, Minnesota
	34	American Recycling Services, Inc.	Minneapolis, Minnesota
	35	Balco Metals, Inc.	Milwaukee, Wisconsin
	36	Bee-Line Auto	Edgar, Wisconsin
	37	Betten Processing Company	Green Bay, Wisconsin
	38	Chicago Iron & Supply Company	Ashland, Wisconsin
	39	Cream City Recycling	Milwaukee, Wisconsin
	40	Definnig Corporation of America	Milwaukee, Wisconsin
	41	EOG Environmental, Inc.	Milwaukee, Wisconsin
	42	FCF Metal Salvage	Burlington, Wisconsin
	43	Gus Holman Company/Sadoff & Rudey	Sheboygan, Wisconsin
	44	H. Samuels Company, Inc.	Portage, Wisconsin
	45	Janesville Recycling Center	Janesville, Wisconsin
	46	Kadinger Auto Salvage	Downing, Wisconsin
	47	Kunbaum Iron & Metal	Whitewater, Wisconsin
	48	Lans Williams Sons Company	South Beloit, Illinois
	49	Lochrie & Associates, Inc.	Milwaukee, Wisconsin
	50	Loeb Metal Recycling Company	Watertown, Wisconsin
	51	Max Phillip & Son	Eau Claire, Wisconsin
	52	Midwest Iron & Metal, Inc.	Milwaukee, Wisconsin
	53	Midwest Recycling Company	Beloit, Wisconsin
	54	Midwest Steel Company	Madison, Wisconsin
	55	North America Micro Corporation	Denmark, Wisconsin
	56	Racine Recycling Industries	Racine, Wisconsin
	57	Recyclers Transport	Waterford, Wisconsin
	58	Recycling World, Inc. Division of Balco	Milwaukee, Wisconsin
	59	Sadoff-Rudoy Metals	Fond du Lac, Wisconsin

**Table B-3 (continued)**

Material Accepted	Number on Map B-3	Name	Address
Aluminum, Tin, Bi-Metal (continued)	60	St. Marie Recycling	Green Lake, Wisconsin
	61	Seward Auto Salvage	Milton, Wisconsin
	62	Sheboygan Waste Material Company	Sheboygan, Wisconsin
	63	Silver, Harris & Sons	Belvidere, Illinois
	64	Smitty's Salvage & Supply Company	Green Bay, Wisconsin
	65	Standard Scrap Metal, Ltd.	Racine, Wisconsin
	66	The Peltz Corporation	Milwaukee, Wisconsin
	67	VIM Corporation	Hinsdale, Illinois
	68	Tomahawk Iron & Metal	Tomahawk, Wisconsin

*Source: Wisconsin Department of Natural Resources and Walworth County Solid Waste Management Department.*



## MARKETS FOR RECYCLED METAL CANS FROM WALWORTH COUNTY



Table B-4

## REGIONAL MARKETS FOR GLASS

Material Accepted	Number on Map B-4	Name	Address
Clear	1	Ball-Incon Glass Packaging	Dolton, Illinois
	2	Cream City Recycling	Milwaukee, Wisconsin
Clear, Green	3	Anchor Glass Container Corporation	Gurnee, Illinois
	4	Reynolds Aluminum Recycling Company	Milwaukee, Wisconsin
Clear, Green, Amber, Mixed	5	Advance Callet Corporation	Chicago, Illinois
	6	Foster Forbes Glass	Burlington, Wisconsin
	7	Lochrie & Associates, Inc.	Milwaukee, Wisconsin
	8	North America Micro Corporation	Denmark, Wisconsin
	9	Patricia's Aluminum Center	Janesville, Wisconsin
	10	Bob Radzinski	Oconto, Wisconsin
	11	St. Marie Recycling	Green Lake, Wisconsin
	12	M. J. Schmidt Company	Butler, Wisconsin
	13	VIM Corporation	Hinsdale, Illinois
	14	5R Processors	Catawba, Wisconsin
Clear, Green, Amber	15	Alfred Muchin Company	Manitowoc, Wisconsin
	16	Aluminum Recycling Center	Beloit, Wisconsin
	17	American Quality Fibers, Ltd.	Menasha, Wisconsin
	18	American Recycling Services, Inc.	Minneapolis, Minnesota
	19	Appleton Recycling Center	Appleton, Wisconsin
	20	Aronson Steel Products, Inc.	Waupun, Wisconsin
	21	Aronson Steel Products, Inc.	Beaver Dam, Wisconsin
	22	Bee-Line Auto	Edgar, Wisconsin
	23	Betten Processing Company	Green Bay, Wisconsin
	24	Ecology Recycling	Delafield, Wisconsin
	25	Golden Goat Machine	Sturgeon Bay, Wisconsin
	26	Green Bay Recycling Center	Green Bay, Wisconsin
	27	H. Samuels Company, Inc.	Portage, Wisconsin
	28	Janesville Recycling Center	Janesville, Wisconsin
	29	Junction Auto Parts	Caledonia, Illinois
	30	Kadinger Auto Salvage	Downing, Wisconsin
	31	Kunbaum Iron & Metal	Whitewater, Wisconsin
	32	Madison Recycling Center	Madison, Wisconsin
	33	Matejka Recycling	Winona, Minnesota
	34	Max Phillip & Son	Eau Claire, Wisconsin
	35	Midwest Recycling Company	Beloit, Wisconsin
	36	Midwest Steel Company	Madison, Wisconsin
	37	Paper Processing, Inc.	Milwaukee, Wisconsin
	38	Patricia's Aluminum Center	Janesville, Wisconsin
	39	Recycling World, Inc., Division of Balco	Milwaukee, Wisconsin
	40	Sheboygan Waste Material Company	Sheboygan, Wisconsin
	41	Silver, Harris & Sons	Belvidere, Illinois
	42	Smitty's Salvage & Supply Company	Green Bay, Wisconsin
	43	The Peltz Corporation	Milwaukee, Wisconsin
	44	Valley Sanitation Recycling Center	Fort Atkinson, Wisconsin
	45	BFI of Wisconsin	Muskego, Wisconsin
	46	Tomahawk Iron & Metal	Tomahawk, Wisconsin

Source: Wisconsin Department of Natural Resources and Walworth County Solid Waste Management Department.

## MARKETS FOR RECYCLED GLASS FROM WALWORTH COUNTY



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## Appendix C

### DATA USED IN COMPILING COSTS FOR ALTERNATIVE RECYCLING PLANS FOR THE WALWORTH COUNTY SOLID WASTE MANAGEMENT PLAN

Table C-1

#### MATERIAL RECYCLING ALTERNATIVE PLAN NO. 1: CONTINUED USE OF EXISTING RECYCLABLE WASTE MANAGEMENT SYSTEMS

Alternative Plan Subelement	Initial Capital Costs	Average Annual Operation and Maintenance
Use of Existing Curbside Management System		
Transfer and Transport Material .....	--	\$189,000
Process and Market Material .....	--	237,000
Subtotal	--	\$426,000
Use of Existing Drop-Off Management System		
Equipment Rental: 12 Sites at \$3,000 per Site per Year .....	--	\$ 36,000
Drop-Off Site Operation and Maintenance .....	--	54,000
Process Pickup, Transfer, Transport, and Market Material .....	--	70,000
Subtotal	--	\$160,000
Total	--	\$586,000

NOTE: Total collected recyclable solid waste = 10,930 tons per year.

Average cost per ton = \$586,000 per year divided by 10,930 tons per year = \$54.

Source: Walworth County Solid Waste Department and SEWRPC.



Table C-2

**MATERIAL RECYCLING ALTERNATIVE PLAN NO. 2: PROCESSING THE DROP-OFF COLLECTED PORTION OF RECYCLABLE WASTE AT A TRANSFER AND SORTING FACILITY WITH A MINIMAL DEGREE OF TECHNOLOGY**

Alternative Plan Subelement	Initial Capital Costs	Average Annual Operation and Maintenance
<b>Use of Existing Curbside Management System</b>		
Transfer and Transport Material .....	--	\$189,000
Process and Market Material .....	--	237,000
Subtotal	--	\$426,000
<b>Use of Existing Drop-Off Management System</b>		
Operation of Existing Drop-Off Sites		
Equipment Rental: 12 Sites at \$3,000 per Site .....	--	\$ 36,000
Drop-Off Site Operation and Maintenance .....	--	54,000
Subtotal	--	\$ 90,000
<b>Proposed Transfer Station</b>		
Construction: 18 Tons per Day at \$15,000 per Ton per Day .....	\$270,000	--
Equipment: Weight Scale at \$45,000 Each .....	45,000	--
Miscellaneous Equipment at \$12,000 .....	12,000	--
Subtotal	\$327,000	--
Add 25 percent for Engineering, Administration and Contingencies ....	\$ 81,000	--
Subtotal	\$408,000	--
Land Acquisition: Five Acres at \$10,000 per Acre .....	\$ 50,000	--
Transportation to Station .....	--	\$ 31,000
Operation and Maintenance at Transportation Station: 14.5 Tons per Day at \$5,500 per Ton per Day .....	--	80,000
Residue Disposal: 190 Tons per Year at \$30 per Ton .....	--	6,000
Minus Net Average Annual Revenue for Pickup, Transfer, Transport, and Marketing of Material .....	--	-25,000
Subtotal	--	\$ 92,000
<b>Total</b>	<b>\$458,000</b>	<b>\$608,000</b>

NOTE: Total collected recyclable solid waste = 10,930 tons per year.

Total annual average cost =  $0.0872(458,000) + 608,000 = \$648,000$ .

Average cost per ton = \$648,000 per year divided by 10,930 tons per year = \$59.

Source: Walworth County Solid Waste Department and SEWRPC.

Table C-3

**MATERIAL RECYCLING ALTERNATIVE PLAN NO. 3A: PROCESSING ALL RESIDENTIAL  
RECYCLABLE SOLID WASTES AT A PROCESSING FACILITY WITH A LOW DEGREE OF TECHNOLOGY**

Alternative Plan Subelement	Initial Capital Costs	Average Annual Operation and Maintenance
<b>Material Recovery Facility</b>		
Construction: 20,000 Square Feet at \$32.50 per Square Foot .....	\$ 650,000	--
Equipment: 50 Tons per Day at \$18,000 per Ton per Day .....	900,000	--
Subtotal	\$1,550,000	--
Add 25 percent for Engineering, Administration, and Contingencies	\$ 380,000	--
Subtotal	\$1,930,000	--
Land Acquisition: Five Acres at \$10,000 per Acre .....	\$ 50,000	--
Operation and Maintenance: 42 Tons per Day at \$9,050 per Ton per Day per Year .....	--	\$380,000
Processing Residue Disposal: 550 Tons per Year at \$30 per Ton .....	--	17,000
Minus Average Annual Revenue for Marketing Material .....	--	-330,000
Subtotal	\$1,980,000	\$ 67,000
<b>Use of Existing Drop-Off Centers</b>		
Equipment Rental: 12 Sites at \$3,000 per Site per Year .....	--	\$ 36,000
Drop-Off Site Operation and Maintenance .....	--	54,000
Subtotal	--	\$ 90,000
<b>Material Transportation</b>		
Transfer and Transport Material to Material Recovery Facility .....	--	\$195,000
Transport Processed Material to Market .....	--	170,000
Subtotal	--	\$365,000
<b>Total</b>	<b>\$1,980,000</b>	<b>\$522,000</b>

NOTE: Total collected recyclable solid waste = 10,930 tons per year.

Total annual average cost =  $0.0872(1,980,000) + \$522,000 = \$694,000$ .

Average cost per ton =  $\$694,000$  divided by 10,930 tons per year =  $\$64$ .

Source: Walworth County Solid Waste Department and SEWRPC.

Table C-4

**MATERIAL RECYCLING ALTERNATIVE PLAN NO. 3B: CONTINUED USE OF TWO MATERIAL RECOVERY FACILITIES CURRENTLY SERVING THE COUNTY, WITH ALL OTHER MATERIAL PROCESSED AT A NEW PROCESSING FACILITY WITH A LOW DEGREE OF TECHNOLOGY**

Alternative Plan Subelement	Initial Capital Costs	Average Annual Operation and Maintenance
<b>Material Recovery Facility</b>		
Construction: 15,000 Square Feet at \$32.50 per Square Foot .....	\$ 488,000	--
Equipment: 36 Tons per Day at \$19,000 per Ton per Day .....	684,000	--
Subtotal	\$1,172,000	--
Add 25 percent for Engineering, Administration, and Contingencies ...	\$ 293,000	--
Subtotal	\$1,465,000	--
Land Acquisition: 4.5 Acres at \$10,000 per Acre .....	\$ 45,000	--
Operation and Maintenance: 32 Tons per Day at \$9,100 per Ton per Day per Year .....	--	\$292,000
Processing Residue Disposal: 420 Tons per Year at \$30 per Ton .....	--	13,000
Minus Average Annual Revenue for Marketing Material .....	--	-240,000
Subtotal	\$1,510,000	\$65,000
<b>Use of Existing Drop-Off Centers</b>		
Equipment Rental: 12 Sites at \$3,000 per Site per Year .....	--	\$ 36,000
Drop-Off Site Operation and Maintenance .....	--	54,000
Subtotal	--	\$ 90,000
<b>Material Transportation for New Material Recovery Facility</b>		
Transfer and Transport Material to Material Recovery Facility .....	--	\$150,000
Transport Processed Material to Market .....	--	130,000
Subtotal	--	\$280,000
<b>Use of Existing Material Recovery Facilities</b>		
Transfer and Transport Material .....	--	\$ 50,000
Process and Market .....	--	55,000
Subtotal	--	\$105,000
<b>Total</b>	<b>\$1,510,000</b>	<b>\$540,000</b>

NOTE: Total collected recyclable solid waste = 10,930 tons per year.

Total annual average cost =  $0.0872(1,510,000) + \$540,000 = \$671,000$ .

Average cost per ton =  $\$671,000$  divided by 10,930 tons per year =  $\$61$ .

Source: Walworth County Solid Waste Department and SEWRPC.

Table C-5

**MATERIAL RECYCLING ALTERNATIVE PLAN NO. 4A: PROCESSING ALL RESIDENTIAL  
RECYCLABLE SOLID WASTES AT A PROCESSING FACILITY WITH A MODERATE DEGREE OF TECHNOLOGY**

Alternative Plan Subelement	Initial Capital Costs	Average Annual Operation and Maintenance
<b>Material Recovery Facility</b>		
Construction: 21,000 Square Feet at \$32.50 per Square Foot . . . . .	\$ 680,000	--
Equipment: 50 Tons per Day at \$24,000 per Ton per Day . . . . .	1,200,000	--
Subtotal	\$1,880,000	--
Add 25 percent for Engineering, Administration, and Contingencies . . .	\$ 470,000	--
Subtotal	\$2,350,000	--
Land Acquisition: Five Acres at \$10,000 per Acre . . . . .	\$ 50,000	--
Operation and Maintenance: 42 Tons per Day at \$9,050 per Ton per Day per Year . . . . .	--	\$391,000
Processing Residue Disposal: 540 Tons per Year at \$30 per Ton . . . . .	--	16,000
Minus Average Annual Revenue for Marketing Material . . . . .	--	-357,000
Subtotal	\$2,400,000	\$ 50,000
<b>Use of Existing Drop-Off Centers</b>		
Equipment Rental: 12 Sites at \$3,000 per Site per Year . . . . .	--	\$ 36,000
Drop-Off Site Operation and Maintenance . . . . .	--	54,000
Subtotal	--	\$ 90,000
<b>Material Transportation</b>		
Transfer and Transport Material to Material Recovery Facility . . . . .	--	\$195,000
Transport Processed Material to Market . . . . .	--	175,000
Subtotal	--	\$370,000
<b>Total</b>	<b>\$2,400,000</b>	<b>\$510,000</b>

NOTE: Total collected recyclable solid waste = 10,930 tons per year.

Total annual average cost =  $0.0872(2,400,000) + \$510,000 = \$719,000$ .

Average cost per ton =  $\$719,000$  divided by 10,930 tons per year = \$66.

Source: Walworth County Solid Waste Department and SEWRPC.

Table C-6

**MATERIAL RECYCLING ALTERNATIVE PLAN NO 4B: CONTINUED USE OF TWO  
MATERIAL RECOVERY FACILITIES CURRENTLY SERVING THE COUNTY, WITH OTHER MATERIAL  
PROCESSED AT A NEW PROCESSING FACILITY WITH A MODERATE DEGREE OF TECHNOLOGY**

Alternative Plan Subelement	Initial Capital Costs	Average Annual Operation and Maintenance
<b>Material Recovery Facility</b>		
Construction: 16,000 Square Feet at \$32.50 per Square Foot	\$ 500,000	--
Equipment: 36 Tons per Day at \$25,000 per Ton per Day	900,000	--
Subtotal	\$1,400,000	--
Add 25 percent for Engineering, Administration, and Contingencies	\$ 350,000	--
Subtotal	\$1,750,000	--
Land Acquisition: 5.0 Acres at \$10,000 per Acre	\$ 50,000	--
Operation and Maintenance: 32 Tons per Day at \$9,100 per Ton per Day per Year	--	\$300,000
Processing Residue Disposal: 420 Tons per Year at \$30 per Ton	--	13,000
Minus Average Annual Revenue for Marketing Material	--	-262,000
Subtotal	\$1,800,000	\$ 51,000
<b>Use of Existing Drop-Off Centers</b>		
Equipment Rental: 12 Sites at \$3,000 per Site per Year	--	\$ 36,000
Drop-Off Site Operation and Maintenance	--	54,000
Subtotal	--	\$ 90,000
<b>Material Transportation for New Material Recovery Facility</b>		
Transfer and Transport Material to Material Recovery Facility	--	\$150,000
Transport Processed Material to Market	--	134,000
Subtotal	--	\$284,000
<b>Use of Existing Material Recovery Facilities</b>		
Transfer and Transport Material	--	\$ 50,000
Process and Market	--	55,000
Subtotal	--	\$105,000
<b>Total</b>	<b>\$1,800,000</b>	<b>\$530,000</b>

NOTE: Total collected recyclable solid waste = 10,930 tons per year.

Total annual average cost =  $0.0872(1,800,000) + \$530,000 = \$687,000$ .

Average cost per ton =  $\$687,000$  divided by 10,930 tons per year = \$63.

Source: Walworth County Solid Waste Department and SEWRPC.



## **Appendix D**

### **CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT SYSTEMS**

#### **INTRODUCTION**

Companies can implement programs and procedures to reduce material wastes and to recycle materials. Such programs and procedures have been carried out to a degree in Walworth County, largely for economic reasons. Practices which can be considered for use in Walworth County include the following waste reduction and material recycling techniques.

#### **WASTE REDUCTION AND RECYCLING MEASURES**

Waste reduction and recycling measures generally include practices which can be employed in the design and procurement phase of construction, the actual construction, and salvaging operations.

##### Design and Procurement Activities

- Develop building designs that use standard size materials
- Evaluate plans to minimize the amount of material required
- Work with suppliers to return substandard or excess materials
- Request that materials be delivered in bulk or in reusable or returnable packaging
- Purchase high-quality recoverable items
- Request information from material suppliers on available recycled products

##### Construction Activities

- Store materials to avoid waste caused by exposure
- Centralize wood cutting operations
- Reuse material scraps

##### Salvaging Operations

- Salvage materials for reuse in construction
- Locate recycling facilities which accept materials from construction and salvage sites
- Segregate such reusable materials as doors, windows, cabinets, counters, and building construction materials and such recyclable materials as wood and cardboard
- Renovate and restore buildings or components of buildings
- Process material, including concrete and asphalt crushing and screening and wood waste processing

#### **CONCLUSIONS**

It is recognized that an individual company's business decisions will largely dictate the use of construction and demolition waste reduction and recycling. Such considerations include labor demands, material cost, liabilities, material suitability, and market conditions. Thus, such activities are recommended to be largely left to the private sector. However, the County could offer technical assistance in the form of the provision of information on reduction and reuse techniques and measures available, perhaps including case studies of successful programs. In addition, the County should monitor and provide information to businesses on material recyclers and opportunities.

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## Appendix E

### WALWORTH COUNTY SOLID WASTE INCINERATION AND RESOURCE RECOVERY COST ANALYSIS

Table E-1

#### WALWORTH COUNTY, WISCONSIN, SOLID WASTE RESOURCE RECOVERY PROJECT: STEAM ONLY, ENERGY COST INCREASE AT 4 PERCENT

Annual Solid Waste Quantities, Operating Costs, and Revenues	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	822,799	855,711	889,939	925,537	962,558	1,001,061	1,041,103	1,082,747	1,126,057	1,171,100
Landfill Disposal .....	163,320	169,853	176,647	183,713	191,061	198,704	206,652	214,918	223,515	232,455
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Annual Revenues										
Steam (4 percent) .....	240,000	249,600	259,584	269,967	280,766	291,997	303,677	315,824	328,457	341,595
Tipping Fees .....	1,252,119	1,281,964	1,313,002	1,345,282	1,378,854	1,413,768	1,450,079	1,487,842	1,527,115	1,567,960
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Tipping Fee (dollars per ton) .....	69	70	72	74	76	77	79	82	84	86

Annual Solid Waste Quantities, Operating Costs, and Revenues	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	1,217,944	1,266,661	1,317,328	1,370,021	1,424,822	1,481,815	1,541,087	1,602,731	1,666,840	1,733,513
Landfill Disposal .....	241,753	251,424	261,481	271,940	282,817	294,130	305,895	318,131	330,856	344,091
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Annual Revenues										
Steam (4 percent) .....	355,259	369,469	384,248	399,618	415,602	432,226	449,515	467,496	486,196	505,644
Tipping Fees .....	1,610,438	1,654,616	1,700,561	1,748,343	1,798,037	1,849,718	1,903,467	1,959,366	2,017,500	2,077,960
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Tipping Fee (dollars per ton) .....	88	91	93	96	99	101	104	107	111	114

NOTES: Plant Capacity: 50 tons per day  
Annual Plant Availability: 85 percent  
Capital Cost, Including Steam Lines: \$5,800,000  
Steam Price: \$3.74 per 1,000 pounds  
Steam Customer: County Complex  
Type of Financing: General Obligation Bonds

Escalation of operation and maintenance costs at 4 percent per year from 1995.

Escalation of energy costs at a rate of 4 percent per year from 1995.

Debt service cost assumed using 6 percent interest over 20 years and 18 month construction period.

Plant availability estimated at 85 percent.

Residue and bypass assumed landfilled at \$20 per ton in 1995 dollars escalated at 4 percent per year from 1985.

Source: R. W. Beck & Associates 1985 Report prepared for Walworth County and modified by Walworth County Solid Waste Management Department and SEWRPC.

Table E-2

**WALWORTH COUNTY, WISCONSIN, SOLID WASTE RESOURCE  
RECOVERY PROJECT: STEAM ONLY, ENERGY COST INCREASE AT 6 PERCENT**

Annual Solid Waste Quantities, Operating Costs, and Revenues	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	822,799	855,711	889,939	925,537	962,558	1,001,061	1,041,103	1,082,747	1,126,057	1,171,100
Landfill Disposal .....	163,320	169,853	176,647	183,713	191,061	198,704	206,652	214,918	223,515	232,455
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Annual Revenues										
Steam (4 percent) .....	240,000	254,400	269,664	285,844	302,994	321,174	340,445	360,871	382,524	405,475
Tipping Fees .....	1,252,119	1,277,164	1,302,922	1,329,406	1,356,625	1,384,590	1,413,311	1,442,794	1,473,048	1,504,080
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Tipping Fee (dollars per ton) .....	69	70	71	73	74	76	77	79	81	82

Annual Solid Waste Quantities, Operating Costs, and Revenues	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	1,217,944	1,266,661	1,317,328	1,370,021	1,424,822	1,481,815	1,541,087	1,602,731	1,666,840	1,733,513
Landfill Disposal .....	241,753	251,424	261,481	271,940	282,817	294,130	305,895	318,131	330,856	344,091
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Annual Revenues										
Steam (4 percent) .....	429,803	455,592	482,927	511,903	542,617	575,174	609,684	646,265	685,041	726,144
Tipping Fees .....	1,535,894	1,568,493	1,601,881	1,636,058	1,671,022	1,706,771	1,743,298	1,780,596	1,818,655	1,857,460
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Tipping Fee (dollars per ton) .....	84	86	88	90	92	94	96	98	100	102

NOTES: Plant Capacity: 50 tons per day  
Annual Plant Availability: 85 percent  
Capital Cost, Including Steam Lines: \$5,800,000  
Steam Price: \$3.74 per 1,000 pounds  
Steam Customer: County Complex  
Type of Financing: General Obligation Bonds

Escalation of operation and maintenance costs at 4 percent per year from 1995.

Escalation of energy costs at a rate of 6 percent per year from 1995.

Debt service cost assumed using 6 percent interest over 20 years and 18 month construction period.

Plant availability estimated at 85 percent.

Residue and bypass assumed landfilled at \$20 per ton in 1995 dollars escalated at 4 percent per year from 1985.

Source: R. W. Beck & Associates 1985 Report prepared for Walworth County and modified by Walworth County Solid Waste Management Department and SEWRPC.

Table E-3

**WALWORTH COUNTY, WISCONSIN, SOLID WASTE RESOURCE  
RECOVERY PROJECT: STEAM ONLY, ENERGY COST INCREASE AT 8 PERCENT**

Annual Solid Waste Quantities, Operating Costs, and Revenues	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	822,799	855,711	889,939	925,537	962,558	1,001,061	1,041,103	1,082,747	1,126,057	1,171,100
Landfill Disposal .....	163,320	169,853	176,647	183,713	191,061	198,704	206,652	214,918	223,515	232,455
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Annual Revenues										
Steam (4 percent) .....	240,000	259,200	279,936	302,331	326,517	352,639	380,850	411,318	444,223	479,761
Tipping Fees .....	1,252,119	1,272,364	1,292,650	1,312,919	1,333,102	1,353,126	1,372,905	1,392,348	1,411,349	1,429,794
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Tipping Fee (dollars per ton) .....	69	70	71	72	73	74	75	76	77	78

Annual Solid Waste Quantities, Operating Costs, and Revenues	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	1,217,944	1,266,661	1,317,328	1,370,021	1,424,822	1,481,815	1,541,087	1,602,731	1,666,840	1,733,513
Landfill Disposal .....	241,753	251,424	261,481	271,940	282,817	294,130	305,895	318,131	330,856	344,091
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Annual Revenues										
Steam (4 percent) .....	518,142	559,593	604,361	652,710	704,926	761,321	822,226	888,004	959,045	1,035,768
Tipping Fees .....	1,447,555	1,464,492	1,480,447	1,495,251	1,508,713	1,520,624	1,530,756	1,538,857	1,544,651	1,547,836
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Tipping Fee (dollars per ton) .....	79	80	81	82	83	83	84	84	85	85

NOTES: Plant Capacity: 50 tons per day  
Annual Plant Availability: 85 percent  
Capital Cost, Including Steam Lines: \$5,800,000  
Steam Price: \$3.74 per 1,000 pounds  
Steam Customer: County Complex  
Type of Financing: General Obligation Bonds

Escalation of operation and maintenance costs at 4 percent per year from 1995.

Escalation of energy costs at a rate of 8 percent per year from 1995.

Debt service cost assumed using 6 percent interest over 20 years and 18 month construction period.

Plant availability estimated at 85 percent.

Residue and bypass assumed landfilled at \$20 per ton in 1995 dollars escalated at 4 percent per year from 1985.

Source: R. W. Beck & Associates 1985 Report prepared for Walworth County and modified by Walworth County Solid Waste Management Department and SEWRPC.



Table E-4

**WALWORTH COUNTY, WISCONSIN, SOLID WASTE RESOURCE  
RECOVERY PROJECT: STEAM ONLY, ENERGY COST INCREASE AT 10 PERCENT**

Annual Solid Waste Quantities, Operating Costs, and Revenues	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	822,799	855,711	889,939	925,537	962,558	1,001,061	1,041,103	1,082,747	1,126,057	1,171,100
Landfill Disposal .....	163,320	169,853	176,647	183,713	191,061	198,704	206,652	214,918	223,515	232,455
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Annual Revenues										
Steam (4 percent) .....	240,000	264,000	290,400	319,440	351,384	386,522	425,175	467,692	514,461	565,907
Tipping Fees .....	1,252,119	1,267,564	1,282,186	1,295,810	1,308,236	1,319,242	1,328,580	1,335,973	1,341,111	1,343,647
Total	1,492,119	1,531,564	1,572,586	1,615,250	1,659,620	1,705,765	1,753,755	1,803,665	1,855,572	1,909,555
Tipping Fee (dollars per ton) .....	69	69	70	71	72	72	73	73	73	74

Annual Solid Waste Quantities, Operating Costs, and Revenues	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quantities (tons per year)										
Waste Received .....	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250	18,250
Waste Processed .....	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513	15,513
Bypass .....	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737
Residue .....	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429	5,429
Waste to Landfill	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166	8,166
Annual Operating Costs										
Principal and Interest Payment .....	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000	506,000
Operation and Maintenance .....	1,217,944	1,266,661	1,317,328	1,370,021	1,424,822	1,481,815	1,541,087	1,602,731	1,666,840	1,733,513
Landfill Disposal .....	241,753	251,424	261,481	271,940	282,817	294,130	305,895	318,131	330,866	344,091
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Annual Revenues										
Steam (4 percent) .....	622,498	684,748	753,223	828,545	911,400	1,002,540	1,102,794	1,213,073	1,334,380	1,467,818
Tipping Fees .....	1,343,199	1,339,337	1,331,585	1,319,416	1,302,239	1,279,405	1,250,189	1,213,789	1,169,316	1,115,786
Total	1,965,697	2,024,085	2,084,808	2,147,961	2,213,639	2,281,945	2,352,982	2,426,862	2,503,696	2,583,604
Tipping Fee (dollars per ton) .....	74	73	73	72	71	70	69	67	64	61

NOTES: Plant Capacity: 50 tons per day  
Annual Plant Availability: 85 percent  
Capital Cost, Including Steam Lines: \$5,800,000  
Steam Price: \$3.74 per 1,000 pounds  
Steam Customer: County Complex  
Type of Financing: General Obligation Bonds

Escalation of operation and maintenance costs at 4 percent per year from 1995.

Escalation of energy costs at a rate of 10 percent per year from 1995.

Debt service cost assumed using 6 percent interest over 20 years and 18 month construction period.

Plant availability estimated at 85 percent.

Residue and bypass assumed landfilled at \$20 per ton in 1995 dollars escalated at 4 percent per year from 1985.

Source: R. W. Beck & Associates 1985 Report prepared for Walworth County and modified by Walworth County Solid Waste Management Department and SEWRPC.

## Appendix F

### INTERNAL RECYCLABLE STORAGE AND COLLECTION EQUIPMENT SUMMARIES

Table F-1

#### INTERNAL RECYCLABLE STORAGE AND COLLECTION EQUIPMENT SUMMARY FOR HIGH-LEVEL RECYCLABLE SEPARATION PROGRAM: ALTERNATIVE PLANS NO. 1 AND NO. 2

Facility and Section	Container Types and Purpose						
	18- to 20-Gallon Square: White Paper	10- to 12-Gallon Bins: White Paper	Three-Unit, 10- to 12-Gallon Stackable: Other Paper	40-Gallon Square: Metal and Plastic	Two-Unit, 10- to 12-Gallon: Glass	Public Square Can Recycler with Bag Holder	10- to 14-Gallon Bin
Courthouse							
General Offices . . . . .	9	9	18	--	--	5	--
Sheriff's Department . . . . .	1	3	4	--	--	1	--
Jail Kitchen . . . . .	--	--	--	1	1	1	--
Lakeland School . . . . .	--	2	2	1	1	2	--
Highway Department . . . . .	--	1	1	--	--	1	40 for trucks
Huber Dormitory . . . . .	--	1	1	1	1	1	--
Jail Annex . . . . .	--	1	1	1	1	1	--
Human Services Administration . . . . .	1	2	3	--	--	2	--
Human Services Center . . . . .	1	2	3	1	1	2	--
Lakeland Medical Center . . . . .	5	15	20	2	2	5	--
Lakeland Nursing Home . . . . .	10	20	30	2	2	6	--
Lakeland Agricultural Complex . . . . .	--	--	--	--	--	1	--
Courthouse Annex . . . . .	--	7	7	--	--	5	--
<b>Total</b>	<b>27</b>	<b>63</b>	<b>90</b>	<b>9</b>	<b>9</b>	<b>33</b>	<b>40</b>

**NOTE: Cost Estimate**

27 18- to 20-gallon square at \$33	= \$ 891
63 10- to 12-gallon bins at \$12	= 756
90 10- to 12-gallon, three unit stackable at \$40	= 3,600
9 40-gallon square at \$35	= 315
9 10- to 12-gallon, three unit stackable at \$48	= 432
33 Can recyclers with bag holder at \$20	= 660
40 10-to 14-gallon bins at \$12	= 480
<b>Total</b>	<b>\$7,134</b>

Source: Walworth County Solid Waste Management Department and SEWRPC.

Table F-2

**INTERNAL RECYCLABLE STORAGE AND COLLECTION EQUIPMENT SUMMARY FOR  
LOW-LEVEL RECYCLABLE SEPARATION PROGRAM: ALTERNATIVE PLANS NO. 3 AND NO. 4**

Facility and Section	Container Types and Purpose					
	18- to 20-Gallon Square: White Paper	10- to 12-Gallon Bins: White Paper	18- to 20-Gallon Square: Other Paper	40-Gallon Square: Metal, Plastic, and Glass	Square Can Recycler with Bag Holder	18- to 24-Gallon Bins: Paper, Metal, and Plastic
Courthouse						
General Offices . . . . .	9	9	18	--	5	--
Sheriff's Department . . . . .	1	3	4	--	1	--
Jail Kitchen . . . . .	--	--	--	2	--	--
Lakeland School . . . . .	--	2	2	2	2	--
Highway Department . . . . .	--	1	1	--	1	20 for trucks
Huber Dormitory . . . . .	--	1	1	2	1	--
Jail Annex . . . . .	--	1	1	2	1	--
Human Services Administration . . .	1	2	3	--	2	--
Human Services Center . . . . .	1	2	3	2	2	--
Lakeland Medical Center . . . . .	5	15	20	4	5	--
Lakeland Nursing Home . . . . .	10	20	30	4	6	--
Lakeland Agricultural Complex . . . .	--	--	--	--	1	--
Courthouse Annex . . . . .	--	7	7	--	5	--
<b>Total</b>	<b>27</b>	<b>63</b>	<b>90</b>	<b>18</b>	<b>33</b>	<b>20</b>

**NOTE: Cost Estimate**

27 18- to 20-gallon square at \$26	= \$ 702
63 10- to 12-gallon bins at \$12	= 756
90 18- to 20-gallon square at \$26	= 2,340
18 40-gallon-square at \$35	= 630
33 Can recyclers with bag holder at \$20	= 660
20 18- to 24-gallon bins at \$20	= 400
<b>Total</b>	<b>\$5,488</b>

Source: Walworth County Solid Waste Management Department and SEWRPC.

## Appendix G

### EXTERNAL RECYCLABLE STORAGE EQUIPMENT SUMMARIES

Table G-1

#### EXTERNAL RECYCLABLE STORAGE EQUIPMENT SUMMARY FOR HIGH-LEVEL RECYCLABLE SEPARATION PROGRAM WITH COUNTY PARTICIPATION IN MARKETING: ALTERNATIVE PLAN NO. 1

Facility and Section	Containers				Cost	
	Number <sup>a</sup>	Type	Material	Service Cycle	Monthly	Annually
Courthouse	1	Four-cubic-yard dumpster	Cardboard	Weekly	\$ 40	\$ 480
	4	80- to 90-gallon totes	Paper	Weekly <sup>b</sup>	--	--
	4	80- to 90-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	10	480
Lakeland School	1	Two-cubic-yard dumpster	Cardboard	Weekly	30	360
	4	40- to 60-gallon totes	Paper	Weekly <sup>b</sup>	--	--
	4	40- to 60-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	9	432
Highway Department	1	Six-cubic-yard dumpster	Cardboard	Weekly	50	600
	4	40- to 60-gallon totes	Paper	Semiweekly <sup>b</sup>	--	--
	4	80- to 90-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly to semiweekly <sup>d</sup>	7 to 10	560
Huber Dormitory	1	Two-cubic-yard dumpster	Cardboard	Semiweekly	20	240
	4	40- to 60-gallon totes	Paper	Semiweekly <sup>b</sup>	--	--
	4	40- to 60-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	9	432
Jail Annex	1	Two-cubic-yard dumpster	Cardboard	Semiweekly	20	240
	4	40- to 60-gallon totes	Paper	Semiweekly <sup>b</sup>	--	--
	4	40- to 60-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	9	432
Human Services Administration	4	40- to 60-gallon totes	Paper	Semiweekly <sup>b</sup>	--	--
	4	40- to 60-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	9	432
Human Services Center	1	Two-cubic-yard dumpster	Cardboard	Semiweekly	20	240
	4	40- to 60-gallon totes	Paper	Semiweekly <sup>b</sup>	--	--
	4	40- to 60-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	9	432
Lakeland Medical Center	1	Six-cubic-yard dumpster	Cardboard	Biweekly	100	1,200
	8	80- to 90-gallon totes	Paper	Weekly <sup>b</sup>	--	--
	8	80- to 90-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	10	960
Lakeland Nursing Home	1	Compactor and 40-cubic-yard storage box	Cardboard	Monthly	160	1,920
	4	80- to 90-gallon totes	Paper	Weekly <sup>b</sup>	--	--
	8	80- to 90-gallon totes	Glass, plastic, metal <sup>c</sup>	Weekly	10	960
Courthouse Annex	1	Four-cubic-yard dumpster	Cardboard	Semiweekly	30	360
	4	40- to 60-gallon totes	Paper	Semiweekly	--	--
	4	80- to 90-gallon totes	Glass, plastic, metal <sup>c</sup>	Semiweekly	7	336
Lakeland Agricultural Complex	4	40- to 60-gallon totes	Paper, glass, plastic, metal <sup>c</sup>	Quadrimestly	3	100

**NOTE: Cost Summary**

Cardboard	\$5,640
Paper (see footnote b)	1,600 per year
Glass, plastic, metals	5,600

Costs do not include revenue of about \$1,200 for paper and \$1,700 for cardboard.

<sup>a</sup> At each facility two extra toter-type containers are to be provided over number noted.

<sup>b</sup> Collected by County personnel. Total annual cost is estimated at \$1,600 for contract hauling of County-owned roll-off for 16 trips per year to market center.

<sup>c</sup> Typical four containers: two glass, one plastic, one metal.

<sup>d</sup> Collect weekly from April through June for 10 containers and semiweekly from July through March for five containers.

Source: Walworth County Solid Waste Management Department and SEWRPC.

Table G-2

**EXTERNAL RECYCLABLE STORAGE EQUIPMENT SUMMARY FOR HIGH-LEVEL RECYCLABLE  
SEPARATION PROGRAM WITH NO COUNTY PARTICIPATION IN MARKETING: ALTERNATIVE PLAN NO. 2**

Facility and Section	Containers				Cost	
	Number <sup>a</sup>	Type	Material	Service Cycle	Monthly	Annually
Courthouse	1	Four-cubic-yard dumpster	Cardboard	Weekly	\$ 35	\$ 420
	4	80- to 90-gallon toters	Paper	Weekly	12	576
	4	80- to 90-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	12	576
Lakeland School	1	Two-cubic-yard dumpster	Cardboard	Weekly	25	300
	4	40- to 60-gallon toters	Paper	Weekly	11	528
	4	40- to 60-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	11	528
Highway Department	1	Six-cubic-yard dumpster	Cardboard	Weekly	55	660
	4	40- to 60-gallon toters	Paper	Semiweekly	7	336
	4	80- to 90-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly to semiweekly <sup>c</sup>	8 to 12	720
Huber Dormitory	1	Two-cubic-yard dumpster	Cardboard	Semiweekly	20	240
	4	40- to 60-gallon toters	Paper	Semiweekly	7	336
	4	40- to 60-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	11	528
Jail Annex	1	Two-cubic-yard dumpster	Cardboard	Semiweekly	20	240
	4	40- to 60-gallon toters	Paper	Semiweekly	7	336
	4	40- to 60-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	11	528
Human Services Administration	4	40- to 60-gallon toters	Paper	Semiweekly	7	336
	4	40- to 60-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	11	528
Human Services Center	1	Two-cubic-yard dumpster	Cardboard	Semiweekly	20	240
	4	40- to 60-gallon toters	Paper	Semiweekly	7	336
	4	40- to 60-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	11	528
Lakeland Medical Center	1	Six-cubic-yard dumpster	Cardboard	Biweekly	80	960
	8	80- to 90-gallon toters	Paper	Weekly	12	1,152
	8	80- to 90-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	12	1,152
Lakeland Nursing Home	1	Compactor and 40-cubic-yard storage box	Cardboard	Monthly	330	3,960
	4	80- to 90-gallon toters	Paper	Weekly	12	576
	8	80- to 90-gallon toters	Glass, plastic, metal <sup>b</sup>	Weekly	12	1,152
Courthouse Annex	1	Four-cubic-yard dumpster	Cardboard	Semiweekly	25	300
	4	40- to 60-gallon toters	Paper	Semiweekly	7	336
	4	80- to 90-gallon toters	Glass, plastic, metal <sup>b</sup>	Semiweekly	7	336
Lakeland Agricultural Complex	4	40- to 60-gallon toters	Paper, glass, plastic, metal <sup>b</sup>	Quadrimestly	3	100

NOTE: Cost Summary

Cardboard <sup>d</sup>	\$7,320
Paper	4,656
Glass, plastic, metals	6,576

<sup>a</sup>At each facility two extra toter-type containers are to be provided over number noted.<sup>b</sup>Typical four containers: two glass, one plastic, one metal.<sup>c</sup>Collect weekly from April through June for 10 containers and semiweekly from July through March for five containers.<sup>d</sup>Includes cost of \$2,500 per year for rental of compactor and storage box at Lakeland Nursing Home, plus \$4,800 per year for other services.

Source: Walworth County Solid Waste Management Department and SEWRPC.



## **Appendix H**

### **PUBLIC INFORMATION MEETING SUMMARY, DOCUMENTATION, AND RELATED MATERIALS**

#### **Exhibit H-1**

#### **SUMMARY MINUTES OF JULY 27, 1994 PUBLIC INFORMATIONAL MEETING**

#### **WALWORTH COUNTY SOLID WASTE MANAGEMENT PLAN UPDATE**

#### **PUBLIC INFORMATIONAL MEETING JULY 27, 1994 7:00 PM**

##### AGENDA

1. Call to Order - Mr. Stanley Mikrut, Chairman, Walworth County Solid Waste Management Board
2. Welcome and Introductions
3. Background Information - Mr. Wade Scheel, Manager, Walworth County Solid Waste Management Department
4. Plan Update Findings and Recommendations -  
Mr. Robert Biebel, Chief Environmental Engineer,  
Southeastern Wisconsin Regional Planning Commission  
(SEWRPC)
5. Public Comments
6. Concluding Remarks
7. Adjourn

Thank you for attending tonight's meeting. If you have any questions about the Walworth County Solid Waste Management Plan Update, or would like to submit written comments on the Plan, you may contact the Solid Waste Department at the phone number and address listed below:

Mr. Wade Scheel, Manager  
Walworth County Solid Waste Management Department  
W3929 County Road NN  
Elkhorn, WI 53121-4362  
(414) 741-3394

## **A SUMMARY OF THE WALWORTH COUNTY SOLID WASTE MANAGEMENT PLAN UPDATE**

### **PUBLIC INFORMATIONAL MEETING SUMMARY**

A public informational meeting and hearing on the preliminary draft of the new solid waste management plan for Walworth County was held on July 27, 1994, at 7:00 p.m., in the County Courthouse Annex Auditorium at the County Lakeland Complex near Elkhorn. This public meeting was attended by a total of 25 persons representing local units of government, private businesses, and concerned citizens. In addition, the County Solid Waste Management Board, County Solid Waste Management Department and Regional Planning Commission staff were in attendance. The public hearing was announced in news releases issued to area newspapers; by placement of a formal notice in the Whitewater Register, the County's official newspaper; and through transmission of a notice of the meeting and a summary of the draft plan to all of the 27 general purpose units of government in the study area, to all County Board members, to the private solid waste haulers and recyclers serving the area, to organizations interested in environmental matters, and to a list of citizens and businesses who had indicated an interest in solid waste management over the past several years.

The public informational meeting was conducted in two phases, the first was a presentation of the preliminary findings and recommendations of the County solid waste plan update and the second was a period for public comment. To assist in the plan presentation, a brochure summarizing the proposed new plan was distributed at the public hearing to all attending. The brochure included a description of the existing solid waste management situation in Walworth County and the alternative solid waste management plans considered; as well as of the preliminary plan recommendations.

The meeting agenda and copies of the legal notice and of the newspaper articles of the meeting follow this summary. In addition, copies of written correspondence submitted relating to the plan are included.

The following summarizes the comments received at the hearing and written comments received after the hearing, and the staff and Solid Waste Management Board's response thereto:

1. Mr. James A. Johnson, a Village of Fontana-on-Geneva-Lake trustee, expressed concern over the ability to put in place an effective recycling program in areas in the County dominated by seasonal residents. He cited the example of the Abbey Springs development located within the Village of Fontana-on-Geneva-Lake, which has largely seasonal residents. Mr. Johnson commented that currently residents of such developments often use a centrally located dumpster for disposal of mixed solid wastes and that curbside collection practices were not effective, because of the seasonal or part-time nature of the residents, in that containers left out for pickup on weekends often would not be able to be retrieved until the next weekend in some cases. Mr. Johnson indicated that there was a concern with the ability of the Village to meet the 1995 State mandates for recycling in such areas.

Ms. Ann M. Lohrmann, Walworth County Solid Waste Management Board member, responded that a drop-off program was recently initiated in the Town of LaGrange and has been successful in obtaining participation from residents in the Lauderdale Lakes area, including many part-time or seasonal residents. Mr. Brian Jongetjes of John's Disposal suggested the use of an additional dumpster for recyclables to be located next to the dumpsters for mixed solid waste as a method to encourage recycling from seasonal or weekend residents. He emphasized the need to make recycling as convenient as possible and indicated multiple storage containers were available from private waste haulers. Mr. Robert P. Biebel, SEWRPC staff, suggested the need for a public educational component such as a flyer or notices to residents in order to make them aware of the need to separate recyclables, as required under State law.

2. Mr. Gene H. Samuelsen, Jr., a citizen and representative of the organization called the Linn Township Weekenders, asked that a master development plan be prepared for the County dealing with sewerage systems, water supply, solid waste management, and land use. He indicated that such activities were currently being done on a piecemeal basis and that this has contributed to high taxes and high costs

for items such as solid waste collection in the County. He indicated that in his opinion Linn Township residents were paying too much for solid waste management and that there was no source of information regarding what other communities were expending for such services or on the most cost-efficient means of managing solid waste. He cited a need for information exchange. Mr. Biebel noted that there was a year 2010 County land use plan in place which was adopted by the County Board in 1993. He noted that the County land use plan, the regional land use plan, the regional water quality management plan and the sewer service area amendments thereto, and the solid waste plan update being discussed tonight did include many of the information and plan recommendation components of a comprehensive County plan. No water supply plan element does exist, he noted. Mr. Biebel also noted that current information on each community's solid waste system, including costs, was in the new County solid waste plan update. He also noted that the County Solid Waste Department was a good source of information on current practices, costs, and contract arrangements.

Ms. Kathy Santucci, a representative of Fiber Resources Recovery, Inc., indicated that the Town of Linn had initiated a drop-off program for recyclables.

3. Dr. Robert White, citizen and former Solid Waste Management Board member, asked about the current and projected availability of markets for recyclables and asked if source-separated recyclables are being landfilled if there is no market for a particular recyclable. He also asked if the County staff was going to be assuming an active role in marketing of recyclables. Mr. Wade Scheel, County Solid Waste Manager, answered that there had been only one isolated case that he knew of where source-separated recyclable material had been landfilled. However, he noted that in general markets are being found for recyclables and that the concern relates to the changes in value of the recyclables. Currently, most recyclables are collected by private waste haulers and the haulers are able to find markets for the recyclables. He noted that the larger, private haulers are most likely able to find profitable markets easier than individual communities or the County and for that reason the solid waste plan update recommended that the marketing be left largely to the private sector.

Mr. Michael C. Ettner, a representative of the Mallard Ridge Recycling and Disposal facility, noted that they have not seen any flagrant dumping of recyclables at the Mallard Ridge landfill. He noted that the solid waste haulers were generally reliable and would not be involved in such practices. He indicated that the Wisconsin Department of Natural Resources is considering requiring periodic inspections of solid waste loads being landfilled after January 1995 in an attempt to keep hazardous wastes and recyclables out of landfills. He also noted that there currently was a relatively good market for newspaper. Mr. Ettner also indicated that there would have to be a good deal of public education to manage effectively the recycling of all the materials which will be required to be recycled as of January 1, 1995.

Mr. Dennis Richter, Walworth County Solid Waste Management Board member, pointed out that a successful solid waste management system must be an integrated system for handling unrecycled and recycled items. He stressed that the most effective haulers had developed good contacts in the various recycling businesses.

Mr. Brian Jongetjes of John's Disposal Service stated that currently markets for recyclables are the best they have been since 1983. He indicated that the quantities of recyclables collected were increasing, that recycled paper and metal prices had recently been improving; and that the emerging market for plastics was also improving.

4. Mr. Samuelsen asked if there was a means of limiting the transport of solid waste across the Wisconsin-Illinois State border. Messrs. Mikrut and Scheel pointed out that such transport could not be prohibited because of interstate commerce regulations. However, current State of Wisconsin laws do require that communities whose solid waste is disposed of in Wisconsin landfills have an effective community recycling program in place. A community must apply to the State to receive an effective recycling program designation.

Mr. Charles Addy, Friends of Nippersink Creek-Geneva Lakes Bioregion-USA, commented that Wisconsin businesses currently ship hazardous wastes outside of the State for disposal. It was noted that Wisconsin

currently does not have any hazardous wastes disposal sites. Mr. Hough stated that the siting for Illinois hazardous waste sites specifically included consideration of Wisconsin waste disposal needs.

5. Mr. Lyle Smith, City of Delavan Director of Public Works and City's Recycling Coordinator, indicated that the City would like to see the County take an active role in composting. He supported the idea of using the composting site at the County Lakeland Complex as a County facility, which could be used by the municipalities. He also stated that it was difficult for communities to operate individual composting operations because of current State regulations and site limitations. He indicated that charging a reasonable fee for use of the County site would be acceptable. Mr. Smith also indicated support for a County-sponsored mobile or satellite household hazardous waste collection, as recommended in the plan, and suggested the County implement such a collection program. Mr. Smith also reported that the City of Delavan curbside recycling was initiated, using private contractors, through passage of an ordinance which took effect in September of 1993. He indicated the cost for disposal of unrecycled solid waste and for collecting recyclables was about \$12 per month per household.

6. Mr. James A. Johnson also indicated the desirability of a decentralized household hazardous waste collection at the local municipalities. He noted that a good time for such a collection would be late summer or early fall, to coincide with general homeowner cleanup and seasonal residents needs.

Mr. Scheel noted that the County was considering means by which mobile or satellite collections could be made as recommended in the draft plan. However, he noted that the current regulations prohibit the combining of hazardous wastes from different communities. As a result, collection of hazardous wastes at satellite locations requires considerable cost since partially filled collection containers from one community cannot be filled at another location. He noted that it would be desirable to have that component of the current regulations changed in order to allow more flexibility in designing a countywide program. Mr. Richter added that the costs of these household hazardous waste collections were high, \$40,000 to \$60,000, and that even with limited State funding were difficult to fit into County and local budgets.

7. Mr. Dean Fischer, Director of Public Works, City of Whitewater, indicated City support for the household hazardous waste collection program. He noted that during the 1992 program, the City of Whitewater did participate and was used as a collection location for the program. He indicated the City would again consider participation in upcoming programs and thanked the County Solid Waste Management Board for conducting the household hazardous waste collection program. He stated that the City of Whitewater supports the collection and will pay its share of the cost.

Mr. Fischer then asked what actions would be taken to implement the plan recommendations regarding public information and education. Mr. Scheel stated that he would be focusing on obtaining available materials and preparing supplemental materials as needed for use in informational and educational programs. These materials were intended to be suitable for distribution to the general public and would cover topics such as household hazardous waste management, composting, and yard waste management. He noted that the County would be able to make these materials available to the municipalities for distribution, or availability at local government offices for use in response to inquiries. In some cases, it may be necessary to ask for some assistance in printing costs. Mr. Samuelsen suggested the use of local cable television public service announcements for education efforts.

Mr. Fischer also reported that the City of Whitewater has been able to dispose of leaves directly on agricultural lands owned by an organic farmer. It was pointed out that the draft plan recommends that a broader application of such an option for yard waste management be explored further by the County Solid Waste Management Department and the University of Wisconsin-Extension staffs.

8. Mr. Dean Fischer raised the question of how intensively the potential landfill sites have been analyzed. Specifically, he asked about current property ownership of areas designated as having a good potential for landfill siting and if the County should consider securing potential sites before the properties become too costly.

Messrs. Biebel and Scheel noted that the landfill analysis in the plan was intended to provide generalized locational data and criteria for landfill siting which represents the first step in the landfill siting process. Currently, the plan recommends that the County monitor landfill loadings and capacities, which at this time appear to be adequate for Walworth County. The potential exists that approved landfill capacity for disposal of mixed solid wastes may become inadequate in the future, depending largely on loadings from out of the County and expansion approvals. At such time, it may become necessary for the County to assume a more direct role in the construction and operation of a new sanitary landfill for the disposal of solid waste generated in Walworth County. Should this become necessary, it is recommended that a County-private partnership be considered to develop and operate a County landfill. It was noted that the amount of land needed for the construction of a landfill was approximately 60 to 80 acres. The lands which had been indicated to have the best potential for landfill siting in the draft plan update total about 49 square miles.

9. Mr. Loren Waite, Chairman, Town of Sugar Creek, reported that the Town of Sugar Creek had prepared a solid waste ordinance and had prepared a specification for a waste haulers contract which was used effectively to secure the necessary private services. The Town had received four bids for the services. He agreed with earlier speakers that there was not as much sharing of such information as there should be. He noted that the Sugar Creek models were one source of such information.

In addition to the testimony at the public hearing, two letters were received regarding the draft plan. The first letter was from Mr. Michael C. Ettner, Division President and General Manager, Mallard Ridge Recycling and Disposal Facility, Waste Management of Wisconsin, Inc. Mr. Ettner's letter discussed four items. The first item related to the landfill locational suitability analysis included in the plan. The letter indicated that the systems level information used cannot be substituted for the more detailed investigations and field studies needed to properly evaluate a given site. In addition, it was noted that some of the criteria used in the siting analyses included in the plan, which were based upon criteria set forth in Chapter 504 of the Wisconsin Administrative Code, can be changed by obtaining variances.

Secondly, Mr. Ettner discusses the current Federal Subtitle D regulations and associated costs for constructing and operating a landfill. In addition, it is noted that constructing such a landfill for Walworth County wastes would be costly because of the relatively small size requirements. Alternatives to constructing a new landfill for County use only are noted, such as use of other regional landfills, or expanding the user base of a County-owned facility.

The third item in Mr. Ettner's letter relates to the potential expansion of the compost operation at the County's Lakeland Complex. Mr. Ettner writes that if the site were to expand to receive more than 20,000 cubic yards on the site, there will be additional restrictions and that the expansion should be evaluated along with other options. The letter indicated that Waste Management of Wisconsin would be interested in discussing alternatives with the County.

The last item raised in Mr. Ettner's letter was a concern about the development and potential content of a landfill ordinance which is recommended to be adopted by the County.

A letter was also received from Barbara S. Wheelock, Town Clerk, Town of Darien, indicating that the Darien Town Board opposes the concept of providing for a County-owned landfill and had recorded a motion to this effect at its August 8, 1994, meeting.

The Walworth County Solid Waste Management Board carefully considered the oral and written comments submitted at the public informational meeting and hearing on the preliminary plan and accordingly made the following revisions to the recommended plan.

1. It is recommended that the proposed public information and educational program specifically include an element directed toward the part-time and seasonal residents of the County. The program would recognize that the use of curbside collection may not be effective for certain areas dominated by weekend



users and that special informational materials or other media would be developed to improve collection practices and to inform such residents of the need for and proper procedures to be used to meet recycling goals and regulatory requirements.

2. It is recommended that the County Solid Waste Management Department obtain copies of sample ordinances and contract hauler specifications which have been used effectively, such as the ones prepared by the Town of Sugar Creek. These materials could then be made available for use as a reference by other communities who will be developing or revising such documents.
3. It is recommended that the County Solid Waste Management Department work with the Wisconsin Department of Natural Resources and other regional, county, and local solid waste managers to develop changes in the current regulations which would improve the cost efficiency of decentralizing the collection of household hazardous waste through the use of mobile or satellite collection programs while maintaining the environmental integrity of such programs.

**List of Persons Attending  
Walworth County Solid Waste Management Plan Update  
Public Information Meeting  
July 27, 1994  
7:00 PM**

<u>Name</u>	<u>Representing</u>
Bob and Bev White	Self
John P. Carney	Town of Troy
Charles Addy	Friends of the Nippersink-Geneva Lakes Bioregion, USA
James D. Hough	Town of East Troy
Kathy Santucci	Fiber Resource Recovery
Jerry Byrnes	
Jim Johnson	Village of Fontana
Gene H. Samuelsen Jr.	Linn Township Week Enders (LTD)
Scott D. Karcher	Wisconsin Reductions Inc.
Andrew Robbins	Wisconsin Reductions Inc.
Kent Bristol	City of Elkhorn
Dean Fischer	City of Whitewater
Ron Jongetjes	Johns Disposal, Whitewater
Brian Jongetjes	Johns Disposal, Whitewater
Joseph S. Cannestra	WALCOMET & Self Interest
Dean Logterman	Village of Darien
Robert Nieuwenhuis	Nieuwenhuis Bros Inc
Micheal C. Ettner	Mallard Ridge
Dan Leclaire	Mallard Ridge
Lyle Smith	City of Delavan
Allen Morrison	Town of Sharon
Loren Waite	Town of Sugar Creek

**WRITTEN COMMENTS ON DRAFT WALWORTH COUNTY SOLID WASTE MANAGEMENT PLAN UPDATE**

**Mallard Ridge Recycling & Disposal Facility**  
Rt. 2, Box 117  
Delavan, Wisconsin 53115  
414/724-3257



A Waste Management Company

August 23, 1994

Mr. Wade Scheel, Manager  
Walworth County Solid Waste Management Dept.  
W3929 County Road NN  
Elkhorn, WI 53121-4362

**RE: Walworth County Solid Waste Management Plan Update**

Dear Mr. Scheel:

Waste Management of Wisconsin, Inc. (WMWI) appreciates the opportunity to comment on the Walworth County Solid Waste Management Plan update. Based on our experience, we have the following comments and suggestions to offer for your consideration.

Suitable Landfill Sites

In the Draft Walworth County Solid Waste Management Plan, the county has evaluated the general suitability of siting landfills in Walworth County. This evaluation was made using regional level information. In order to properly evaluate a potential landfill site a developer must first perform extensive research and field investigations. This type of preliminary research can cost several hundred thousand dollars and take several months per site. Without first performing some preliminary research and field evaluations it is not possible to accurately assess whether a site is appropriate for a landfill.

In addition, variances can be obtained from the Wisconsin Department of Natural Resources from the landfill location criteria listed in Wisconsin Administrative Code NR 504 on a case-by-case basis. The purpose of the landfill location criteria is for landfill developers to evaluate the potential impact on the surrounding areas. Landfill development at a site is not precluded if all the criteria in NR 504 is not met.

Therefore, based on these items it is our opinion that at this time it is premature for the county to eliminate sites for potential landfill development. In addition, it is not cost effective for the county to perform site specific preliminary assessments in order to properly evaluate potential landfill sites without an immediate need to site a facility.

## Development of a County Landfill

With the implementation of the Federal Subtitle D regulations the costs to develop and operate a municipal solid waste landfill have increased dramatically. To counteract these higher costs the trend has been to develop fewer and larger regional landfills. The reason for developing larger facilities is that a majority of the costs associated with developing and operating a landfill are fixed costs not dependent on the size of the landfill making it more cost effective to develop larger landfills.

In the Draft Walworth County Solid Waste Management Plan, the county proposes to potentially develop a county landfill in the future. This landfill would be used for disposal of residential, commercial, and industrial wastes generated in Walworth County. If all the wastes generated in Walworth County were to be disposed of at the proposed county landfill the estimated annual waste tonnages (year 2010) received at the landfill would range between 113,400 tons per year (TPY) to 164,700 TPY.

Since Wisconsin Administrative code NR 504.05(2) limits the maximum size of a proposed landfill, the proposed county landfill would be limited to a maximum waste capacity of 2,470,500 tons or an approximate design capacity of 3.5 million cubic yards and assuming an estimated annual waste tonnage of 164,700 TPY. This tonnage corresponds to an approximate maximum footprint of 27 acres.

The costs to develop and operate the proposed county landfill would be significant. An investment of over 80 million dollars (1994 dollars) would be required to develop and operate the proposed county landfill over the life of the facility. If problems occur in the siting process or if waste volumes are less than anticipated the costs will increase even more. The impact of using a county landfill over a large regional landfill would mean increased disposal costs in the range of 20 - 40% higher than what the market place demands.

In summary, there are many issues involved when planning, permitting, and operating a sanitary landfill. Future regulations will dictate what the landfill of tomorrow will look like and how many we will have in our state. We agree with your projection that by the year 2010 less than 60% of the waste generated will be landfilled. Obviously this reduction in volume will impact the urgency to continue to build and expand new or existing facilities. However, the need and dependency for having a landfill will not change. Landfills will continue to operate as regional facilities in order to offset the costs associated with permitting, operation, and long term care. Before the county invests money to develop a proposed county landfill, it would be cost effective to first evaluate using a large regional facility in Southeastern Wisconsin not necessarily in Walworth County. Another option is that if the county does develop a county owned landfill the county should extend the service area to areas outside the county in order to gain economy of scale benefits and reduce the per ton costs.

### County Compost Facility

In the Draft Walworth County Solid Waste Management Plan, the county proposed to expand the compost operation at the County Lakeland Complex and that the county take over operation. The current operation at the County Lakeland Complex is permitted for 20,000 cubic yards or less. If the proposed expansion to the compost operation is expected to have more than 20,000 cubic yards on site at anytime, then a new permit will be required.

Once the 20,000 cubic yard threshold is exceeded the requirements for the operation of the compost operation change. Typically the Wisconsin Department of Natural Resources will require a more in depth plan of operation submittal, surface water and groundwater monitoring and additional control features such as a clay pad and a surface water detention basin. The additional requirements dramatically increase the compost operation costs.

Before the County Lakeland Complex Compost operation is expanded, the county should evaluate potential volumes and costs. It may be cheaper to operate several smaller compost operations throughout the county or contract the collection and operation of the compost facility to an outside contractor. We would be interested in talking with you about such an arrangement.

### Landfill Ordinance

Our concerns about the adoption of this Landfill Ordinance by Walworth County are two fold. First, we note that while the County has more than adequate authority under *S 59.07(135), Wis. Status.* to operate its own landfill, it does not appear that this sub-section of the Statutes (or any other) gives the County the authority to regulate non-county owned/operated landfills located within the County. As you also know, the County is a subsovereign of the State and, as such, must find express statutory authority for any program that it seeks to impose. The authority for the regulation and licensing of landfills seems to be lacking. As you also know, landfills are highly regulated by the Wisconsin Department of Natural Resources and have been for the past twenty-five (25) years. Any attempt by the County to superimpose its technical standards upon a landfill located within the County would arguably be preempted by the well established and on going state wide regulatory program. However, this is not to say that the County cannot utilize its zoning powers (subject to *S 144.445, Wisc. Stats.*) to control where such facilities might be sited in the County. Our second concern deals with the obviously excessive nature of the fees which the Ordinance seeks to impose. Both the application fee and the annual fees must be in direct proportion to the cost that the County would incur as a result of the activity which is sought to be licensed. The courts in Wisconsin have consistently so held. In fact the fees are set so high that it seems that the sole purpose (other than revenue enhancement) is to deter the siting of landfills within the County. From our review of the Ordinance it does not appear that the County will incur any significant cost as a result of the siting or expansion of a landfill within the County. Hence, the fees appear to be excessive and confiscatory in nature.

Thank you for your time and consideration. We would welcome the opportunity to provide any clarification of these recommendations at your request. Please feel free to contact myself or Dan Leclaire at (414) 724-3257 for assistance.

Sincerely,

A handwritten signature in black ink, appearing to read 'M.C. Ettner', with a long horizontal flourish extending to the right.

Michael C. Ettner  
Division President and General Manager  
Mallard Ridge Recycling and Disposal Facility

DJL/ME/bk

cc: Dan Leclaire  
Lynn Morgan, MSO  
Gerard Hamblin, MSO  
Dennis Wilt, Westchester



**TOWN OF DARIEN**  
Walworth County  
Wisconsin

August 24, 1994

Mr. Wade Scheel, Manager  
Walworth County Solid Waste  
Management Department  
W3929 County Road NN  
Elkhorn, Wisconsin 53121-4362

Dear Mr. Scheel:

At the August 8, 1994 meeting of the Darien Town Board Dale Wheelock presented a summary of the Walworth County Solid Waste Management Plan Update: 2010.

After discussion, the Darien Town Board opposed the section entitled Landfill Element Considerations on pages 20 and 21. Specifically, the Town opposes the concept of county owned landfills. A motion to this effect is recorded in the meeting minutes.

Thank you for your attention to this written testimony.

Sincerely yours,

*Barbara S. Wheelock*

Barbara S. Wheelock, Clerk  
TOWN OF DARIEN  
N4692 State Road 89  
Delavan, Wisconsin 53115-9621

JULY 27, 1994, PUBLIC MEETING NOTICES

July 14

WC-22  
Two Times

**NOTICE OF  
SOLID WASTE MEETING**

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed a solid waste management study for Walworth County. The study is an update of the original County Solid Waste Management Plan, which was completed in 1982, and includes an analysis of options for county involvement in recycling, household hazardous waste collection and disposal, yard waste composting, public education, landfilling and incineration.

The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendation of the Plan update. The meeting has been scheduled for Wednesday, July 27 at 7 p.m. and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. Anyone interested in solid waste management issues is welcome to attend.

A summary pamphlet has been developed to briefly present the findings and recommendations of the study. Copies of the summary pamphlet, and more information about the public meeting may be obtained by contacting the Walworth County Solid Waste Management Department at (414) 741-3394.

Whitewater Register  
July 14, 1994

## **NOTICE OF SOLID WASTE MEETING**

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed a solid waste management study for Walworth County. The study is an update of the original County Solid Waste Management Plan, which was completed in 1982, and includes an analysis of options for county involvement in recycling, household hazardous waste collection and disposal, yard waste composting, public education, landfilling, and incineration.

The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendation of the Plan update. The meeting has been scheduled for Wednesday, July 27 at 7:00 PM and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. Anyone interested in solid waste management issues is welcome to attend.

A summary pamphlet has been developed to briefly present the findings and recommendations of the study. Copies of the summary pamphlet, and more information about the public meeting may be obtained by contacting the Walworth County Solid Waste Management Department at (414) 741-3394

Elkhorn Independent  
July 14, 1994

## NEWS RELEASE

FROM: Walworth County Solid Waste Management Department  
W3929 County Road NN, Elkhorn, WI 53121-4362  
Phone: (414) 741-3394

FOR: Immediate Release

BY: Wade Scheel, Walworth County Solid Waste Manager

DATE OF SUBMISSION: July 5, 1994

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed an update of the Solid Waste Management Plan for Walworth County. The County Solid Waste Department has scheduled a public meeting to review the findings and recommendations of the Plan update. The meeting has been scheduled for Wednesday, July 27 at 7:00 PM and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. Anyone interested in solid waste management issues is welcome to attend.

Significant changes have taken place with regard to solid waste management in the County since the completion of the original County Solid Waste Plan in 1982. The increase of recycling due to Act 335, Wisconsin's Recycling Law, the abandonment of eight landfills once used for the disposal of Walworth County waste, the ban on yard waste from landfills, and the siting of a major landfill and landfill expansion are all changes that have occurred since the original Plan was completed.

The purpose of the Plan update was to review the recommendations of the initial County Solid Waste Management Plan and to develop and evaluate alternatives for countywide solid waste management in the future. The Plan update focuses on those areas which the County can significantly influence

(more)

including: options for recycling, household hazardous waste collection and disposal, yard waste composting, public education, landfilling, and incineration.

A summary pamphlet has been developed to briefly present the findings and recommendations of the study. Copies of the summary pamphlet, and more information about the public meeting may be obtained by contacting the Walworth County Solid Waste Management Department at 741-3394.

(end)

News Release sent to the following:

Burlington Standard Press  
Walworth County Week  
Delavan Enterprise  
Janesville Gazette  
Shopper-Sunday  
East Troy News  
Elkhorn Independent  
Radio Station W M I R  
Lake Geneva Regional News  
Walworth Times  
Whitewater Register  
Beloit Daily News  
Sharon Reporter

# WALWORTH COUNTY

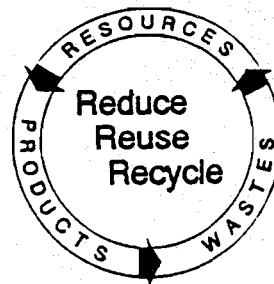
W3929 County Rd NN

Elkhorn, WI 53121-4362

Telephone: (414) 741-3394

FAX: (414) 741-3266

## Solid Waste Management Department



July 7, 1994

Dear County Board Member:

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed an update of the Solid Waste Management Plan for Walworth County. The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendations of the Plan update. The meeting has been scheduled for Wednesday, July 27, 1994 at 7:00 PM and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. This meeting is primarily for the public, but County Board Supervisors are welcome to attend.

SEWRPC and the Solid Waste Management Department will be presenting the findings and recommendations of the Solid Waste Plan update to the County Board as a special item of business at the September 20 County Board meeting. A summary pamphlet has been developed to briefly present the findings and recommendations of the study, and this pamphlet will be forwarded to you prior to the September 20 meeting. The final report is to be published after the public informational meeting so that any changes in the Plan necessitated by testimony presented at the informational meeting can be incorporated into the report.

Thank you for your consideration of this matter, and please call me if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads 'Wade Scheel'.

Wade Scheel, Manager  
Walworth County Solid Waste  
Management Department

WS:jc





# WALWORTH COUNTY

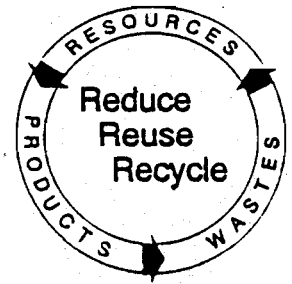
W3929 County Rd NN

Elkhorn, WI 53121-4362

Telephone: (414) 741-3394

FAX: (414) 741-3266

## Solid Waste Management Department



July 7, 1994

Dear Municipal Officials and Recycling Contacts:

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed an update of the Solid Waste Management Plan for Walworth County. The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendations of the Plan update. The meeting has been scheduled for Wednesday, July 27, 1994 at 7:00 PM and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. Please pass the information regarding this meeting on to Recycling Committee members, compost site managers, Public Works Department personnel, street supervisors, or any other individual in your municipality who may be interested in solid waste management issues.

Significant changes have taken place with regard to solid waste management in the County since the completion of the original County Solid Waste Plan in 1982. The increase of recycling due to Act 335, Wisconsin's Recycling Law, the abandonment of eight landfills once used for the disposal of Walworth County waste, the ban on yard waste from landfills, and the siting of a major landfill and landfill expansion are all changes that have occurred since the original Plan was completed.

The purpose of the Plan update was to review the recommendations of the initial County Solid Waste Management Plan and to develop and evaluate alternatives for countywide solid waste management in the future. The Plan update focuses on those areas which the County can significantly influence including: options for recycling, household hazardous waste collection and disposal, yard waste composting, public education, landfilling, and incineration.

A summary pamphlet has been developed to briefly present the findings and recommendations of the study. A copy of the summary pamphlet is enclosed for your review. The final report is to be published after the public informational meeting so that any changes in the Plan necessitated by testimony presented at the informational meeting can be incorporated into the report.

Thank you for your consideration of this matter, and please call me if you have any questions.

Sincerely,

Wade Scheel, Manager  
Walworth County Solid Waste  
Management Department

WS:jc

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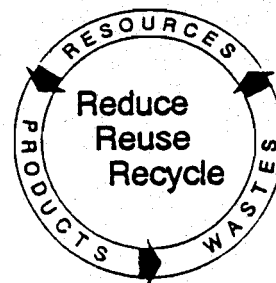


printed on recycled paper

# WALWORTH COUNTY

W3929 County Rd NN  
Elkhorn, WI 53121-4362  
Telephone: (414) 741-3394  
FAX: (414) 741-3266

## Solid Waste Management Department



July 7, 1994

Dear Solid Waste Hauler / Processor / Recycler:

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed an update of the Solid Waste Management Plan for Walworth County. The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendations of the Plan update. The meeting has been scheduled for Wednesday, July 27, 1994 at 7:00 PM and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. Please inform those individuals in your company who may be interested in attending this meeting.

Significant changes have taken place with regard to solid waste management in the County since the completion of the original County Solid Waste Plan in 1982. The increase of recycling due to Act 335, Wisconsin's Recycling Law, the abandonment of eight landfills once used for the disposal of Walworth County waste, the ban on yard waste from landfills, and the siting of a major landfill and landfill expansion are all changes that have occurred since the original Plan was completed.

The purpose of the Plan update was to review the recommendations of the initial County Solid Waste Management Plan and to develop and evaluate alternatives for countywide solid waste management in the future. The Plan update focuses on those areas which the County can significantly influence including: options for recycling, household hazardous waste collection and disposal, yard waste composting, public education, landfilling, and incineration.

A summary pamphlet has been developed to briefly present the findings and recommendations of the study. A copy of the summary pamphlet is enclosed for your review. The final report is to be published after the public informational meeting so that any changes in the Plan necessitated by testimony presented at the informational meeting can be incorporated into the report.

Thank you for your consideration of this matter, and please call me if you have any questions.

Sincerely,

Wade Scheel, Manager  
Walworth County Solid Waste  
Management Department

WS:jc



# WALWORTH COUNTY

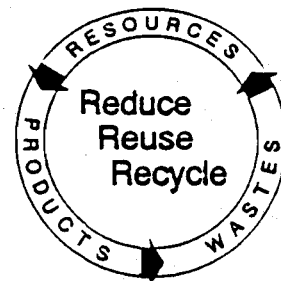
W3929 County Rd NN

Elkhorn, WI 53121-4362

Telephone: (414) 741-3394

FAX: (414) 741-3266

## Solid Waste Management Department



July 7, 1994

To: Associations and Individuals Interested in Environmental Issues

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed an update of the Solid Waste Management Plan for Walworth County. The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendations of the Plan update. The meeting has been scheduled for Wednesday, July 27, 1994 at 7:00 PM and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. Anyone from your organization is welcome to attend. Please distribute the information regarding this meeting to your members or to anyone you may know who has a special interest in solid waste management issues.

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Management Department

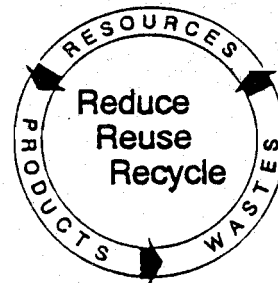
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# WALWORTH COUNTY

W3929 County Rd NN  
Elkhorn, WI 53121-4362  
Telephone: (414) 741-3394  
FAX: (414) 741-3266

## Solid Waste Management Department



July 7, 1994

To: All Interested Individuals

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Significant changes have taken place with regard to solid waste management in the County since the completion of the original County Solid Waste Plan in 1982. The increase of recycling due to Act 335, Wisconsin's Recycling Law, the abandonment of eight landfills once used for the disposal of Walworth County waste, the ban on yard waste from landfills, and the siting of a major landfill and landfill expansion are all changes that have occurred since the original Plan was completed.

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Sincerely,

Wade Scheel, Manager  
Walworth County Solid Waste  
Management Department

WS:jc



# WALWORTH COUNTY

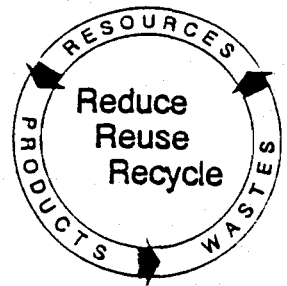
W3929 County Rd NN

Elkhorn, WI 53121-4362

Telephone: (414) 741-3394

FAX: (414) 741-3266

## Solid Waste Management Department



July 14, 1994

Dear Municipal Official:

The Southeastern Wisconsin Regional Planning Commission (SEWRPC), in cooperation with the Walworth County Solid Waste Management Department, has recently completed an update of the Solid Waste Management Plan for Walworth County. The County Solid Waste Department has scheduled a public informational meeting to review the findings and recommendations of the Plan update. The meeting has been scheduled for **Wednesday, July 27, 1994 at 7:00 PM** and will be held in the Auditorium of the Courthouse Annex East building of the Lakeland Complex on Highway NN east of Elkhorn. This information has already been sent to the recycling contact person for your community, but please pass the information regarding this meeting on to compost site managers, street supervisors, or any other individual in your municipality who may be interested in solid waste management issues.

Significant changes have taken place with regard to solid waste management in the County since the completion of the original County Solid Waste Plan in 1982. The increase of recycling due to Act 335, Wisconsin's Recycling Law, the abandonment of eight landfills once used for the disposal of Walworth County waste, the ban on yard waste from landfills, the siting of a major landfill and landfill expansion are all changes that have occurred since the original Plan was completed. The purpose of the Plan update was to review the recommendations of the initial County Solid Waste Management Plan and to develop and evaluate alternatives for countywide solid waste management in the future. The Plan update focuses on those areas which the County can significantly influence including: options for recycling, household hazardous waste collection and disposal, yard waste composting, public education, landfilling, and incineration.

A summary pamphlet has been developed to briefly present the findings and recommendations of the study. A copy of the summary pamphlet is enclosed for your review. The final report is to be published after the public informational meeting so that any changes in the Plan necessitated by written comments or testimony presented at the informational meeting can be incorporated into the report. I realize that this information may be reaching you after your monthly community meeting, therefore, I will be accepting written comments until August 19 to give you the opportunity to discuss this information with your city/town/village council. Written comments should be sent to my attention at the address given on this letterhead.

Thank you for your consideration of this matter, and please call me if you have any questions.

Sincerely,

Wade Scheel, Manager  
Walworth County Solid Waste Management Department





WALWORTH COUNTY BOARD OF SUPERVISORS

AGENDA

TUESDAY, SEPTEMBER 20, 1994 - 6:00 p.m.  
COURT HOUSE - COUNTY BOARD ROOM

- A) Call to order - 6:00 p.m.
- B) Roll Call
- C) Pledge of Allegiance
- D) Adoption of Minutes
- E) Special Order of Business
  - 1. 6:30 p.m. - Solid Waste Plan Update and a Solid Waste Management Plan Update for Walworth County - 2010 - Robert Biebel, SEWRPCOM & Wade Scheel, Solid Waste Mgr.
- F) Claims
  - 1. Tuscany Partners - \$1,700.00 - Denied
  - 2. Diana J. and James McCambridge - \$50,000.00 - Denied
- G) Reports of Officers
  - 1. County Clerk - Zoning Gone Into Effect
  - 2. County Clerk - Zoning Petitions Referred
  - 3. Chairman's Report
  - 4. WCA Director's Report
- H) Reports of Committees
  - 1. Park & Planning Commission:
    - a) William J. and Patricia O'Neill, Geneva - approved
    - b) Michael V. Lazzaroni (Michael and Antonia Lazzaroni, Appl.), Linn - approved
    - c) Warren and Marilyn Hull-Hull Living Trust, Whitewater - approved
    - d) Kenneth D. and Marian L. Walter (Pell Lake Sanitary Dist. #1, Appl.), Bloomfield - approved
    - e) Gaylord M. and C. P. Culp (Douglas R. Schuldt, Appl.), Lyons - approved
    - f) Mary C. Dawson and Steven and Jodi Scott (Pioneer Mobile Homes, Inc., Appl.), Darien - approved
    - g) Martin J. Brunner, Richmond - approved
- I) Appointments
- J) Unfinished Business
- K) New Business
  - Res. No. 24-09/94- Authorizing the Purchase of New

- Walk Through Metal Detector - Sheriff
- Res. No. 25-09/94- Declaration - September 1994 Child Support Enforcement Month in Walworth County - Law Enforcement Committee
- Res. No. 26-09/94- Lakeland Medical Center Loan from County General Fund - Lk. Medical Center Board of Trustees
- Res. No. 27-09/94- Buy Out Lease - IBM Credit Corp. - Computer Aided Dispatch System-Finance Committee
- Res. No. 28-09/94- Amend Rules of Government - Walworth County Solid Waste Management Board - Solid Waste Mgt. Board
- Res. No. 29-09/94- Walworth County to Host 1999 Wisconsin Counties Association Annual Convention - Executive Committee
- Res. No. 30-09/94- Lifeline Trailer Lease Extension - Law Enforcement Committee
- Res. No. 31-09/94- Adopt Revised Personnel Policies: LMC Outreach Respiratory Therapy
- Res. No. 32-09/94- Solid Waste Management Plan Update - Solid Waste Mgt. Board

L) Communications

M) The transaction of any business which is properly brought before the Board.

Carol Krauklis  
County Clerk

## NEWSPAPER ARTICLES REGARDING THE WALWORTH COUNTY SOLID WASTE MANAGEMENT PLAN UPDATE

Lake Geneva Regional News  
August 4, 1994

# County Waste Plan Updated

By Charles Addy

Lake Geneva Regional News

A preliminary solid waste plan update for Walworth County was presented to approximately 40 citizens and officials Wednesday, July 27, at a public informational meeting in Elkhorn.

Since the completion of the initial solid waste management plan for Walworth in 1982, significant changes have taken place with regard to solid waste management in the county. Included in these changes is a shift toward more recycling, the abandonment of eight landfills formerly used for waste disposal, the siting of a new major landfill in the county and new state regulations relating to landfill disposal, incineration facility requirements and recycling.

At the request of the County Solid Waste Management Board, the update of the plan was prepared by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in cooperation with the county solid waste management department to address issues affecting solid waste management within the county, including updating the plan for the year 2010.

The plan provides an updated assessment of solid waste management needs and develops and evaluates alternatives for county-wide solid waste management facilities in a manner compatible with the roles of the local government units operating in the county.

## Major Steps

Major steps involved in the preparation of the plan were: 1) the formation of solid waste management objectives, 2) collection and analysis of data pertaining to the existing system, 3) forecasts of solid waste management needs and of resources available to meet those needs, 4) development of alternative solid waste management plans and 5) selection of the best set of alternatives.

The meeting was called to order by Stanley Mikrut, chairman of the Solid Waste Management Board. He introduced Robert Biebel, SEWRPC chief environmental engineer, to review the plan with the audience. Wade Scheel, manager of the county's solid waste management department, summarized the process involved in updating the 1982 plan which included a comprehensive survey completed by all county municipalities and Whitewater which included data through November 1992. Another survey on yard wastes was completed in October 1993.

SEWRPC used the information to develop chapters of the plan at the rate of one every month or two which were then reviewed and approved by the solid waste management board currently composed of county board members Ann Lohrmann, Mikrut, Stanley Muzatka, Lawrence Scharine and Peter Wenglowsky. Citizen board members are Bernadette Carney, James Hough, Judy Knudsen, and Dennis Richter.

## Banned Items

Biebel pointed out that Wisconsin statute requires that by Jan. 1, 1995 the following items will be banned from landfills: newspapers, magazines, corrugated cardboard, office paper, aluminum, glass, steel, plastic, and bi-metal containers, styrofoam packaging and waste tires. He also said that local government units are the designated "responsible units for recycling" under state law.

Biebel said the 577 square mile area covered by the updated plan had 28,000 housing units, including 8,000 seasonal units, and a population of 77,000 according to the 1990 Census. He said 11 per cent of land use in Walworth County is for urban uses.

Due to potential development pressures from Illinois Biebel said it is useful to consider a "range of potentials" for the Walworth plan. He said that a year 2000 population could range between 89,000 (16 per cent increase) up to 141,000 (83 per cent increase).

Biebel said the primary focus of the plan is residential solid waste. The summary report indicates that the 1992 residential solid waste stream was estimated to include 37,600 tons of mixed solid waste, or approximately 2.6 pounds capita per day and 3,300 tons of recycled solid waste. The total amounts of residential solid waste generated within the study area may be expected

to increase from about 40,600 tons per year in 1992 to about 50,400 and 80,700 tons per year under the intermediate-growth centralized and high-growth decentralized future condition scenarios, respectively.

Biebel said SEWRPC had projected that the present less than 10 per cent recycling rate will increase to 34 per cent. He also stated that wastes generated from outside the county have a heavier impact on the plan than what is generated in the county. Only 60 acres would be needed to handle Walworth County's wastes.

Biebel said that recycling is more expensive than landfilling if only direct costs are considered.

## Seasonal Resident Problems

In the public comment section of the meeting Jim Johnson, Fontana trustee, said he was glad to hear that the seasonal population phenomenon had been addressed in the plan. He said that "seasonals are not sorting recyclables." Biebel said drop-off centers open on weekends might help to solve the problem. Johnson said there is a dumpster problem at Abbey Springs. Biebel said a bag system might be an alternative as well as a "variable service" where a contractor would be paid extra to pick up containers from next to garages instead of from the curb only.

Brian Jongetjes from John's Disposal, Whitewater, suggested that garbage and recycling at a common disposal site might be an alternative.

Gene Samuelson representing a group of "164 people in Linn Township called the Linn Weekenders" said that 60 to 70 per cent of the population in Linn is from "out-of-state."

Samuelson said he was disappointed in the plan update in that it was not as comprehensive as the first. He also complained that there was a lack of exchange of information between governmental units and professionals "in the (solid waste) business." He charged that there was no coordination of township plans at the county level.

Samuelson said Abbey Springs residents were drinking bottled water due to the presence of nitrates in the water. He suggested the nitrates were coming from golf course fertilizers. Johnson responded to the accusation saying "no way" and referred to two university reports which had studied the problem.

Biebel said that \$100 per household per year for solid waste services is

PLEASE SEE WASTE PLAN PAGE 260

## Waste Plan

CONTINUED FROM PAGE 259

not that expensive in comparison to other counties. He indicated that as more recycling occurs, the costs will rise.

Scheel responded to Samuelson's charges of the lack of coordination of township activities. He said that a great degree of cohesiveness was lost due to the state recycling law which allows each community to be responsible for its own programs.

Biebel suggested to Samuelson that Scheel could be invited to attend public meetings to make use of his knowledge of what other governmental units are doing.

Bob White, former Solid Waste Management board member, asked if there is no market for recyclable waste would it end up in a landfill. He also asked if the county is responsible for helping to market the recyclable waste.

Scheel said that he doubted contractors would jeopardize their standing with a governmental body by not responsibly and ethically handling recycled materials. He said that he could think of one particular instance which was "blown out of proportion."

As to the marketing question, Scheel said he believed that contractors were doing a good job on their own.

Mike Ettner, Waste Management, said recyclables are recycled and that it is "not a problem."

Lyle Smith, recycling coordinator for Delavan, said he believed government should stay out of the garbage business, but encouraged the county to take a lead role in composting. He also suggested a mechanism or equipment

that could visit each municipality to pick up household hazardous wastes periodically.

Scheel said that a "clean sweep" operation is difficult to stage due to difficult state regulations.

Samuelson suggested that the county should inform citizens on how to compost on their own.

Scheel said there is \$3,000 for education purposes in the solid waste management department budget which he said he planned to use to produce "generic" brochures which all municipalities could use. He acknowledged that the Department of Natural Resources already produces brochures on recycling issues.

Biebel referred to the potential landfill siting map SEWRPC had produced and cautioned that it was not the purpose of the study to identify specific sites due to cost considerations and the purpose of the updating activities. He said waste stream flows will be continually monitored and if capacities are used up faster than expected a more detailed analysis could be triggered at a future date.

Biebel said the county farm site offered a potential site that would need further research. He said due to development in the county since 1980 the areas of best potential had been reduced since landfills are meant to be isolated from settled areas.

Persons having questions about the Solid Waste Management Plan Update or who wish to submit written comments on the plan may write to Wade Scheel, Manager, Walworth County Solid Waste Management Department, W3929 County NN, Elkhorn, 53121-4362 or call 741-3394.

# Supervisors Approve County Waste Plan

## Landfill Ban on Yard Wastes, Recyclables Delays Need for New Site

By Judy Lincoln

Lake Geneva Regional News

Supervisors unanimously approved a plan to meet solid waste disposal needs through the year 2010 Tuesday, Sept. 20, when it was described differently than outlined in published form.

The 1993 landfill ban on yard wastes and a similar ban on virtually all recyclables as of Jan. 1, 1995 will help delay the need for a new landfill site in Walworth County, Southeastern Wisconsin Regional Planning Commission (SEWRPC) member Robert Biebel told supervisors at the County Board Meeting.

Biebel then summarized two elements of the SEWRPC Solid Waste Plan update through the year 2010 with a slightly different emphasis than indicated in the group's published summary.

### Residential Recyclables

With respect to "residential" recyclables, the published plan's first recommendation is for the county to operate a transfer, storage and potential sorting facility near Lakeland Complex, where the county would deal with its own recyclables at a site shared with

municipalities or their collection contractors.

Biebel mentioned the shared site idea last among three recommendations for "residential" recyclables, after describing the written plan's recommendations for the county to help municipalities develop public education programs and provide samples of ordinances and specifications for waste-haulers.

As of Jan. 1, Biebel said recycling is required for newspapers, magazines, corrugated cardboard, office paper, styrofoam packaging, waste tires, bi-metal containers and containers of aluminum, glass, steel and plastic.

The recycling programs themselves are to be developed and implemented by municipalities, Biebel noted, adding that state laws for some related functions to be delegated to counties.

### Yard Waste Management

With respect to yard waste management, Biebel reversed the order of recommendations in the SEWRPC written plan, which first recommends the county run a compost operation at Lakeland Complex.

The second yard waste recommen-

dation in the written plan is for the county to implement an education program on composting, encouraging individuals to compost yard wastes on their own property.

Briefly summarizing other elements of the published SEWRPC plan, Biebel said the county should continue with household hazardous waste collections, using either a mobile collection point or multiple fixed collection points at a recommended six locations annually or biennially;

- The county should work with the Department of Natural Resources to amend current regulations that discourage using multiple collection centers for household chemical collection programs;

- The county should survey agricultural hazardous waste disposal needs and schedule programs accordingly; and

- The county should develop an education program geared toward reducing hazardous household waste.

On the controversial topic of landfills, Biebel said Walworth County sites at Mallard Ridge and Troy Area landfills "import" waste brought in from northern Illinois as well as Rock, Milwaukee, Waukesha, Jefferson, Dane, Kenosha and Racine counties.

Privatized waste companies and interstate commerce regulations are responsible for "imported" trash, Solid Waste Manager Wade School said, and Biebel also noted that Walworth County refuse ends up in both local landfills and in three out-of-county landfills as well.

"A county this size-about 40 square miles-needs about 60 to 80 acres of landfill to serve its own needs," Biebel said, but he said there is no need to plan for specific future landfill sites until there is an identifiable need for the space.

Both Biebel and the SEWRPC written plan recommend that the county develop an annual review of waste disposal needs because "the potential exists that the approved landfill capacity for disposal of non-recycled solid waste may become inadequate in the future."