KANE COUNTY SOLID WASTE

MANAGEMENT PLAN

FIVE YEAR UPDATE

November, 1997

VOLUME 1

Prepared by the
Kane County Department of Environmental Management
Geneva, Illinois

Adopted by the
Kane County Board

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Chapter 5 Evaluation of Alternative Waste Technologies prepared by Andrews Environmental Engineering, Inc., Warrenville, IL

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KANE COUNTY SOLID WASTE MANAGEMENT PLAN
FIVE YEAR UPDATE
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EXECUTIVE SUMMARY

On November 10, 1992 Kane County adopted the Solid Waste Management Plan, prepared in compliance with the Illinois Solid Waste Planning and Recycling Act (415 ILCS 15/1 et seq). The Planning and Recycling Act requires that, "each county waste management plan shall be updated and reviewed every five years, and any necessary or appropriate revisions shall be submitted to the (Illinois Environmental Protection) Agency for review and comment." This document, the Kane County Solid Waste Management Plan update (Update), has been prepared in accordance with this requirement.

The Kane County Plan was developed over a period of two years by the Kane County Development Department. A twenty member Solid Waste Plan Advisory Committee was appointed by the County Board in June 1990, reviewed the Plan during its development and made recommendations to the County. Each step of the planning process was also reviewed by the Development Committee of the County Board.

In September 1995, the County Board directed the Department of Environmental Management, a new department created in June 1994, which now administers the solid waste program of the County, to begin this Update of the Plan. Each piece of the Plan Update was reviewed by the Solid Waste Committee.

An assessment of solid waste needs found that in the base year of 1989, 490,820 tons of solid waste were generated, the equivalent of 8.4 pounds per person each day. In 1997, with an estimated population growth of approximately 18% since 1989, it is estimated that Kane County will generate 572,390 tons of waste; again, the equivalent of 8.4 pounds per person each day, of which 37% is residential waste, 28% is commercial waste, 22% is industrial waste, and 13% is construction and demolition waste.

In 1989, approximately 9% of the waste stream was recycled. With aggressive recycling programs, the County has achieved a countywide recycling rate of 37.6% in 1996, and has set a 52% recycling rate goal by the year 2003. The County has the most aggressive recycling program in Illinois. Curbside recycling is offered to every resident. The County has adopted a multi-family recycling ordinance where owners of multi-family dwelling units must provide recycling service for the occupants of their buildings, and waste haulers must provide recycling services to all residential dwelling units they serve within Kane County. In addition, Kane County has adopted a commercial recycling ordinance. This ordinance requires all commercial establishments in the County to recycle the two largest recyclable materials in their waste stream. Haulers may not collect waste from any establishment that is not recycling. The County not only has adopted these ordinances, but they are being enforced. The County has developed educational programs targeted at both the general public and school populations. These actions have allowed our residential and commercial recycling programs to mature. Construction and demolition waste recycling has been a difficult challenge. The County will continue to pursue programs which will increase recycling of this portion of our waste stream.

Programs aimed at reducing the amount of solid waste produced in the County will continue to be developed and expanded. These programs include source reduction, household hazardous

waste collection events, tire collection events, waste oil collection events, latex paint drop-off facilities, landscape waste composting, household appliance recycling, and battery collection programs.

The County commissioned a detailed evaluation of waste technologies be conducted. This study evaluated and compared several waste technologies to landfilling.

Kane County has two active landfills. The Woodland Landfill, located in unincorporated St. Charles Township, is owned and operated by Waste Management of Illinois, Inc. This facility has a projected life of approximately two and a half years. Waste Management has committed that this landfill will not expand. The other active landfill is Settler's Hill, located in unincorporated Geneva Township, owned by Kane County and operated by Waste Management. This facility received siting approval by the County Board for an expansion of 5.5 million cubic yards of capacity in January, 1994. The siting approval was challenged, and ultimately upheld in September, 1997. Upon receiving approval of this expansion, the County Board, the City of Geneva, and Waste Management entered into a three party binding agreement which resolved differences concerning this facility, and commits that Settler's Hill will cease accepting waste before January 1, 2008.

To meet our future waste disposal needs, the Update departs from the philosophies of the original Plan. The original Plan called for the County to take all necessary steps to assure that future landfill capacity is available by developing a new landfill facility controlled by the County, and located within the County. The County formed a fifteen member Public Siting Advisory Committee, hired a professional consultant to work with the committee, and evaluated all of unincorporated Kane County for suitable landfill site locations. The findings of this effort were presented to the County Board in September, 1995. The Board resolved that Kane County will not pursue the acquisition of property, the development of, or siting approval for a new landfill in Kane County. As a result of the work conducted by this committee, the Plan Update does not support the development of new landfill capacity within unincorporated Kane County by any individual or organization.

The Plan Update demonstrates adequate landfill capacity exists to meet our long-term disposal needs, and landfill tipping fees have become very competitive. This trend is projected to continue based on existing, permitted landfill capacity in Illinois, market conditions, and competition. In order to access this existing landfill capacity, a series of waste transfer stations, owned and operated by the private sector are proposed to be developed. Transfer stations consolidate waste from waste collection trucks to semi-truck loads for more efficient transport over long distances. With a network of transfer stations and continued competitive landfill pricing, waste disposal costs are projected to remain stable.

CHAPTER 1
INTRODUCTION AND BACKGROUND

On November 10, 1992 Kane County adopted the Solid Waste Management Plan, prepared in compliance with the Illinois Solid Waste Planning and Recycling Act (415 ILCS 15/1 et seq). The Planning and Recycling Act requires that, "each county waste management plan shall be updated and reviewed every five years, and any necessary or appropriate revisions shall be submitted to the (Illinois Environmental Protection) Agency for review and comment." This document, the Kane County Solid Waste Management Plan update (Update), has been prepared in accordance with this requirement.

In September 1995, the County Board directed the Department of Environmental Management, a new department created in June 1994, which now administers the solid waste program of the County, to begin this Update of the Plan. Each piece of the Plan Update was reviewed by the Solid Waste Committee.

Five years have now passed since adoption of the Plan by the County Board. The Plan has been closely adhered to. The primary change contained within this Update compared to the original Plan is adequate landfill capacity exists outside Kane County to meet our long term needs. The Plan Update recommends a series of privately owned and operated transfer stations be developed to access this existing landfill capacity. Under this scenario, no additional landfill capacity is needed within Kane County beyond what has been sited, and disposal rates are projected to remain stable.

The Chapters of this Plan Update are organized according to the six steps used to update the Plan:

1) Demographic Trends, Waste Composition, and Waste Generations Rates (Chapter 2)

2) Waste Reduction Programs (Chapter 3)

3) Recycling Activities and Goals (Chapter 4)

4) Evaluation of Waste Technologies as an alternative to landfilling (Study conducted by Andrews Environmental Engineering, Inc.) (Chapter 5)

5) Developing a Transfer Station Program (Chapter 6)

6) Evaluation of the landfill market (Chapter 7)

CHAPTER 2
SOLID WASTE NEEDS ASSESSMENT

Introduction

Kane County's original Assessment of Solid Waste Needs was completed in October, 1990 and relied upon data collected in 1989. Since that time, the County's waste generation and waste management patterns have changed significantly. The primary purpose of this component of the Kane County Plan Update is to document and discuss those changes and to provide a basis for further enhancements to Kane County's successful waste reduction and disposal system.

This chapter addresses demographics, waste generation, waste composition, and waste management in Kane County. It examines data and trends for the past five years, and projects key waste management planning data five years into the future. Several of the key findings of this analysis are:

- Kane County is expected to continue experiencing significant growth in population (34%), households (48%), and employment (27%) over the period 1990-2010. This growth will result in increased solid waste generation, and the continued need for planning and infrastructure enhancement to effectively and efficiently manage the County's growing waste stream.

- In 1997, it is estimated that Kane County will generate approximately 572,390 tons of solid waste, an increase of 17% since 1989. By 2001 (the last year covered by this five year Plan Update), the County will generate an estimated 612,555 tons of waste, an increase of 25% since 1989.

- Textiles, food waste and wood represent the three largest components of the County's solid waste stream that are not currently collected by the majority of the County's recycling programs. Combined these materials comprise approximately 29% of the solid waste generated in the County.

- Kane County has 16 permanent solid waste management sites in the County that accept a wide range of materials, including recyclables, landscape waste, used motor oil, latex paint, household batteries and refuse. In addition, there are numerous one day collection events held in the County each year for items such as household hazardous waste, tires, used motor oil and latex paint.

- Approximately 33 % of the municipalities in the County have volume-based or modified volume-based billing systems for residential waste collection.

- In 1996, the County recycled 38% of its solid waste, an increase of 14 percentage points since the Plan was adopted in 1992. The greatest growth in recycling since 1992, in percentage terms, has been commercial sector recycling (247%) and curbside recycling in the unincorporated areas of the County (102%).

- Future growth in residential recycling, in percentage terms, is expected to level off in the near future and commercial sector recycling is expected to steadily grow as the Kane County Recycling and Hauler Licensing Ordinance becomes fully implemented.

- The County has made significant progress in meeting its ultimate recycling goal of 47.3%. Recycling efforts targeting residential, commercial and landscape wastes have achieved 94% or greater of their targeted goals. The remaining waste stream, construction/demolition debris, has only achieved a 3% recycling rate, which is only 4% of its target goal of 75%. Increased recycling of construction/demolitions debris will likely be necessary in order for the County to reach its 47.3% recycling goal.

- The amount of waste landfilled by the County has decreased 21% from approximately 446,155 tons in 1989 to 350,785 in 1996. This decline has occurred in spite of a 14% increase in solid waste generation over the same time period. Despite the County's success in diverting material from the landfill, 350,785 tons per year is still a significant amount of waste requiring final disposal. The County will need to continue evaluating long-term disposal options to manage this waste.

Methodology

The 1990 Assessment of Solid Waste Needs (found in Appendix A of the 1992 Kane County Solid Waste Management Plan) utilized data collected from local sources. These sources included the two landfills in the County, waste haulers, and recycling service providers. The data was used to estimate the amount of municipal waste and non-hazardous, non-special industrial waste ("solid waste") generated in the County. As will be demonstrated later in this chapter, this data collection effort yielded projections of future waste quantities that compare favorably to annual data the County now collects pursuant to the Kane County Recycling and Hauler Licensing Ordinance.

This update relies on the data and projections contained in the 1990 Assessment of Solid Waste Needs and the data currently collected from the haulers and recyclers on an annual basis. Using these two sources of data the County is able to project waste generation rates, recycling rates, landscape waste diversion rates, and landfilling rates with reasonable accuracy.

In order to estimate the composition of the waste stream the County has chosen to rely on a combination of national data published by the USEPA and local data collected through field sorting studies conducted at landfills in Lake County and DuPage County. These three sources of data were averaged and then modified to reflect Kane County's highly successful residential and commercial recycling programs. Waste sorting studies are relatively expensive and given the fact that two nearby and similar counties (Lake and DuPage) have already conducted such studies it was decided that performing another waste sorting study in Kane County was not necessary.

The data on solid waste generation, composition and management practices presented in the following sections is primarily focused on the period 1992-2001. 1992 is significant because it is the year the County adopted the Kane County Solid Waste Management Plan. The year 2001 is significant because it is the last year covered by this five year Plan Update.

Demographic Trends

A primary variable affecting solid waste generation in Kane County is the growth in population, households and employment. As the following data suggest, Kane County is experiencing significant growth in population, households and employment. If this growth is to be sustained, the County must plan for a solid waste management system that provides affordable and convenient recycling services and disposal capacity.

Population

Table 2-1 shows Kane County's population projections by municipality for the period 1990-2010. Note that the totals are for Kane County only, and do not include portions of border municipalities that lie outside of the County's border.

Figure 2-1 shows projections of population growth from 1990-2010. During this twenty year period, the County's population is projected to increase from 317,471 in 1990 to 426,100 in 2010, an increase of approximately 34%. The impact of this population growth is significant on the County's waste management infrastructure because it continues to increase the demand for managing the recyclables and residual waste generated by the County.

TABLE 2-1
POPULATION TRENDS IN KANE COUNTY, 1990 - 2010

Municipality	1990 Count	2010 Projection	% Change
Algonquin[1]	1,469	5,417	269%
Aurora[1]	84,770	103,127	22%
Barrington Hill[1]	151	177	17%
Batavia	17,076	23,581	38%
Burlington	400	495	24%
Carpentersville	23,049	33,790	47%
East Dundee	2,721	7,410	172%
Elburn	1,275	6,167	384%
Elgin[1]	61,610	78,942	28%
Geneva	12,617	20,985	66%
Gilberts	987	3,069	211%
Hampshire	1,843	4,226	129%
Maple Park[1]	641	823	28%
Montgomery[1]	3,675	6,431	75%
North Aurora	5,940	10,519	77%
Pingree Grove	138	277	101%
St. Charles[1]	22,491	33,147	47%
Sleepy Hollow	3,241	3,631	12%
South Elgin	7,474	10,479	40%
Sugar Grove	2,005	7,214	260%
Wayne[1]	823	1,841	124%
West Dundee	3,728	8,957	140%
Municipal Totals	**258,124**	**370,705**	**44%**
Unincorporated Kane County	59,347	55,395	-7%
County Totals	**317,471**	**426,100**	**34%**

Note:
1. Kane County Portion Only

Sources: 1990 Estimate: U.S. Census, 2010 Projections: Northeastern Illinois Planning Commission, Sept. 1990

POPULATION TRENDS IN KANE COUNTY
1990 - 2010

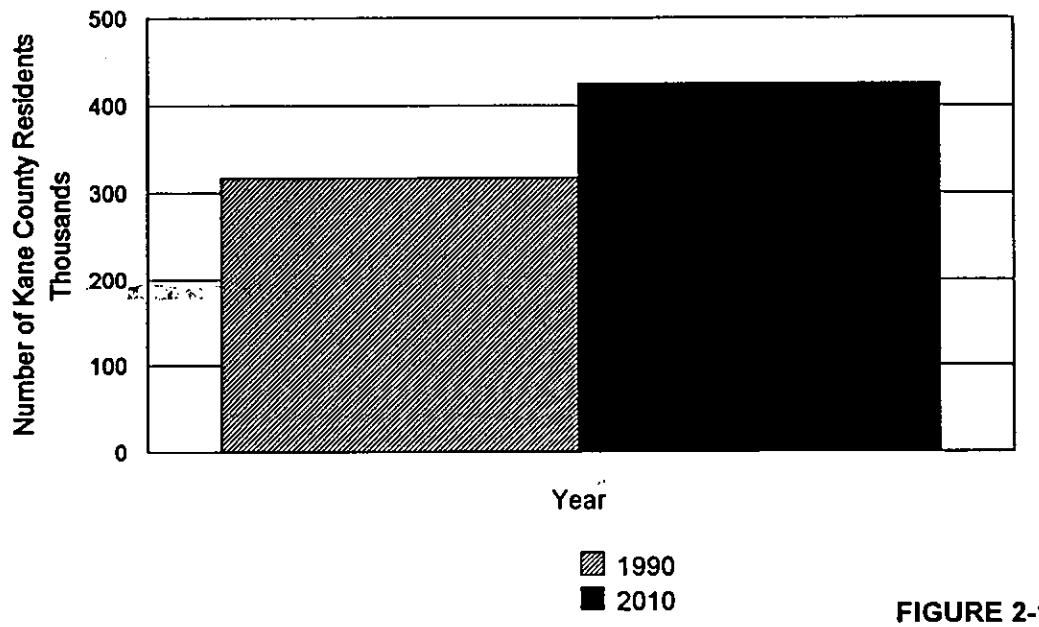


FIGURE 2-1

Households

Tracking household data, in addition to population data, is important because household growth in Kane County, on a percentage basis, is expected to be greater than population growth. Table 2-2 indicates the total number of households, by municipality, for the period 1990 to 2010. Figure 2-2 shows the growth in the total number of households from 111,496 in 1990 to 164,890 in 2010, an increase of approximately 48%. The projected household growth in the incorporated areas of the County is expected to be 56% which is substantially greater than the 10% growth expected in the unincorporated areas.

New, small chart
County-wide
Images,
Ranges -

TABLE 2-2
HOUSEHOLD TRENDS IN KANE COUNTY, 1990 - 2010

Municipality	1990 Household Count	2010 Household Projection	% Change
Algonquin[1]	456	1,865	309%
Aurora[1]	29,572	39,486	34%
Barrington Hills[1]	51	54	6%
Batavia	6,449	9,032	40%
Burlington	153	193	26%
Carpentersville	7,171	11,305	58%
East Dundee	1,028	2,758	168%
Elburn	474	2,427	412%
Elgin[1]	22,420	33,106	48%
Geneva	4,802	8,743	82%
Gilberts	295	1,039	252%
Hampshire	653	1,626	149%
Maple Park[1]	243	297	22%
Montgomery[1]	1,487	2,488	67%
North Aurora	2,391	4,447	86%
Pingree Grove	55	100	82%
St. Charles[1]	8,502	13,080	54%
Sleepy Hollow	1,064	1,209	14%
South Elgin	2,503	3,748	50%
Sugar Grove	697	2,461	253%
Wayne[1]	291	643	121%
West Dundee[1]	1,526	3,581	135%
Municipal Totals	**92,283**	**143,688**	**56%**
Unincorporated Kane County	19,213	21,202	10%
County Totals	**111,496**	**164,890**	**48%**

Note: 1. Kane County Portion Only

Sources: 1990 Estimate: U.S. Census, 2010 Projection: Northeastern Illinois Planning Commission

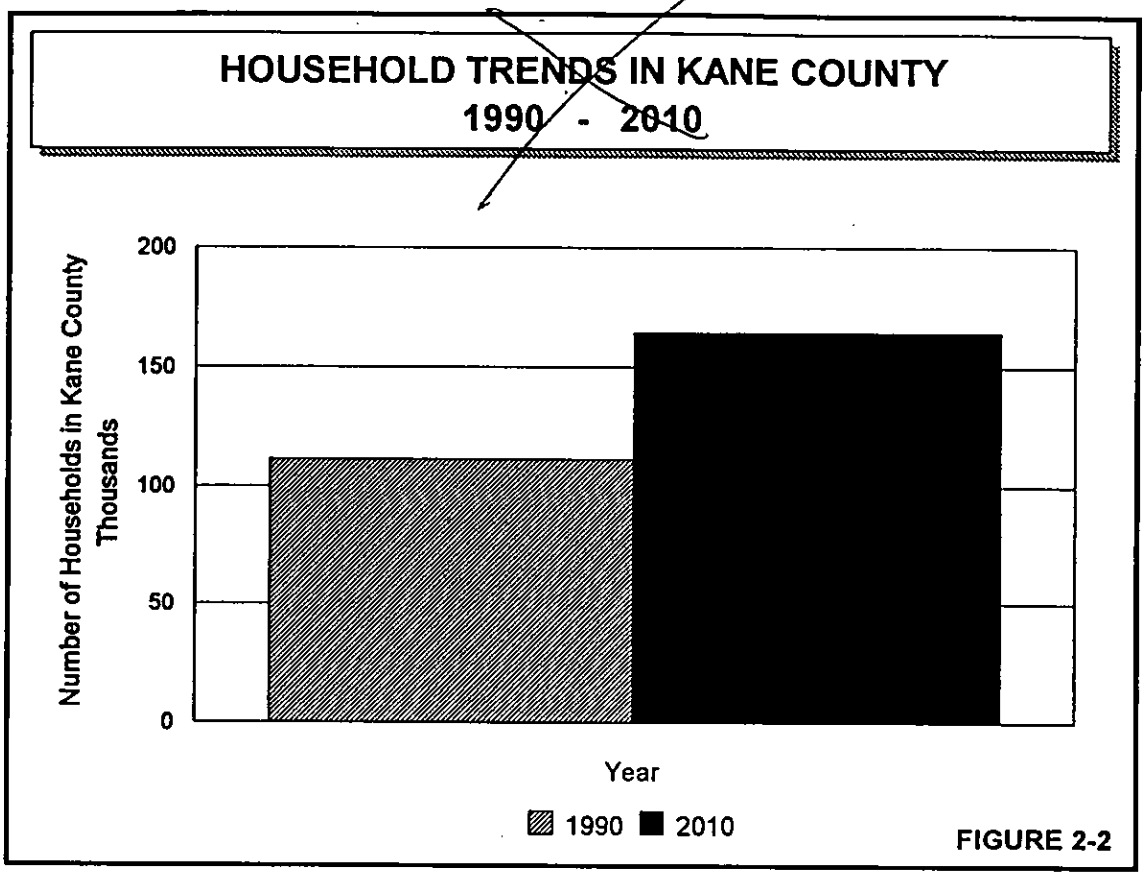


FIGURE 2-2

Employment

The level and type of employment in the County has a significant impact on waste generation in the County. Solid waste generated in the County due to commercial, industrial and construction activity represents approximately 63% of the solid waste generated in the County.

Table 2-3 contains estimates, by employment category, for Kane County in 1990. Figure 2-3 shows the growth in the overall number of jobs in Kane County from a total of 136,800 in 1990 to 174,400 in 2010, an increase of 27%.

TABLE 2-3
1990 EMPLOYMENT ESTIMATES FOR KANE COUNTY, BY CATEGORY

Employment Category	Number of Employees	% of Total Employment
Construction & Mining	7,000	5%
Manufacturing	33,900	25%
Transportation, Communication, Utilities, Wholesale Trade	11,900	9%
Retail Trade	28,400	21%
Finance, Insurance & Real Estate	8,100	6%
Services & Miscellaneous	21,500	16%
Health Services	10,700	8%
Federal Government	1,500	1%
State Government	2,100	1%
Local Government	4,200	3%
Local Education	7,500	5%
Total	136,800	

Source: Northeastern Illinois Planning Commission, Data Bulletin 93-2, June, 1993.

Redo

EMPLOYMENT TRENDS IN KANE COUNTY
1990 - 2010

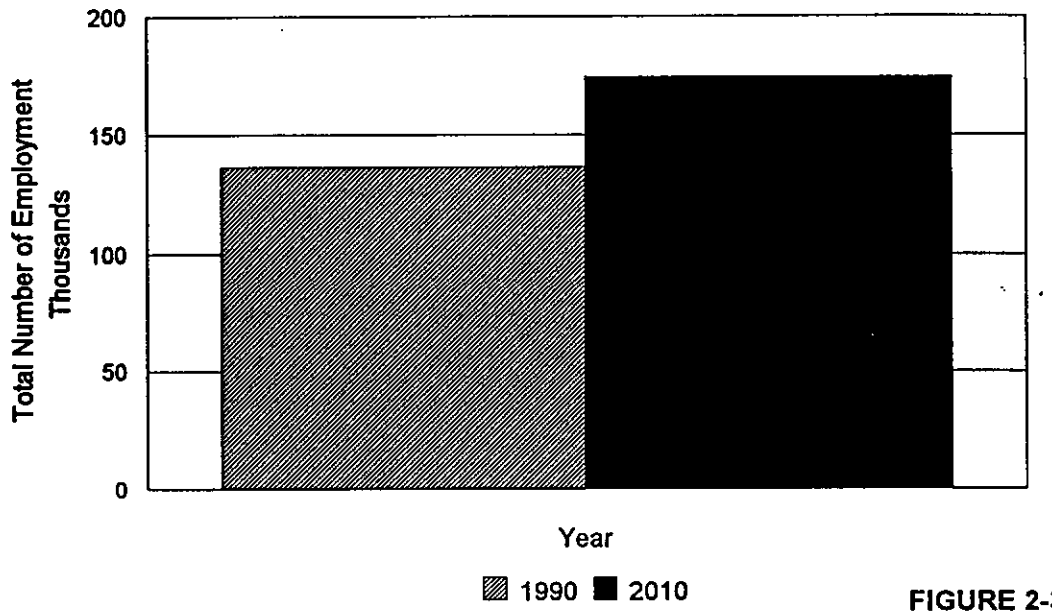


FIGURE 2-3

Waste Generation

This section provides estimates of the amount of non-hazardous solid waste generated by the residents, institutions and businesses in Kane County. It is important to track and monitor waste generation trends for planning purposes and to evaluate the success of waste management programs.

Kane County, in the original Solid Waste Management Plan, utilized local sources of data, including surveys of local businesses and landfill gate surveys conducted in 1989 and 1990, to estimate waste generation rates for the period 1989-2010, as documented in the 1990 Assessment of Solid Waste Needs. Based upon the data collected, the County estimated that waste is generated at an average rate of 8.4 pounds per capita per day, as shown is Table 2-4. The County estimated that 36.8% of this was residential waste, 28.1% was commercial waste, 22.5% was industrial waste, and 12.6% was construction/demolition waste, as shown in Figure 2-4. By multiplying the pounds per capita per day (pcd) estimates contained in the 1990 Assessment of Solid Waste Needs Report by the annual population estimate, the County is able to estimate future annual tonnages of solid waste generated in Kane County.

TABLE 2-4 PER CAPITA WASTE GENERATION RATES BY SECTOR	
Residential	3.09 pcd
Commercial	2.36 pcd
Industrial	1.89 pcd
Construction/Demolition	1.06 pcd
Total	8.40 pcd
Note: pcd = Pounds per capita per day	

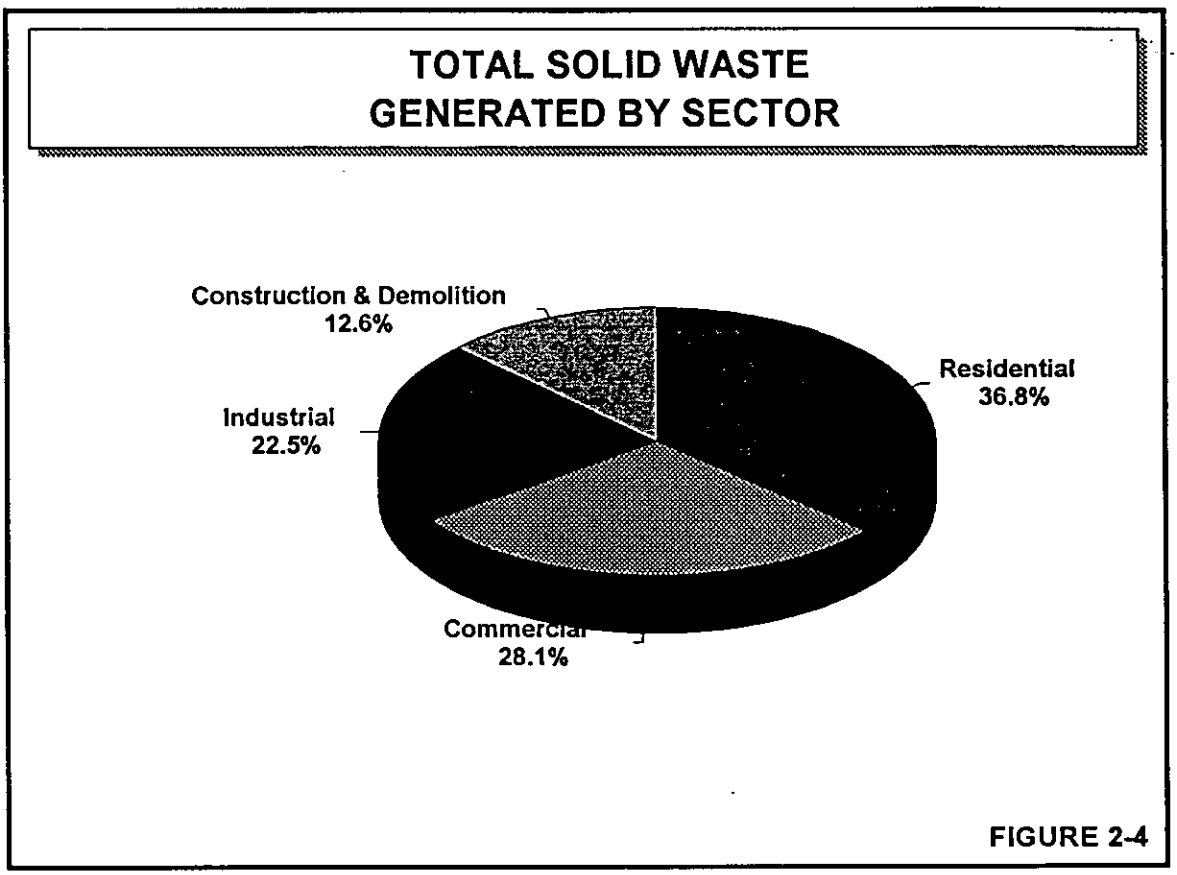


FIGURE 2-4

With the enactment of the Kane County Recycling and Hauler Licensing Ordinance, which requires annual reporting on the amount of recyclables, landscape waste and refuse collected by waste haulers and recycling service providers in the County, the County is now able to calculate on an annual basis the amount of solid waste generated. Figure 2-5 compares the total annual tonnage estimates for solid waste generation in Kane County from the 1990 Assessment of Solid Waste Needs with the actual reported data collected in accordance with the Kane County Recycling and Hauler Licensing Ordinance. The comparison only goes as far back as 1994, the first year reporting was required under the County's Ordinance. The difference between the estimates in the 1990 report and the actual reported data was 0.7% in 1994, 1.8% in 1995 and

6.1% in 1996. It appears that the projections contained in the 1990 Assessment of Solid Waste Needs are accurately predicting waste quantities in the County. As a result, the County intends to continue to rely upon the projections in the 1990 Assessment of Solid Waste Needs.

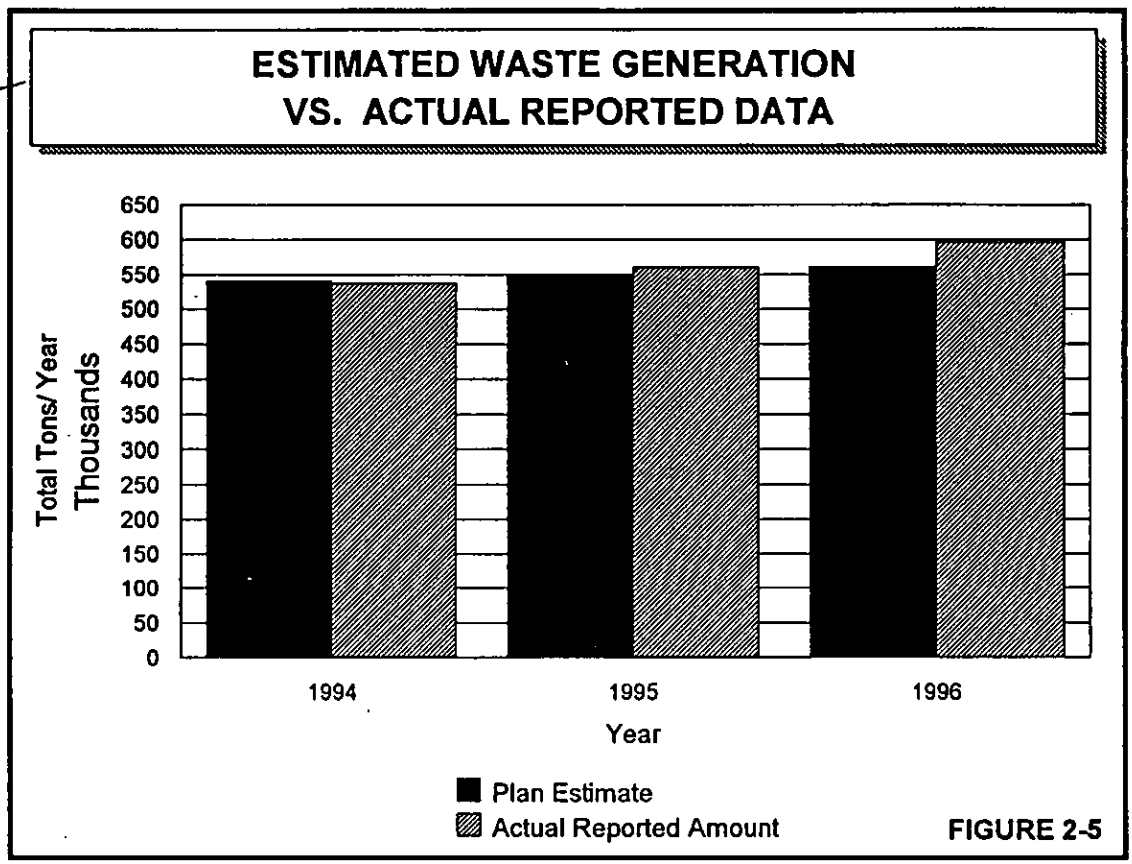


FIGURE 2-5

Current and Projected Waste Generation

In 1997 it is estimated that Kane County will generate 572,390 tons of material that will need to be recycled, composted or disposed of. Table 2-5 contains projections of annual waste tonnages for 1989-2001. Figure 2-6 shows the steady rise in the amount of waste generated in the County, which is expected to increase by approximately 25% from 1989 to 2001.

TABLE 2-5
PROJECTED SOLID WASTE GENERATION, 1989 - 2001

Year	Generation Rate*	Total Tons Per Year
1989	8.40	490,820
1990	8.43	500,664
1991	8.46	510,827
1992	8.49	521,050
1993	8.51	530,707
1994	8.54	541,040
1995	8.57	551,430
1996	8.60	561,881
1997	8.63	572,390
1998	8.66	582,960
1999	8.69	593,588
2000	8.72	604,277
2001	8.72	612,555

*Pounds per capita per day

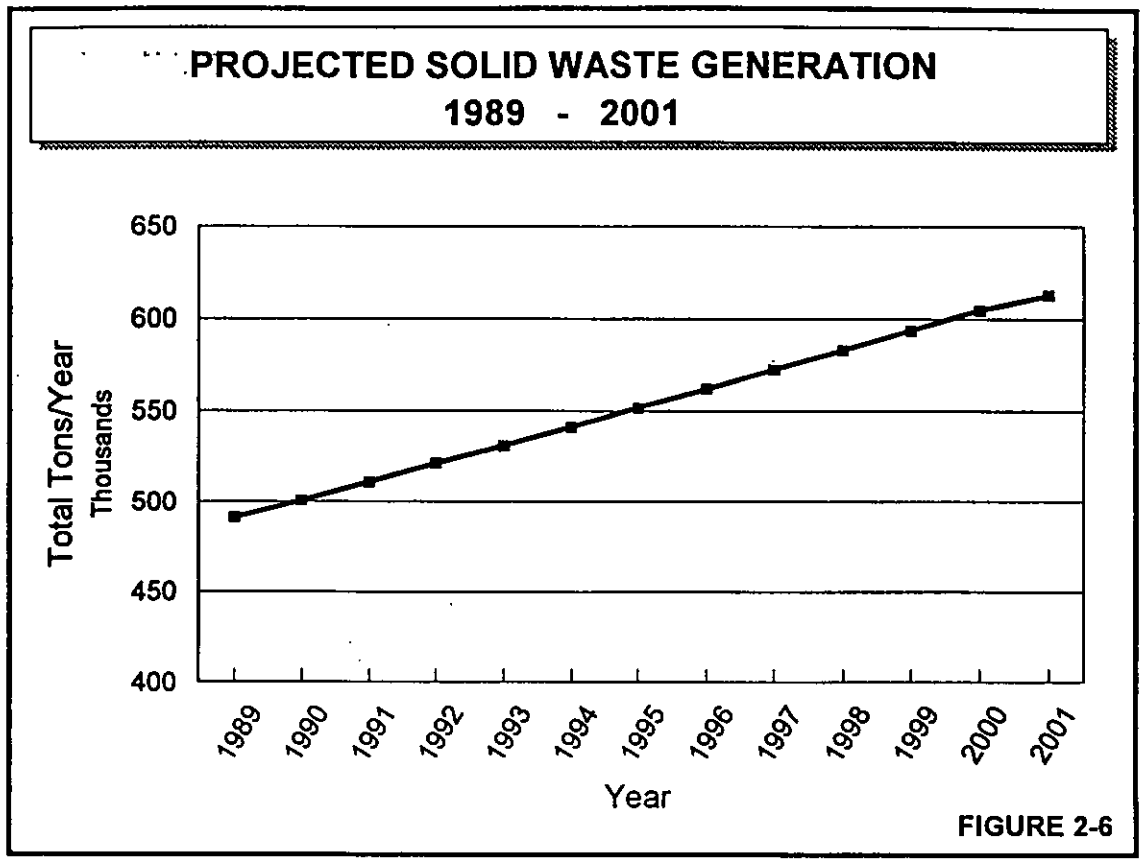


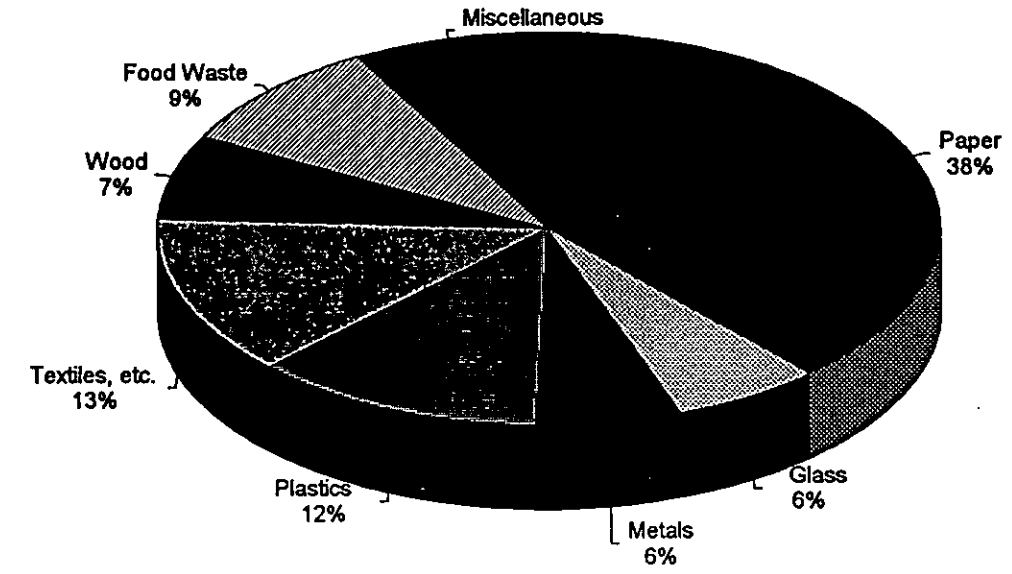
FIGURE 2-6

Waste Composition

Figure 2-7 shows the estimated composition of the County's solid waste stream. The percentage estimates are based on USEPA's national averages and local waste sorting studies conducted at landfills in Lake and DuPage Counties, which have been averaged and slightly modified by the County to account for its comprehensive residential and commercial recycling programs. The estimates shown in Figure 2-7 are for waste disposed, after recycling.

Figure 2-8 shows the amount of each solid waste stream component estimated to be generated in Kane County in 1997. Paper, textiles, plastics and food waste are the largest components of the waste stream and together account for approximately 412,121 annual tons or 72% of the total waste generated. To date, textiles and food waste have not been targeted by recycling programs to the same extent as paper, glass, metals, plastics, wood, and yard waste. Depending on market conditions these components of the waste stream may warrant further scrutiny.

KANE COUNTY
WASTE COMPOSITION, AFTER RECYCLING



Note: Projected Yard Waste = 0%

FIGURE 2-7

PROJECTED 1997 WASTE QUANTITIES, AFTER RECYCLING, BY MATERIAL

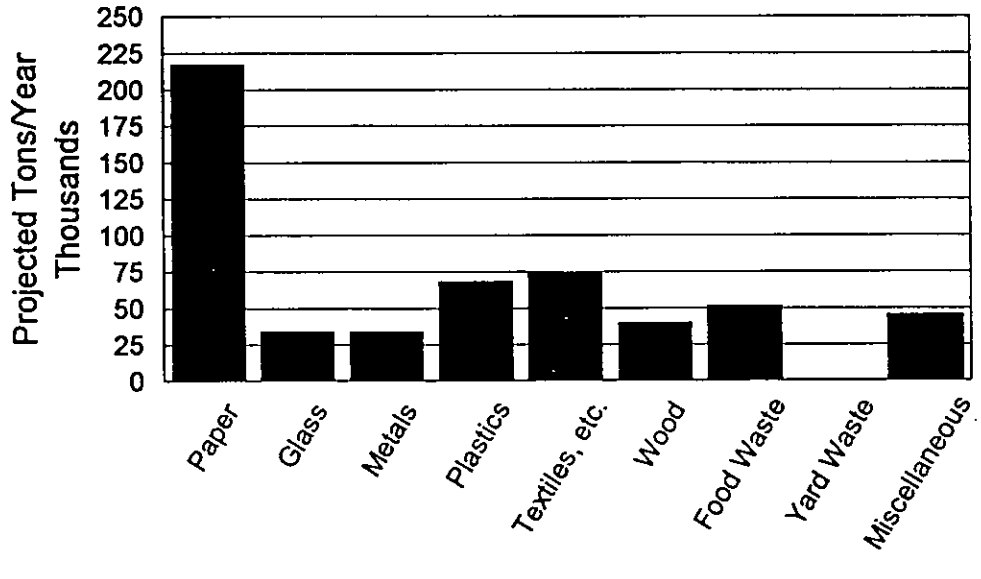


FIGURE 2-8

Soli
d

- Add Market Forces
Regional/State Capacity

Waste Management System

Since the enactment of the County's Plan in 1992 the waste management infrastructure in Kane County has continued to evolve. For example, many recycling drop-off locations have been replaced by curbside recycling programs and outlets have been established to accept such items as household batteries, used motor oil and latex paint. Figure 2-9 shows the approximate location of the various components of the waste management infrastructure located in Kane County. The infrastructure consists of two landfills, one transfer station, two MRFs, eight recycling centers (drop-off or buy-back), one landscape waste composting site, four latex paint outlets, four household battery drop-off sites and one used motor oil collection site. In addition, the County and other organizations in the County sponsor and coordinate one day collection events for used motor oil, latex paint, tires, newspaper and household hazardous waste. The County is currently negotiating with the City of Naperville to use Naperville's permanent household hazardous waste collection site.

The remainder of this section takes a closer look at the collection, processing and ultimate management of the approximately 561,881 tons of solid waste generated in the County in 1996 (the most recent year that comprehensive data is available for).

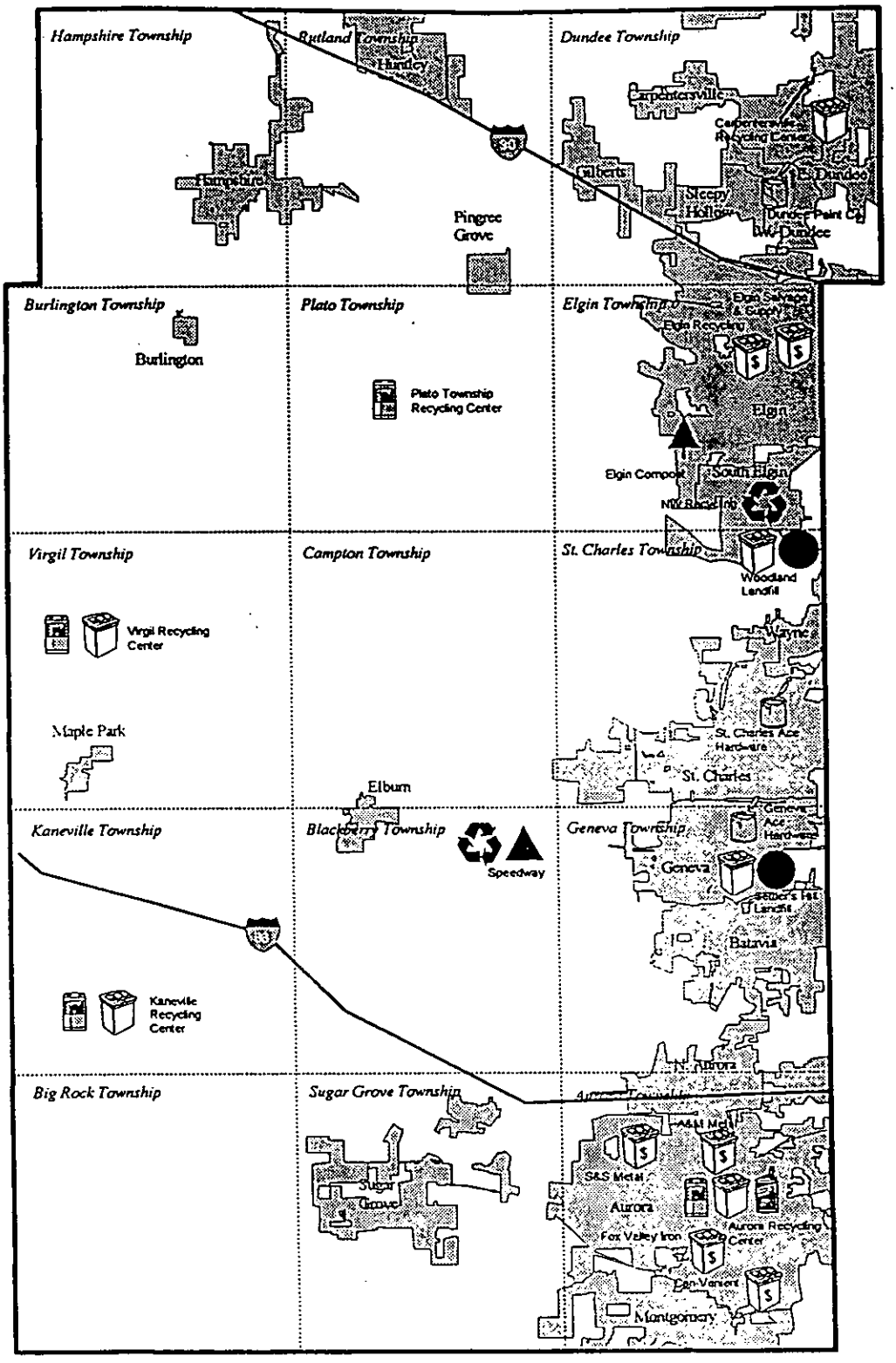
Solid Waste Collection –

Table 2-6 lists the haulers who are under contract with the incorporated municipalities in Kane County to collect residential waste. All of the municipalities listed in the table have either entered into a municipal contract with a hauler or awarded an exclusive franchise to a hauler. As the table shows, there are seven different haulers providing residential waste collection services. Of the 18 municipalities, 6 or 33% have volume-based or modified volume-based billing systems.

Collection of commercial, institutional, industrial and construction/demolition debris is conducted on a private contract basis between the hauler and the waste generator. Haulers charge a volume based fee for their non-residential accounts by billing an establishment based on the size of the container and the frequency of pick-up. Many of the municipalities (and the County) license haulers which provide collection services to non-residential customers. Kane County currently licenses sixteen waste haulers providing collection services in the County.

More on Disposal/Transfer
List Landfills?

+ Burning –



Landfill
MRF
Drop-off Facility ($ = Buyback)
Motor Oil Recycling
Transfer Station
Compost Facility
Paint Recycling
Battery Recycling

FIGURE 2-9

TABLE 2-6
MUNICIPAL RESIDENTIAL WASTE HAULERS IN KANE COUNTY, 1997 2002

Municipality	Hauler	Volume-Based (yes / no)
Aurora	BFI	Yes
Batavia	BFI	Yes
Burlington	~~WMI~~ BFI	No
Carpentersville	WMI	No
East Dundee	BFI	No
Elburn	~~Speedway~~ WMI	No
Elgin	WMI	~~No~~ Modified
Geneva	WMI	Yes
Gilberts	~~Monarch~~	No
Hampshire	WMI	No
Maple Park	WMI	No
Montgomery	BFI	Modified
North Aurora	WMI	Yes
St. Charles	~~BFI~~ OOK	Yes
Sleepy Hollow	~~WSD~~ Crown	No
South Elgin	~~Superior~~ BFI	No
Sugar Grove	~~TSD~~ WM	No
West Dundee	~~Laidlaw~~ RFI?	No

Solid Waste Management

Solid waste generated in Kane County is either recycled, composted (or land applied) or landfilled. Table 2-7 shows the county-wide estimates for residential, commercial, construction, landscape and total solid waste generated and recycled for the period 1992-1996. The total solid waste recycling rate in 1992 was approximately 24% and has increased to approximately 38% in 1996. The State of Illinois goal is 25%. The County's ultimate goal is a 47.3% recycling rate. Three of the four waste stream sectors shown in Table 2-7 have achieved 94% or greater of their targeted goal. The remaining waste stream, construction, is only achieving 4% of its target goal, and as a result, this is the waste stream component that holds the most promise for future growth in the County's recycling rate. Figure 2-10 shows the high recycling rates in the residential and commercial waste sectors and the relatively low recycling rate in the construction waste sector for the period 1992-1996.

TABLE 2-7
SOLID WASTE GENERATION & RECYCLING, BY SECTOR
KANE COUNTY, ILLINOIS

Year	Type of Waste	Residential (tons)	Commercial (tons)	Construction (tons)	Landscape (tons)	Total (tons)
1992	Solid Waste Generated	135,890	249,687	65,652	69,821	521,050
	Amount Recycled	28,825	25,435	25	69,821	124,106
	Percent Recycled	21.2%	10.2%	0.0%	100.0%	23.8%
1993	Solid Waste Generated	138,408	254,315	66,869	71,115	530,707
	Amount Recycled	38,748	28,361	1,001	71,115	139,225
	Percent Recycled	28.0%	11.2%	1.5%	100.0%	26.2%
1994	Solid Waste Generated	141,211	259,158	68,171	72,499	541,040
	Amount Recycled	42,176	45,376	1,324	72,499	161,375
	Percent Recycled	29.9%	17.5%	1.9%	100.0%	29.8%
1995	Solid Waste Generated	143,923	264,135	69,480	73,892	541,040
	Amount Recycled	42,806	66,676	1,304	73,892	184,678
	Percent Recycled	29.7%	25.2%	1.9%	100.0%	33.5%
1996	Solid Waste Generated	146,651	269,141	70,797	75,292	561,881
	Amount Recycled	45,489	88,203	2,112	75,292	211,096
	Percent Recycled	31.0%	32.8%	3.0%	100.0%	37.6%
RECYCLING GOAL		33.0%	33.0%	75.0%	100.0%	47.3%
1996	Level as % of Goal	94.0%	99.3%	4.0%	100.0%	79.4%

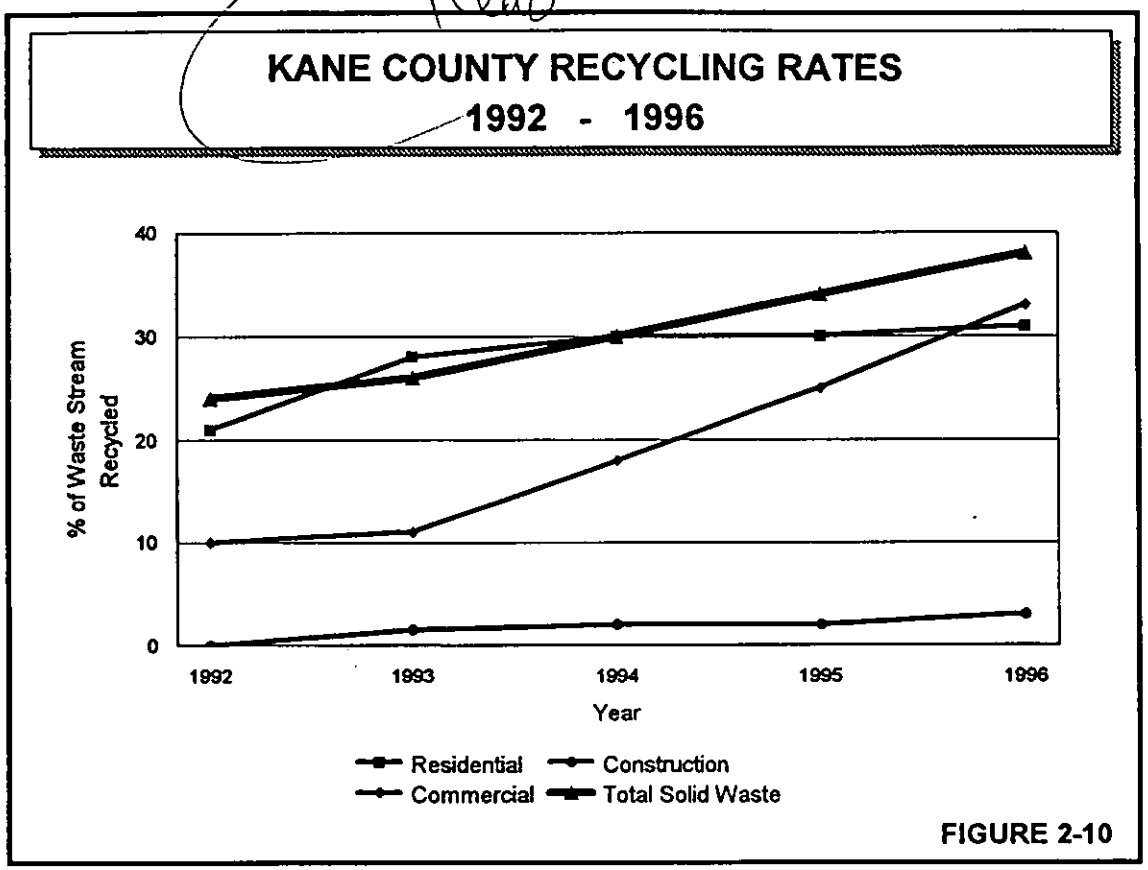


FIGURE 2-10

Table 2-8 provides more detailed data on recycling of residential, commercial, construction, and landscape waste. Residential waste recycling appears to be leveling off with most of the households in the County now served by curbside recycling programs. Municipalities led the way in the early 1990's and the unincorporated areas have shown more recent growth, but also appear to be leveling off. Figure 2-11 shows the growth in the number of households with curbside recycling service in municipalities and unincorporated areas for the period 1992-1996.

TABLE 2-8
RECYCLING ACTIVITY, BY SECTOR & COLLECTION METHOD
KANE COUNTY, ILLINOIS

	Tons					% Change	
	1992	1993	1994	1995	1996	95 - 96	91 - 96
RESIDENTIAL							
Municipal Curbside	19,961	29,170	32,254	32,919	33,619	2.1%	68.4%
Unincorp. Curbside	2,282	2,527	3,550	4,150	4,609	11.1%	102.0%
Dropoff - Public	808	773	630	542	682	25.8%	15.6%
Buyback - Private	5,758	5,875	5,583	4,459	5,767	29.3%	0.16%
Multi-family	16	403	159	736	812	10.3%	4975.0%
Subtotal Collected	8,864	9,578	9,922	9,887	11,870	6.3%	57.8%
COMMERCIAL							
Haulers	5,454	9,653	15,841	17,526	21,991	25.5%	303.2%
Other	19,981	18,708	29,535	49,150	66,212	34.7%	231.4%
Subtotal Collected	19,981	18,708	29,535	49,150	66,212	32.3%	246.8%
CONSTRUCTION							
Haulers	25	1,001	1,324	1,304	2,112	62.0%	8348%
LANDSCAPE WASTE							
Public Works	9,003	10,695	8,486	8,170	10,003	22.4%	11.1%
Haulers/Municipal	16,025	10,474	12,428	12,157	12,828	5.5%	-20.0%
Haulers/Unincorp.		254	254	292	349	19.5%	-
Haulers/Commercial	489	244	213	259	488	88.4%	-0.2%
Subtotal Collected	16,514	10,972	12,895	12,708	13,665	13.4%	-7.2%
Total LSW Generated	69,821	71,115	72,499	73,876	75,292	1.9%	7.8%
Percent Collected	36.5%	30.5%	29.5%	28.3%	31.4%	11.0%	-14.0%
TOTAL	124,081	139,225	161,375	184,662	211,096	14.4%	70.1%

NUMBER OF HOUSEHOLDS WITH CURBSIDE RECYCLING 1992 - 1996

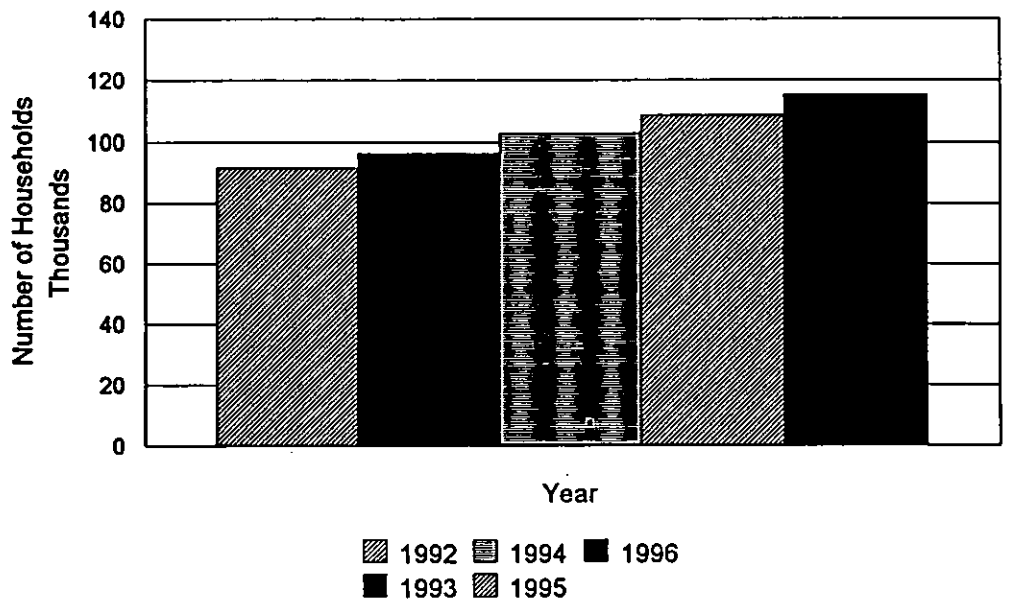


FIGURE 2-11

The growth in commercial recycling can be linked to the Kane County Recycling and Hauler Licensing Ordinance. Since 1994, the amount of commercial waste recycled has nearly doubled from 45,376 tons to 88,202 tons. The County should continue to experience growth in commercial recycling with the final component of the Ordinance becoming effective for all commercial establishments on January 1, 1997. Prior to this date, the Ordinance only applied to commercial establishments with 10 or more employees. Figure 2-12 shows the significant increase in the number of businesses recycling in the County from 480 in 1992 to 2,529 in 1996.

NUMBER OF BUSINESSES WITH RECYCLING PROGRAMS 1992 - 1996

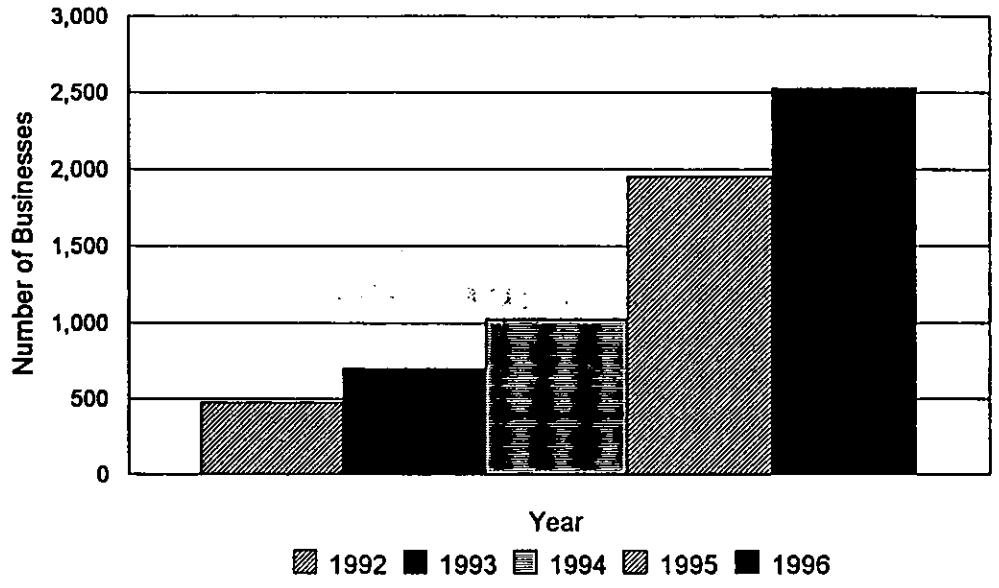


FIGURE 2-12

As mentioned earlier, the construction/demolition waste stream presents the greatest potential for future recycling growth based solely on the current level of recycling. The economics of construction waste recycling are still difficult to determine given the lack of experience and facilities in Illinois capable of processing the waste. There has been steady growth in the number of haulers recycling construction waste (from one hauler in 1992 to seven haulers in 1997) and the amount of material recycled (from 25 tons in 1992 to 2,112 in 1996). The County established a construction waste recycling goal of 75% and is currently recycling only 3% of the construction waste generated.

The strong growth in recycling programs county-wide has had a direct impact on the amount and percentage of the County's waste that is ultimately landfilled. Figure 2-13 compares the percentage of waste recycled with the percentage of waste landfilled for the period 1992-1996. Figure 2-14 shows the overall trends in the amount of waste landfilled and recycled from 1989 (the base year for the Assessment of Solid Waste Needs Report) to 1996. While total waste generated has increased 14% over this period, the amount of waste landfilled has decreased by 21% and the amount recycled has increased by 372%.

SOLID WASTE MANAGEMENT TRENDS SINCE PLAN ADOPTION

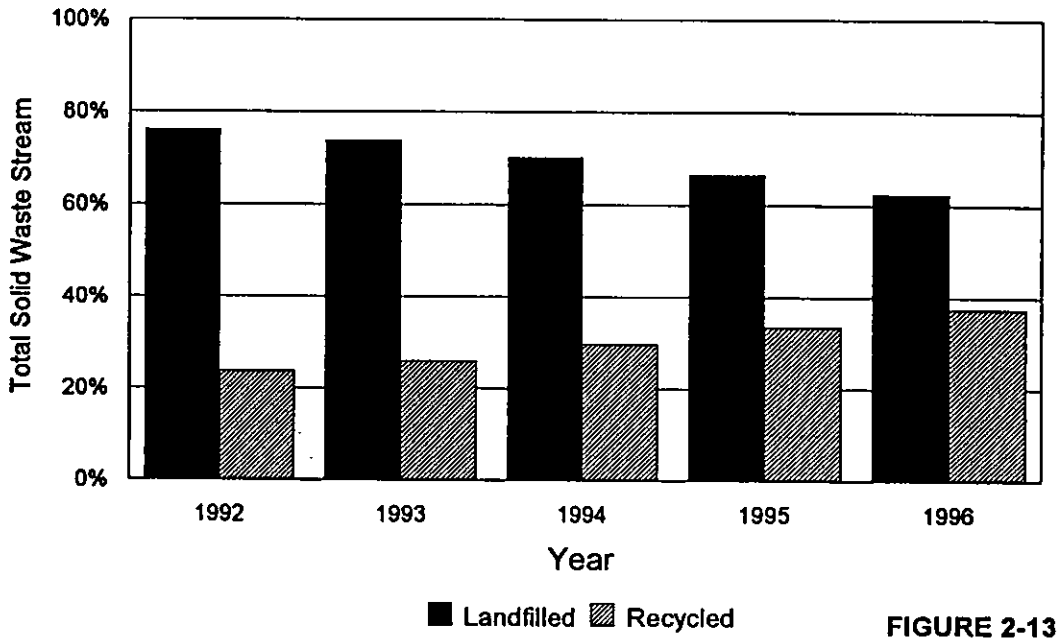


FIGURE 2-13

TRENDS IN SOLID WASTE MANAGEMENT 1989 - 1996

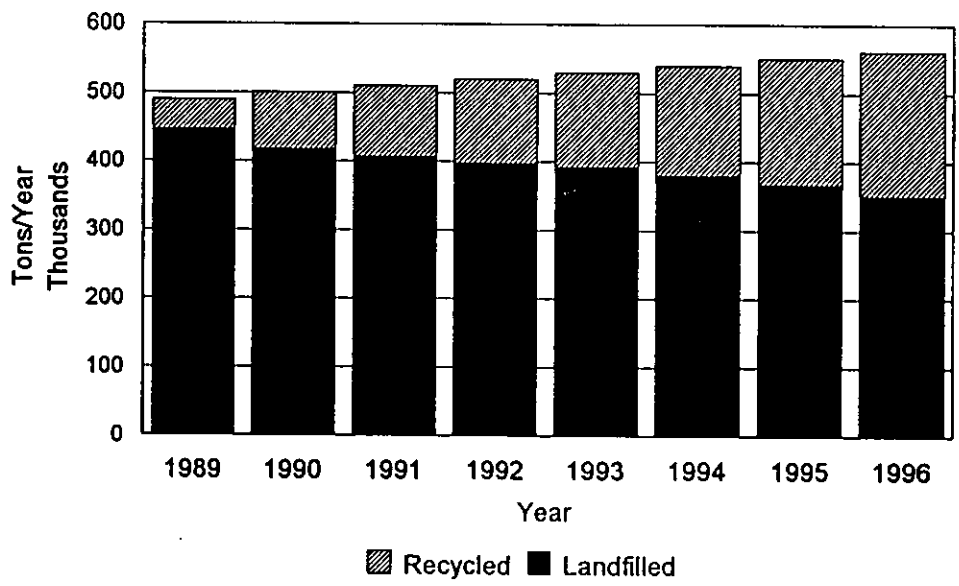


FIGURE 2-14

Conclusion

Kane County has made significant progress, over the past five years, in increasing its recycling rate and reducing its reliance on landfilling. With the anticipated future growth in the County, it will be important to continue to monitor waste generation, recycling, and disposal rates to ensure that Kane County's residents and businesses continue to recycle and that adequate disposal capacity exists to manage the County's solid waste in a cost-effective manner.

CHAPTER 3
WASTE REDUCTION

Introduction

Since enacting its Solid Waste Management Plan in 1992, Kane County has committed significant resources to waste reduction activities and programs. As defined by Kane County, the term "waste reduction" includes source reduction (i.e., reducing the amount of waste generated) and toxicity reduction (i.e., reducing the generation of toxic materials, and collecting and managing toxic materials in a more environmentally sensitive manner). The County's waste reduction efforts have been focused on providing education, encouraging volume-based collection programs, conducting single-event collection programs and establishing permanent collection sites for materials requiring special handling. These efforts are discussed in the following section.

Overview of Kane County's Waste Reduction Programs

Kane County's waste reduction programs have been very successful in diverting municipal waste and other more difficult to manage materials from final disposal. The waste reduction programs have also changed the perspective of thousands of Kane County residents, who have become more aware of the implications of their generation and management of waste. This is evident given the number of phone calls the County receives on a yearly basis (approximately 1,200) concerning what residents should do to properly recycle or manage a potentially toxic material, and the growing participation and demand for single-event collection programs and permanent sites to manage such materials as household hazardous waste, used oil, paint, household batteries and tires. The remainder of this section discusses the County's waste reduction efforts targeted at:

- Source Reduction
- Household Hazardous Waste
- Used Motor Oil
- Latex Paint
- Household Batteries
- Tires and White Goods

Source Reduction

Source reduction is the most preferred method for managing waste because less waste results in fewer collection vehicles, which in turn reduces road wear and emissions, and extends the life of existing landfill capacity. The County's source reduction efforts have included providing education to the County's residents and businesses, and promoting the implementation and continued utilization of volume-based collection programs.

The County's Recycling Education Coordinator spends the majority of her time promoting source reduction and recycling to the County's school children through on-site visits and the development of a regular newsletter. Further educational efforts are provided by the County's Recycling Coordinator who also gives frequent talks to County organizations and who has developed a referral network throughout the County which resulted in approximately 1,200 phone calls in 1996. Another educational component is provided at the one day household hazardous waste collection events where residents are provided with information on how to minimize their generation of household hazardous waste and how to properly manage it once it has been generated.

Volume-based collection is another method for promoting source reduction because it provides an economic incentive to generate less garbage. Under a volume-based program, households are charged based on the amount of waste they set out for disposal. Typically, residents buy stickers for a set fee and must apply a sticker to each can and/or bag of waste they set out. As a result, residents have an economic incentive to reduce the amount of waste they set out for disposal.

Of the 18 municipalities in the County, 6 or 33% have volume-based or modified volume-based collection/billing systems. The most recent addition to the list of volume-based programs is the Mill Creek development in unincorporated Kane County, just west of Geneva. The County is responsible for contracting for waste collection and recycling service for the residents of Mill Creek and as part of the bidding process for a service provider stipulated in the bid documents that volume-based collection would be required. This is the same process that the other six municipalities utilized and that the County will continue to promote to the other municipalities in the County.

Household Hazardous Waste

Since 1992, Kane County has held eight household hazardous waste (HHW) collection events, which have been extremely well received, averaging over 1,300 households each. This does not include the three events scheduled for 1997 in Aurora (May, 1997), Elgin (fall, 1997) and St.Charles (fall, 1997). Table 3-1 shows the results for the eight collection events and the data available to date on the 1997 collection events.

TABLE 3-1
SUMMARY OF HOUSEHOLD HAZARDOUS WASTE COLLECTION EVENTS IN KANE COUNTY

Date	Site	Households	Drums	Cost	County Contribution
5/92	St. Charles	736	145	$ 67,466	-
9/92	Aurora	1,239	325	$159,385	-
9/93	Elgin	1,834	340	$ 97,910	-
9/94	Geneva	1,282	239	$ 96,078	-
10/95	South Elgin	1,245	169	$ 35,397	$ 25,000
6/96	Carpentersville	1,358	336	$ 86,586	$ 25,000
6/96	North Aurora	1,432	285	$ 64,761	$ 25,000
9/96	Campton Twp.	1,356	336	$ 71,953	$ 25,000
5/97	Aurora	1,569	N/A	N/A	$ 25,000
	TOTALS:	12,051	2,175	$679,536	$125,000
	Averages:	1,339	272	$84,942	

Source: Illinois Environmental Protection Agency

As the information in the Table 3-1 shows, the level of participation has increased since 1992 and remained fairly stable at between 1,300 and 1,500 households per event. The Illinois Environmental Protection Agency, which provides the majority of the funding and hires the contractor, has succeeded in finding more cost-effective means of managing the HHW. However, these events are still relatively expensive and the County has contributed $25,000 per event since 1995 to help defray these costs. This is part of the County's commitment under the IEPA's informal Charter Community Program, which gives Kane County priority for these events in return for establishing alternative collection sites and events for paint and used oil, and providing education and funding. Kane County has met these criteria, and as a result has been awarded three collection events by the IEPA in both 1996 and 1997.

Because of the high level of participation at the HHW collection events and the number of telephone calls the County receives concerning the management of HHW, the County is negotiating with the City of Naperville to allow Kane County residents access to Naperville's permanent site, one of only two in the entire state. The County's intent is to make HHW management more convenient and permanent for the County's residents.

The County's HHW education efforts include the *Kane County Recycles* publication, which in the past has had entire sections devoted to HHW management, the one day HHW collection events where educational materials are handed out, and the hundreds of phone calls the County receives concerning managing HHW.

Given the high cost of the HHW collection events and the fact that approximately 50% of the material collected is paint and used oil, the County has focused on finding other methods of collecting these two materials, as discussed in the following two subsections.

Used Motor Oil

Beginning in 1994 the County began a series of one-day used motor oil collection events at various locations throughout the County. These events have been well-received, averaging 200-300 vehicles and collecting approximately 3,000 gallons each. Figure 3-1 shows the number of gallons collected at the eight annual collection events since 1994.

As the data shows, the program experienced tremendous growth from 1994 to 1995 and has stayed fairly steady at approximately 25,000 gallons per year since then. The County has responded to this demand for used oil recycling by assisting the City of Aurora establish a

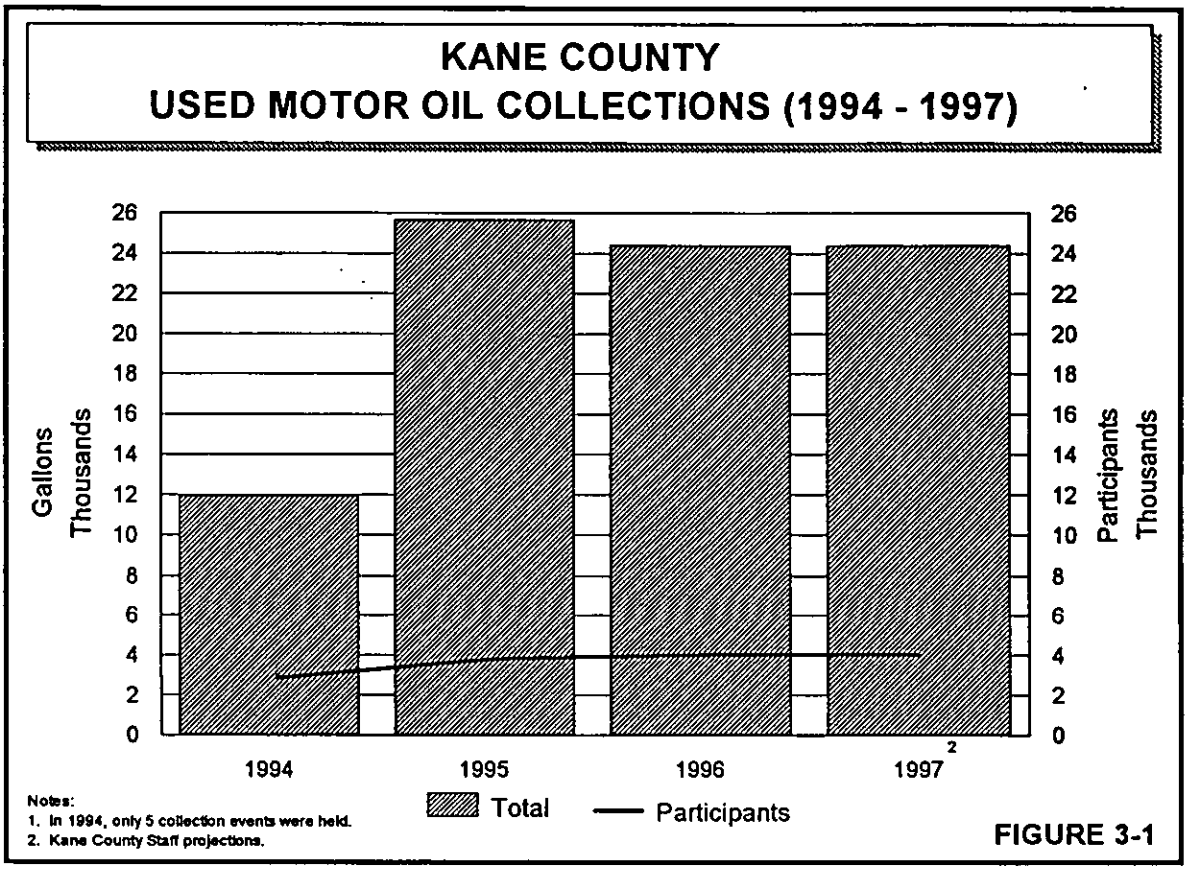


FIGURE 3-1

permanent used oil drop-off site at the City's recycling center on North Broadway Street. The County paid for the tank and related site improvements and provides the City with an annual stipend to help defer costs. This permanent site provides residents of Aurora and the surrounding area a permanent location for dropping off used oil when the recycling center is open on Wednesdays and Saturdays. The County's goal is to establish more permanent used oil drop-off sites throughout the County.

According to Illinois Statute, as of July 1, 1996, used oil may no longer be mixed with municipal waste or disposed of at a sanitary landfill.

Latex Paint

Kane County has worked with local paint retailers since April 1993 to accept usable latex paint from the public, mix it, and provide it at no charge to local community groups. The program began with five retailers in Elgin, Geneva, Hampshire, St. Charles, and West Dundee. The Hampshire location has since dropped out of the program (due to low participation), and the Elgin location ceased business operations in 1996. In addition, starting in October 1995, the Dial Corporation in Montgomery has conducted an annual latex paint drop-off day where workers bulk the paint for donation to local groups. Figure 3-2 shows the number of gallons of paint that have been reused in the County since 1993 and the number of participants in the program.

The County's latex paint program has been successful in promoting the reuse of latex paint, and

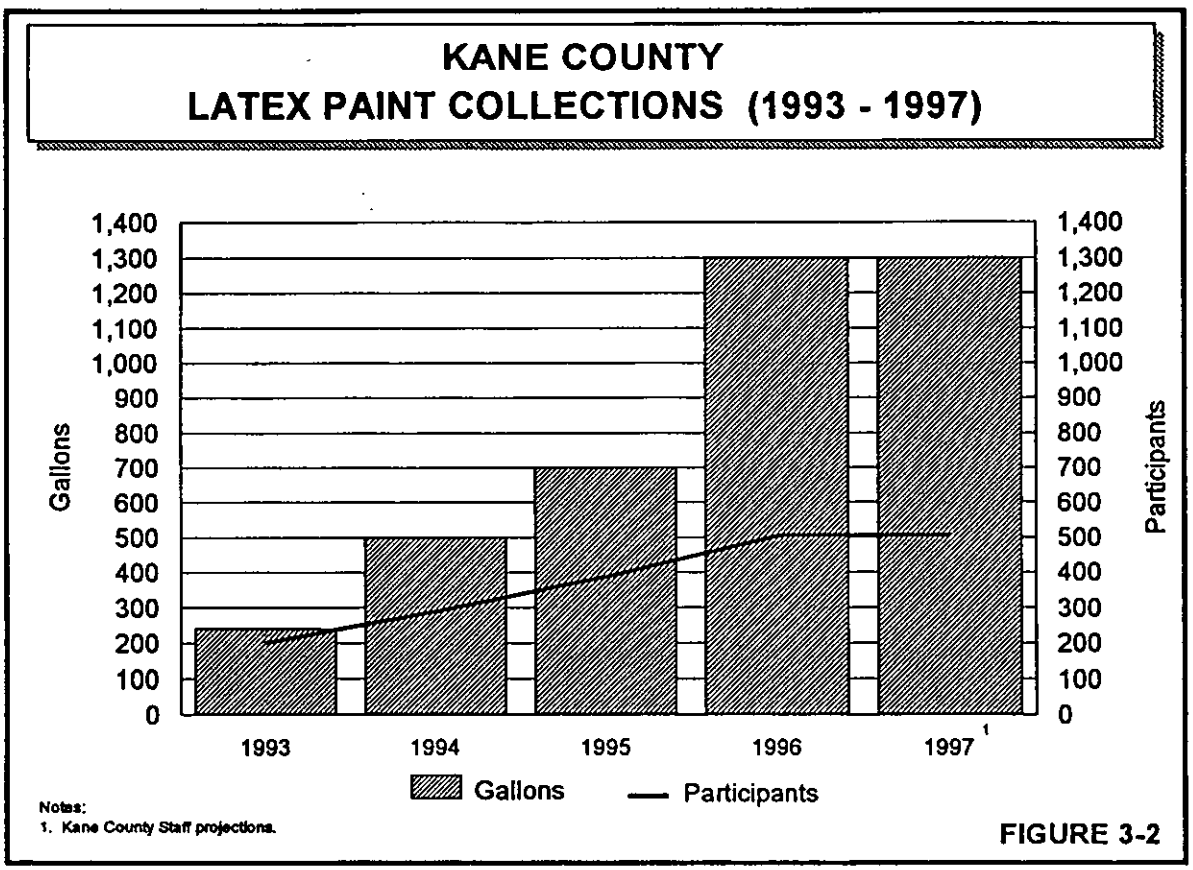


FIGURE 3-2

has also helped reduce the amount of paint that could potentially have been taken to the HHW collection events, thereby reducing the cost of these events. The County will continue to support the efforts of the retailers and the Dial Corporation to divert latex paint from the HHW collection events and from improper disposal.

Household Batteries

A pilot program for collecting household batteries was initiated in 1995, in conjunction with the Plato Township Solid Waste Disposal District. The District provided a drop-off bin at the Plato Township Hall and distributed special bags and program literature to all the residents of Plato Township. Kane County agreed to provide shipping and handling costs for all batteries collected. This program is still ongoing and since its inception has diverted 3,643 pounds of household batteries from final disposal. Figure 3-3 shows the amount (in pounds) of batteries diverted from final disposal and the number of participants.

In addition to the Plato Township drop-off site, additional drop-off sites have been established at the Aurora Recycling Center, and offices of the Farm Bureau and Kane-DuPage Soil and Waste Conservation District. Starting in 1997, the County expanded its collection program to eight schools and children were encouraged to bring their household batteries to school for collection. This expansion of the collection efforts is reflected in the data for 1997, as shown in Figure 3-3.

Finally, a local hauler, Speedway Recycling and Disposal, collects household batteries as part of its curbside collection service in the Village of Elburn and unincorporated areas, and also accepts batteries at the two drop-off sites it services in Kaneville and Virgil.

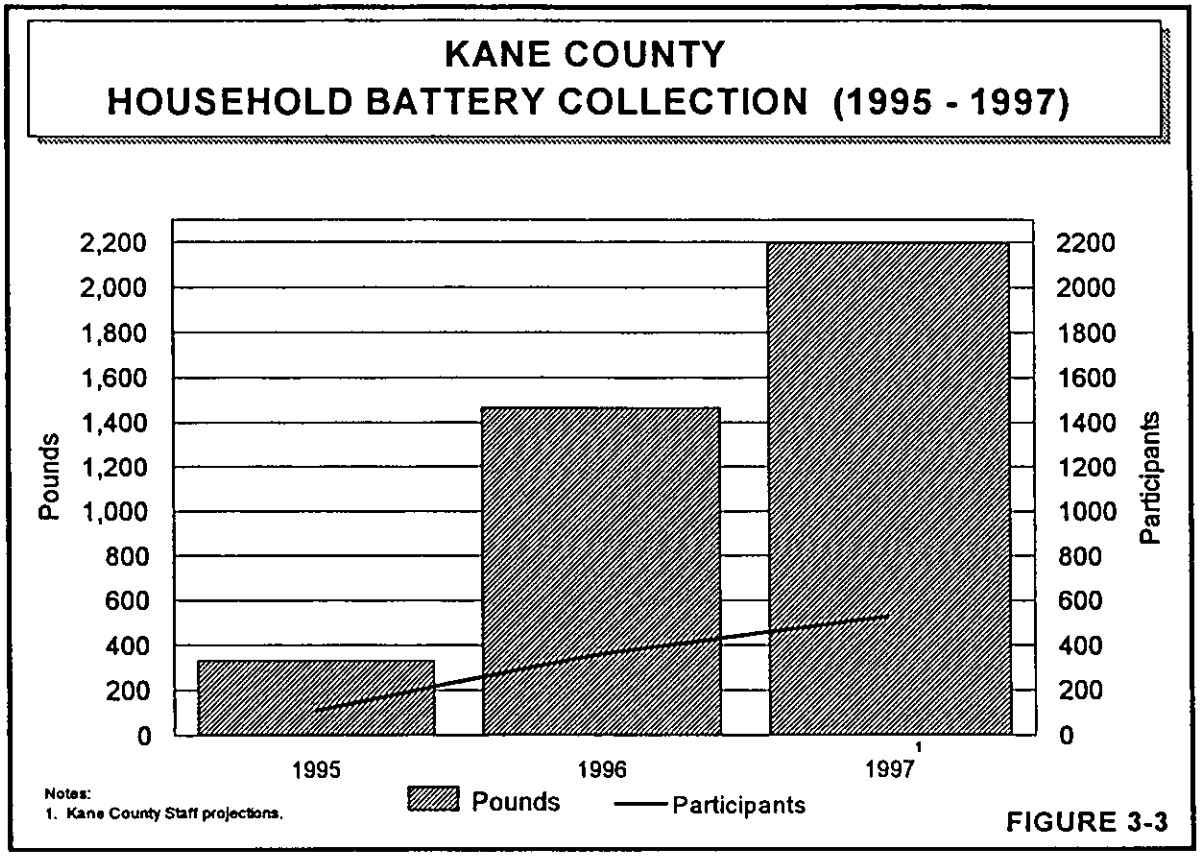


FIGURE 3-3

Tires and White Goods – Move To Recycle

The County schedules single-day tire collection events every other year as part of the IEPA's tire collection program. The County intends to continue working with the IEPA to hold these collection events once every other year. The County-sponsored events have been very successful, and in 1994 and 1996 averaged approximately 14,000 tires collected from 400 participants each year.

"White goods" is a waste industry term for major appliances including refrigerators, ranges, water heaters, air conditioners and similar household and commercial appliances. Under Illinois law, white goods cannot be offered for collection or landfilled unless potentially hazardous white good components (e.g., electric switches containing mercury, chlorofluorocarbon refrigerant gas) have been removed. In effect, this law bans the disposal of white goods in landfills.

Recommendations for the Next Five Years

During the next five years Kane County will continue to build upon its existing waste reduction programs. Based upon participation rates at many of the single-day collection events and the number of phone calls that the County continues to receive, there is a strong demand for these programs. Overall, the County's goal is to further institutionalize these programs and develop more permanent sites for the collection of materials that are more difficult to handle. More specifically, the waste reduction recommendations include:

- ❑ Recommendation 3.1. Continue to provide source reduction education through the efforts of the County's staff and the County's two newsletters (*Kane County Recycles* and *Recycle News*).
- ❑ Recommend 3.2. Continue to support the implementation of volume-based collection programs throughout the County.
- ❑ Recommendation 3.3. Continue to participate in the IEPA's Charter Community Program and provide funding of $25,000 per collection event, up to a maximum of three events per year.
- ❑ Recommendation 3.4. Enter into an intergovernmental agreement with the City of Naperville to allow Kane County residents access to Naperville's permanent HHW collection site. Investigate the need for and feasibility of developing additional permanent HHW collection sites in Kane County or partnerships with other units of local government in the region.
- ❑ Recommendation 3.5. Develop a network of four to eight permanent used oil collection sites strategically located throughout the County. Continue to conduct single-day collection events in portions of the County which are not being conveniently served by a permanent collection site.

- ❑ Recommendation 3.6. Continue to support the efforts of local paint retailers and the Dial Corporation to collect and reuse latex paint. Monitor the need for developing more permanent collection sites and/or single-day collection events.

- ❑ Recommendation 3.7. Evaluate the need for continued collection of household batteries given current trends in the manufacturing of batteries and the costs associated with diverting batteries from final disposal and encourage where practical, the curbside collection of household batteries by waste haulers.

- ❑ Recommendation 3.8. Continue to work with the IEPA to provide at least one single-day collection event, every other year, for used tires.

- ❑ Recommendation 3.9. Continue to monitor state and federal legislation and regulations concerning other potentially toxic components of the wastestream, including the Federal Universal Waste Rule, 40 CFR Part 273 and Illinois Public Act 89-619 which addresses the disposal and management of fluorescent and high intensity discharge lamps.

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CHAPTER 4
RECYCLING

Introduction

Recycling has become an established behavior across Kane County during the past eight years. The beginning of the County's extensive program can be traced to the initiation of three municipal curbside collection programs in 1989, in the Villages of East Dundee and Sleepy Hollow and the City of St. Charles.

By late 1990, 14 of the 19 Kane County municipalities that regulate garbage collection were providing curbside recycling service to their residents. The state ban on landfilling of landscape waste also took effect in 1990, resulting in the separate collection and diversion of landscape waste throughout the County.

The County's 1992 Solid Waste Management Plan established an overall recycling goal of 47.3 percent of the total solid waste stream by 1998. The recycling rate in Kane County grew from only 9.1 percent in 1989 to 23.8 percent in 1992 and 37.6 percent in 1996. Actual and targeted recycling rates are presented in Figure 4-1.

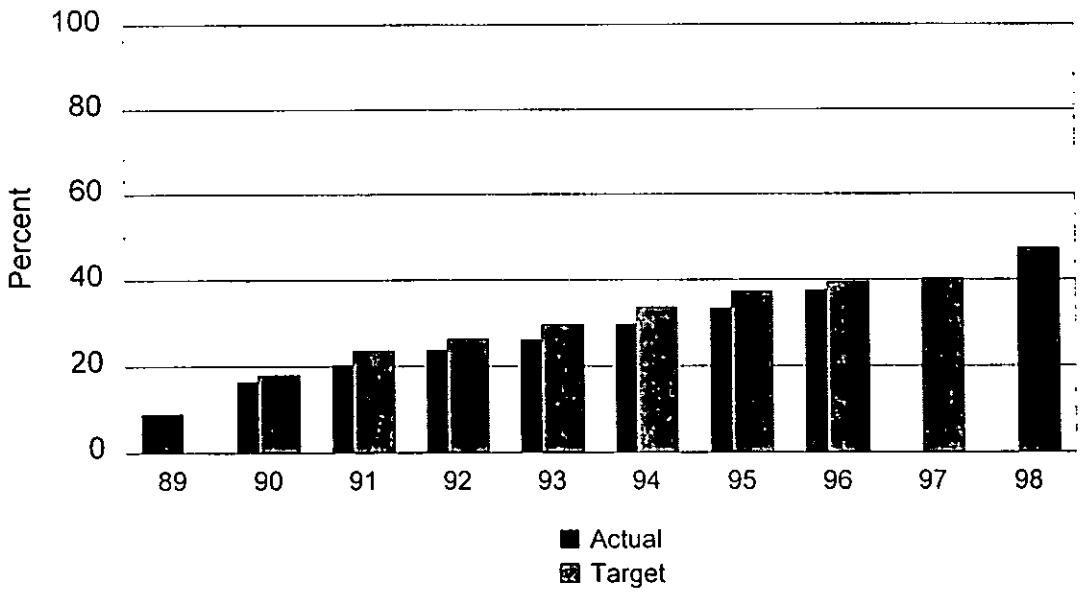


FIGURE 4-1

The County has developed several key programs to increase recycling levels and attain the 47.3 percent goal. A comprehensive education program targets both the general public and all public and private schools within the County. A mandatory residential recycling ordinance, adopted in 1994, requires waste haulers to provide recycling service to all residential customers, particularly in multi-family dwellings and unincorporated areas. A mandatory commercial recycling ordinance, adopted in 1995 and fully effective in 1997, requires all commercial establishments to recycle the two largest recyclable items in their waste stream. And finally, a consistent data collection program allows the careful tracking and analysis of recycling activity by sector since 1991.

Infrastructure

Kane County relies almost entirely on the private sector for the collection and processing of recyclable materials. This privately-based infrastructure is well-developed, competitive, and is believed to have sufficient capacity to handle current and future volumes of recyclable material generated in Kane County.

In 1997, 17 county-licensed companies provide collection services for solid waste and recyclables in the residential, commercial and construction sectors. The recyclables collected by these companies are generally taken to one of five different processing facilities, including privately-owned facilities near Geneva, South Elgin, Schaumburg, and Plainfield, and a publicly-owned facility in Carol Stream.

In addition, there are numerous companies that provide recyclable collection from commercial establishments and schools. Several of these companies are based in Kane County, while others are based as far away as Chicago. Some local businesses that generate large quantities of recyclable material (usually corrugated paper and sometimes industrial plastic) make independent arrangements to ship these materials directly to end-users.

As of 1997, there are six drop-off recycling centers available for public use. Four of these are located on public/government property in Aurora, Carpentersville, Kaneville, and Virgil, and two are located at the two landfills near Geneva and South Elgin. In addition, there are currently seven local companies that operate "buy-back" centers in Aurora (4), Elgin (2), and St. Charles (1).

The only direct public sector involvement is in the management of landscape waste. Several municipalities, including Batavia, Elgin, Geneva, and St. Charles, collect brush and leaves from their residents. Brush from St. Charles is chipped by City crews and used on City property or distributed to the public. The City of Elgin operates an IEPA-permitted compost facility for leaves collected by its crews. The Villages of Batavia and Geneva land-apply the leaves that they collect on private property.

Waste haulers also provide separate collection of grass, leaves, and brush. These privately-collected materials are taken to one of two privately-owned, IEPA-permitted composting facilities in DeKalb and Kendall Counties.

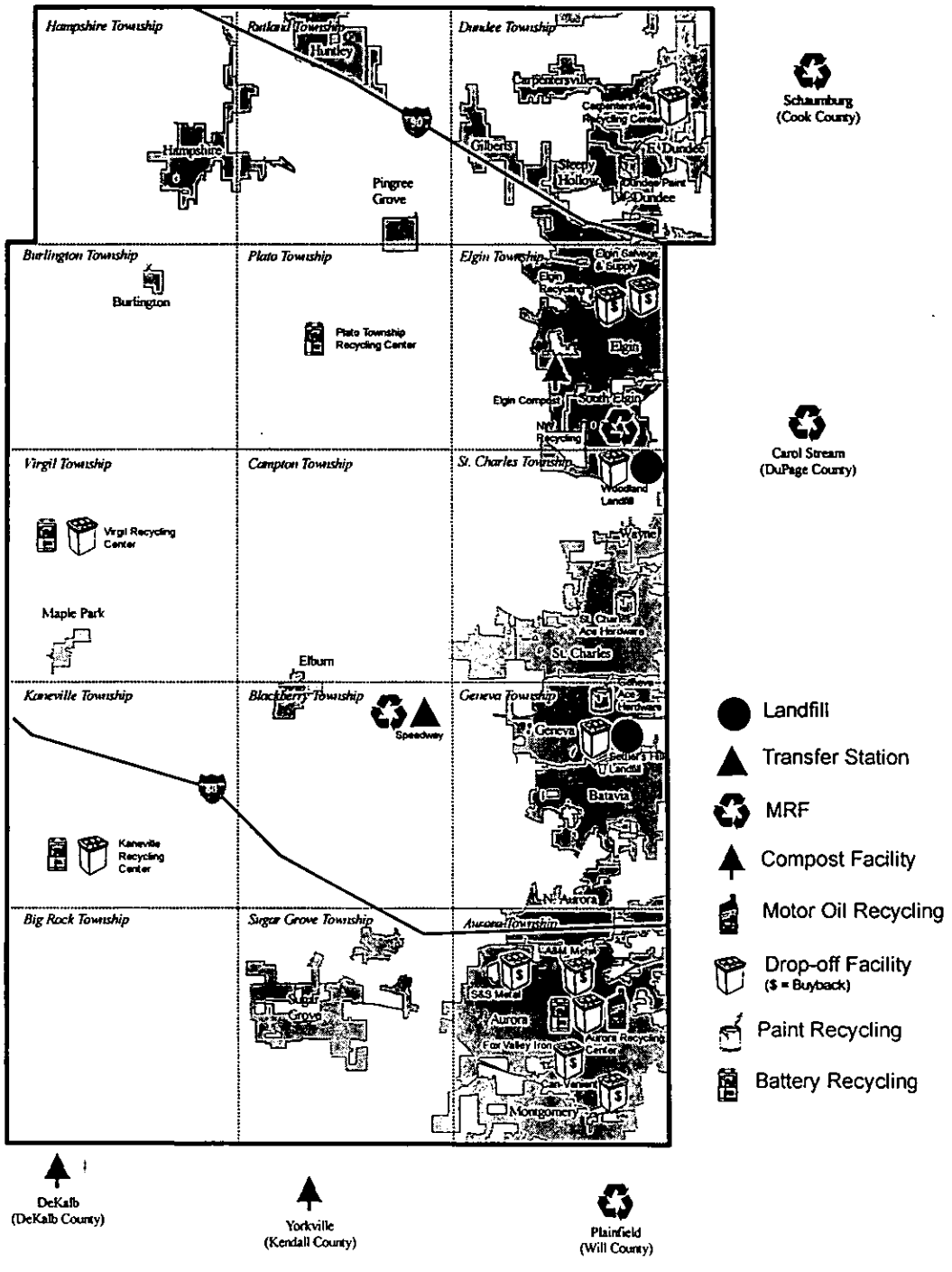

Hampshire Township
Pingree Grove
Dundee Township
Schaumburg
(Cook County)
Burlington Township
Burlington
Plato Township
Plato Township Recycling Center
Elgin Township
Elgin
South Elgin
Carol Stream
(DuPage County)
Virgil Township
Virgil Recycling Center
Maple Park
Campton Township
Elburn
St. Charles Township
St. Charles
Kaneville Township
Kaneville Recycling Center
Blackberry Township
Speedway
Geneva Township
Geneva
Batavia
Aurora
Big Rock Township
Sugar Grove Township
Aurora Township
Montgomery
DeKalb
(DeKalb County)
Yorkville
(Kendall County)
Plainfield
(Will County)
Landfill
Transfer Station
MRF
Compost Facility
Motor Oil Recycling
Drop-off Facility
($ = Buyback)
Paint Recycling
Battery Recycling

FIGURE 4-2

Residential Sector

Every municipality in Kane County which contracts for garbage collection also provides for the curbside collection of recyclables. Municipal recycling service covered 95,266 households in 1996. On average, 75-95 percent of households in these communities set out their recycling bin each week for collection. The average amount of material collected from each household grew steadily from 1991 to 1994, and has leveled off since then (Figure 4-3). This trend may be attributed to the residents learning how to participate during the first 2-3 years of a collection program, and to the addition of materials (#3-#7 plastics, junk mail, magazines, etc.) that weren't originally included in the programs.

A typical curbside program now accepts aluminum and steel cans, glass containers (all colors), empty aerosol and paint cans, aluminum foil and pie tins, #1 through #7 plastic containers, and plastic six-pack rings. Allowable paper types include newspaper, magazines, telephone directories, mixed paper, chipboard, cardboard, and milk cartons and juice boxes.

CURBSIDE PROGRAM YIELDS (POUNDS/HOUSEHOLD/MONTH)

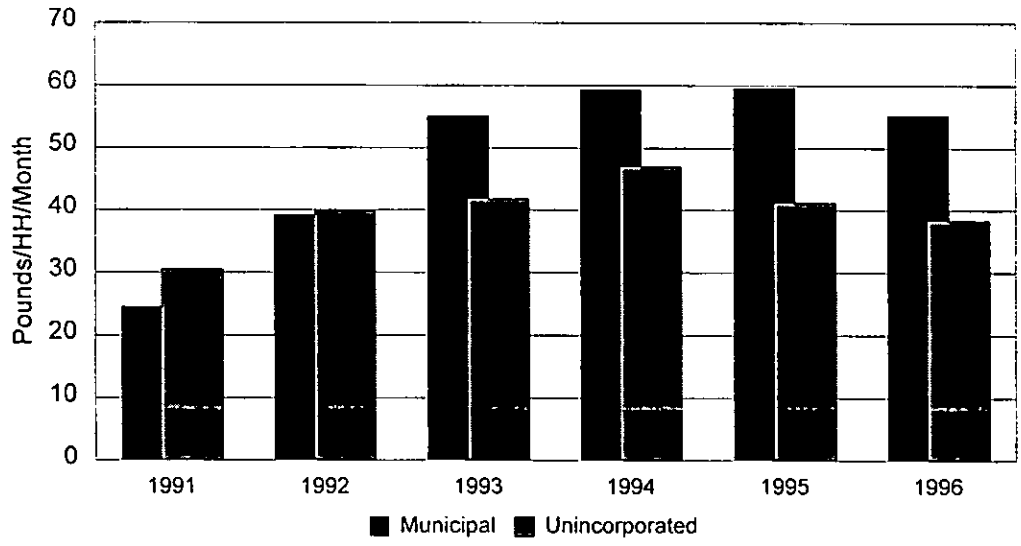


FIGURE 4-3

Recycling service is also provided to about 90 percent, or an estimated 20,032 households, in unincorporated areas and small municipalities which do not contract for garbage service. This is a significant growth from the 3,625 households (24 percent of the total) served in 1992 (see Figure 4-4). A large portion of this growth can be attributed to the County's mandatory residential recycling ordinance, adopted in 1994.

NUMBER OF UNINCORPORATED HOUSEHOLDS RECYCLING

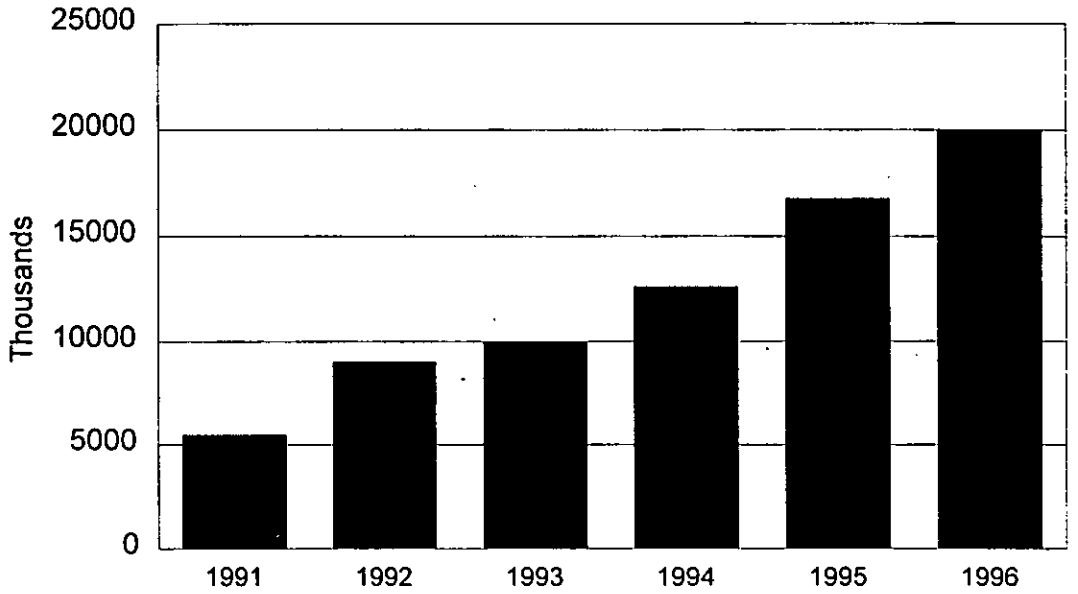


FIGURE 4-4

Multi-family dwelling units are often faced with conditions which may hinder the operation of effective recycling programs, including a lack of sufficient storage area, high resident turnover rates, and other factors. The County's mandatory residential recycling ordinance requires waste haulers to provide recycling service to multi-family buildings, and went into effect on January 1, 1995. By the fall of 1995, an estimated two-thirds of all such buildings in the County were provided with recycling service, usually in the form of separate small recycling dumpsters placed adjacent to garbage dumpsters. Participation by tenants varies widely from complex to complex, and contamination levels (the amount of non-recyclable material) are, in some cases, significantly higher than in single-family programs.

Haulers reported that some of their multi-family customers refused to pay the extra charge for recycling service. To address this situation, the mandatory residential ordinance was amended in 1997, providing for fines of $25 to $100 per day for owners of multi-family dwelling units who fail to provide recycling service for their tenants.

Recommendation 4.1

The County should work to improve the level of recycling in multi-family residences, through enforcement of the mandatory residential recycling ordinance, and by targeting educational programs to tenants of multi-family properties.

The existing drop-off and buy-back centers serve several important roles, including encouraging the recycling of materials with greater economic value to generators (aluminum cans, scrap metals, etc.), providing recycling opportunities for rural residences without garbage service, and, in some cases, providing expanded recycling opportunities for multi-family tenants and commercial establishments. These facilities should be supported by continuing to publicize their location, hours of operation, and types of material accepted.

Collection and composting programs for landscape waste materials have matured since the landfill ban took effect in July 1990, and existing efforts are effectively handling these materials. At the present time, there is no apparent need for County involvement in this area.

Single-family residential collection programs appear to have reached a high level of maturity, based on the stabilization of participation rates and per-household yields. The "menu" of materials accepted in these programs are as extensive as any program in the Country. The potential does exist, however, to divert additional materials, such as carpeting, mattresses, textiles, and food waste, from landfills.

The potential also exists to slightly increase the volume of recyclable material currently collected from single-family households, by encouraging households that currently recycle to separate more material, and by encouraging non-recyclers to begin recycling. Volume-based billing (sticker) programs are particularly effective in maximizing per household recycling volumes by providing a direct financial incentive for increased recycling.

Recommendation 4.2

> *The County should continue to monitor new and future trends in residential recycling and should continue to assess the potential of, and where appropriate develop programs for, the recycling of additional components of the residential waste stream.*

Recommendation 4.3

> *In order to increase per household recycling amounts, the County should continue public educational efforts and should encourage the adoption of volume-based billing programs in municipalities and other areas which currently use conventional trash billing practices.*

The recycling rate in the residential sector, including landscape waste, has increased from 36.2 percent in 1991 to 51.1 percent in 1996 (See Appendix 1 for additional data). The 1992 Plan included separate goals of 33% residential recycling and 100% landscape recycling. An estimated 80 percent of landscape waste is generated in the residential sector; the remainder is assumed to be generated in the commercial sector. The separate residential and landscape waste goals should be combined, and a new goal of 55% recycling should be established for the residential sector.

Recommendation 4.4

Adopt a re-stated goal of 55 percent recycling for the residential sector waste stream.

Commercial Sector

Collection of recyclables from commercial, industrial, and institutional establishments is solely performed by private sector service providers. The majority of local business establishments use their waste hauler to recycle. Some establishments, usually larger companies, use independent recycling companies located in Kane County, the greater metropolitan area, or out-of-state, to recycle.

As reported by waste haulers, the number of businesses with recycling programs in place has increased from 195 in 1991 to 2,529 in 1996. According to the waste haulers, there are approximately 6,000 commercial accounts in Kane County. However, since businesses may use third-party companies (i.e. non-licensed haulers) for recycling, the actual number of businesses recycling is probably closer to 3,000 to 3,500, or more than one-half of all businesses.

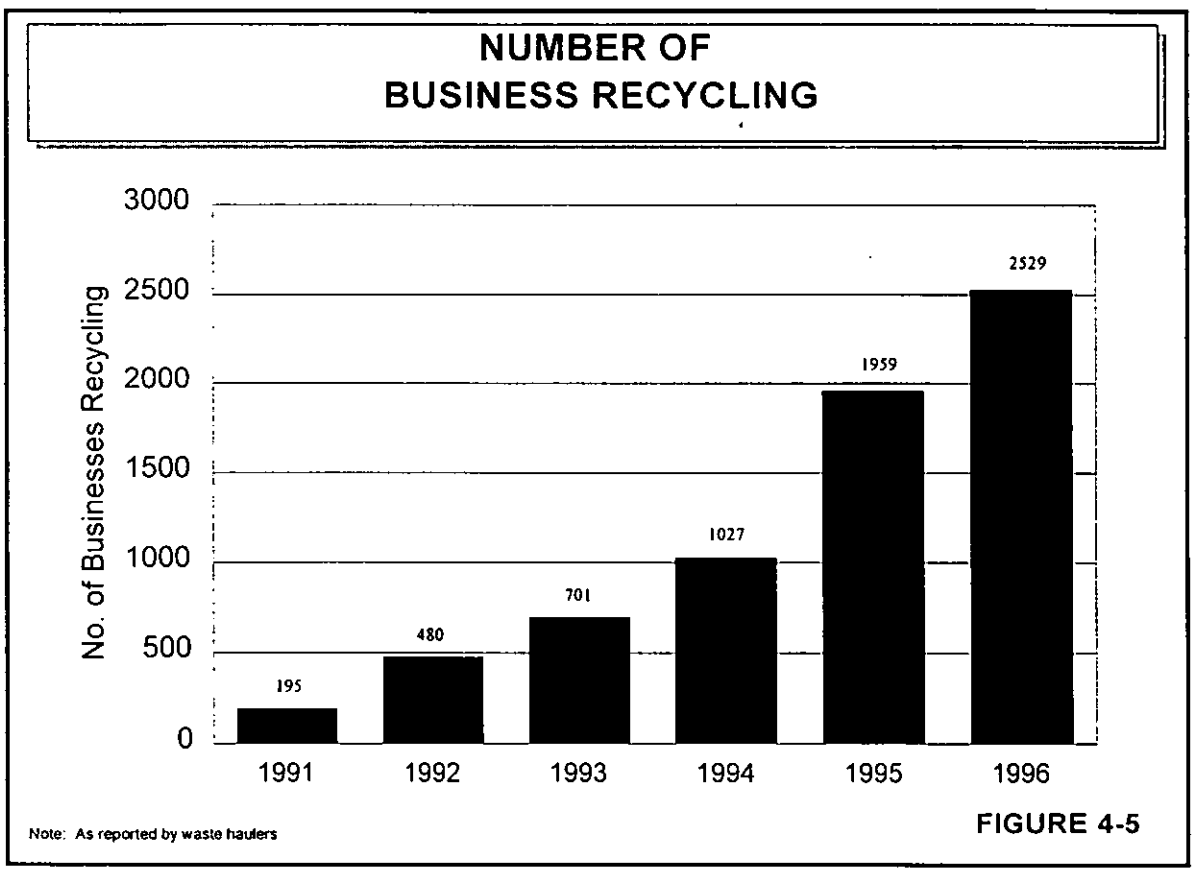


FIGURE 4-5

Data collected from licensed local haulers, other local recycling firms, and businesses that recycle with out-of-county firms indicates that the amount of commercial recycling has increased from 22,743 tons (9.3% of the commercial waste stream) in 1991 to 88,203 tons (32.8%) in 1996. See Appendix 1 for additional data.

In order to increase the recycling level in the commercial sector, the County adopted a mandatory commercial recycling ordinance in 1995. This Ordinance requires all commercial establishments in the County to recycle the two largest recyclable items in their waste stream. The Ordinance took effect January 1, 1996 for businesses with 10 or more employees, and January 1, 1997 for establishments with less than 10 employees. Initial enforcement efforts in 1997 found that as many as 65 percent of commercial establishments had recycling programs in place. As enforcement efforts continue, it is expected that this level will increase to 80-90 percent.

The 1992 Plan recommended a 33 percent recycling goal for the commercial sector. If the 20 percent of all landscape waste that is estimated to originate in the commercial sector is included, the overall 1996 recycling rate in this sector was 36.3 percent. It is believed that some of the estimates of recycling volumes for earlier years underestimate the amount of recycling that occurs with third-party (i.e. non-waste hauler) companies. Since only an estimated two-thirds of businesses are currently recycling, there appears to be a potential for this sector to recycle as much as 50 percent of its waste stream.

Recommendation 4.5

Continue enforcement of the commercial recycling ordinance, and increase the recycling goal for the commercial sector to a 50 percent level.

Construction Sector

Construction and demolition waste comprises a relatively small, but significant portion of the solid waste stream in Kane County. An estimated 70,797 tons of this material was generated in 1996, about 12.6% of the total waste stream. However, the high level of both residential and commercial development in the County makes this a highly visible and important sector.

The 1992 Plan recommended a 75% recycling goal for this sector, to be gradually achieved by 1998. The progress of recycling construction waste has been significantly slower than expected. In 1994, only 2 percent of this waste stream was being recycled, and only 3% was recycled in 1996 (See Appendix 1 for additional data). The number of haulers reporting involvement in this sector, however, has increased, from only 1 in 1992 to 7 in 1997.

There are several stumbling blocks to recycling construction waste, including lack of satisfactory end-use markets, difficulty in separating recyclable components of the waste, and an apparent lack of interest by generators (builders and subcontractors) in developing effective recycling strategies.

The major components of construction waste include wood (44%), corrugated containers (23%), drywall (10%), plastics(4%), metals (1%), and miscellaneous items (18%) (see Figure 4-6). At present, satisfactory markets exist only for corrugated paper. There are no know markets for scrap drywall in the State of Illinois. A local business initiated a scrap wood chipping operation in East Dundee in 1996, the first substantial local market for waste wood. However, haulers have been slow to deliver large amounts of material to this facility, due in part to separation and contamination concerns and the lack of a sufficient pricing differential when compared to landfill tipping fees.

Even when market prices for corrugated paper were at record highs in 1995-96, there was apparently an insufficient economic incentive for haulers or generators (builders and subcontractors) to develop separate collections systems for this valuable component. An additional factor is the high level of contamination found on job sites.

TYPICAL COMPOSITION OF CONSTRUCTION WASTE

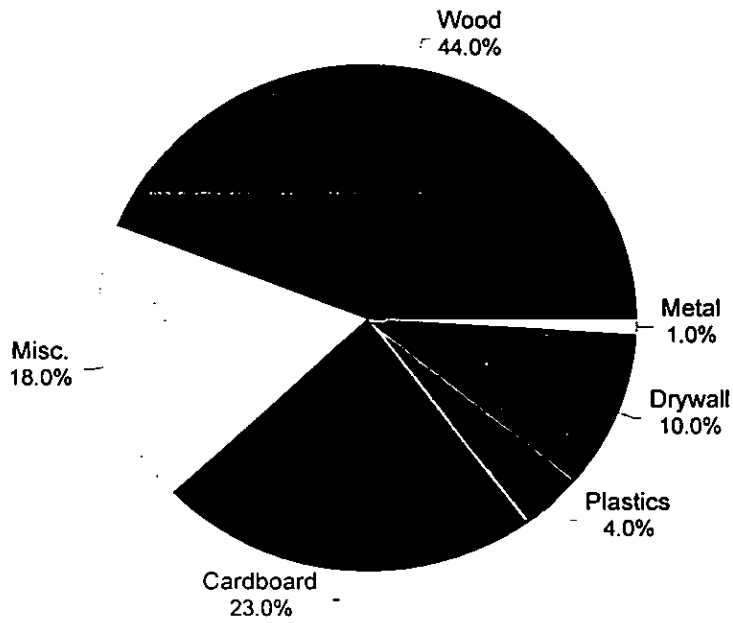


FIGURE 4-6

The County, in cooperation with the Home Builder's Association of Fox Valley, conducted pilot corrugated recycling projects at the Association's Gallery of Homes events in 1993 and 1996. Arrangements were made with the participating builders and their haulers to provide separate roll-off boxes for corrugated. The results were largely favorable, with two haulers at the 1993 event reporting collection of 132 cubic yards of corrugated from 12 job sites, about 24% of the total waste volume from the 12 homes. At the 1996 event, one hauler reported collecting 18 cubic yards from five job sites, while another hauler reported that their corrugated dumpsters were half filled with trash and un-recyclable. No known on-going private sector recycling efforts have been developed as a result of these pilot programs.

The eventual development of recycling efforts in the construction sector will likely be the result of clear economic benefits to waste haulers and, to a lesser extent, builders. The majority of local waste haulers have begun exploratory efforts in recycling construction waste. As most area landfills reach capacity and haulers are faced with increased transport distances for waste disposal, it can be expected that continued private sector efforts will be made to develop effective methods for recycling construction wastes.

Recommendation 4.6

Continue to monitor the development of private sector separation programs and end-use markets for construction waste, and adjust the recycling goal to 50 percent for the construction sector.

Recycling in County Facilities

Over the past five years, recycling programs for mixed office paper, old corrugated containers, and aluminum cans have been established in all county offices. Recycling service has been incorporated into the garbage collection contract which covers the Government Center, Courthouse, Judicial Center, Sheriff's Office and Jail, and Juvenile Justice Center. Separate arrangements have been made for county offices at the Campana Building in Geneva, the Division of Transportation facility, Health Department offices in Aurora, Geneva, and Elgin, and the KDK Job Training offices in St. Charles. In addition, a pilot program for the collection and recycling of fluorescent light bulbs from the Government Center, Courthouse, and Judicial Center was initiated in 1997.

With the assistance of a grant from the State of Illinois, recycling bins for aluminum, glass, and plastic containers were placed in all forest preserves in 1995. Recycling bins for mixed containers were also placed at the Settlers' Hill Golf Course, and bins for plastic drink cups were placed at Elfstrom Stadium. The results of the Forest Preserve program have been mixed, due, in large part, to logistical difficulties and the inherent difficulties encountered when recycling in public places.

Recommendation 4.7

Continue to monitor and administer recycling programs in all county facilities, with an emphasis on maximizing the effectiveness of these programs.

Education Programs

Educational programs targeted at both the general public and school populations have been a critical component in the development of successful and effective residential and commercial recycling programs. The importance of educational efforts continues after programs have been initiated and are necessary to encourage additional participation in recycling efforts, maximize the separation of recyclable materials, minimize the level of contamination, and to explain existing program to residents who are new to the area.

Public education efforts by municipalities and haulers consist largely of occasional reminders of what items are acceptable in individual recycling programs and schedules for landscape waste collection. The regular presentation of information to the public about what is recyclable, what happens to the recyclables after they are set out for collection, and the effectiveness of individual recycling efforts are all necessary to encourage continued participation in residential and commercial programs.

The transiency of local residents presents another clear need for continued educational efforts. According to the 1990 census, only 50.4% of residents were residing in the same house they were five years earlier. Twenty six percent of 1990 residents lived in a different house in Kane County, often in a different community with different recycling "rules". The remaining 23.7 percent of residents had moved to the County in the past five years from elsewhere in Illinois, other states, or other countries.

Since the 1992 Plan was adopted, the County has conducted a variety of public education efforts. Three issues of "Kane County Recycles", an eight-page tabloid publication have been published and distributed as inserts in all local newspapers. A cooperative effort with the U.S. Postal service in 1996 resulted in a special edition newsletter, "Priority Recycling", being distributed to all mailing addresses in the County.

County staff has given more than 30 presentations to local civic organizations, and has exhibited a table-top display at the county fair, municipal libraries, and other locations. Over the past five years, an informal referral network for recycling questions has been established with municipalities and waste haulers, resulting in County staff fielding over 1,200 phone inquiries per year from the general public. In addition, for the past five years, the County and the Kane-DuPage Soli & Water Conservation District have conducted a Kane County Recycling Awards program, which has provided recognition to 26 local businesses, 26 schools, 7 local governments, and 10 other organizations. (A list of all award recipients is presented at the end of this chapter in Appendix 2).

Recommendation 4.8

> *The County should continue its public education efforts and increase the publishing frequency of "Kane County Recycles" to once per year.*

The County also initiated a comprehensive program targeted at public and private schools in the Kane County Education Service Region in 1993. The goals of this program are to increase the level of recycling in local schools, and to develop educational efforts to inform students and staff about the importance of recycling at school, at home, and in the workplace.

The school program includes classroom presentations, in-service training for teachers, partial funding of recycling-related assembly programs, development of vermi-composting (worm bin) projects, programs for middle and high school environmental clubs, and a targeted newsletter. The County has also attracted and administered three state grants totaling $47,000 and enhancing recycling efforts in 53 local schools.

During the past four years, the County's school program has directly reached 132 of the 180 schools in the County, 2,100 teachers, and 33,000 students. Demand for services by the schools has continued strong. The frequent turnover of teachers in each building, as well as the constant influx of new students, results in the continued need for programs in this important area.

Recommendation 4.9

The County should continue to offer programs designed to support in-school recycling efforts and increase recycling awareness in local schools.

Recycling Goals

Kane County has experienced significant progress toward the 47.3% recycling goal established in the 1992 Plan, with the 1996 county-wide recycling rate reaching 37.6 percent. As shown in Figure 4-7, substantial progress has been made toward goals in both the residential and commercial sectors. When landscape waste is included, slightly more than 50 percent of all residential waste is being diverted from landfills. The largest amount of waste still being landfilled originates in the commercial sector (see Figure 4-8).

As recommended earlier in this section, the County should increase its diversion goal for the residential sector to 55 percent (including landscape waste) from the current 33 percent (which does not include landscape waste). The County should also increase the recycling goal for the commercial sector from 33 percent to 50 percent, and adjust the construction sector goal from 75 percent to 50 percent. These adjustments would result in an overall goal of recycling 52 percent of the County's solid waste.

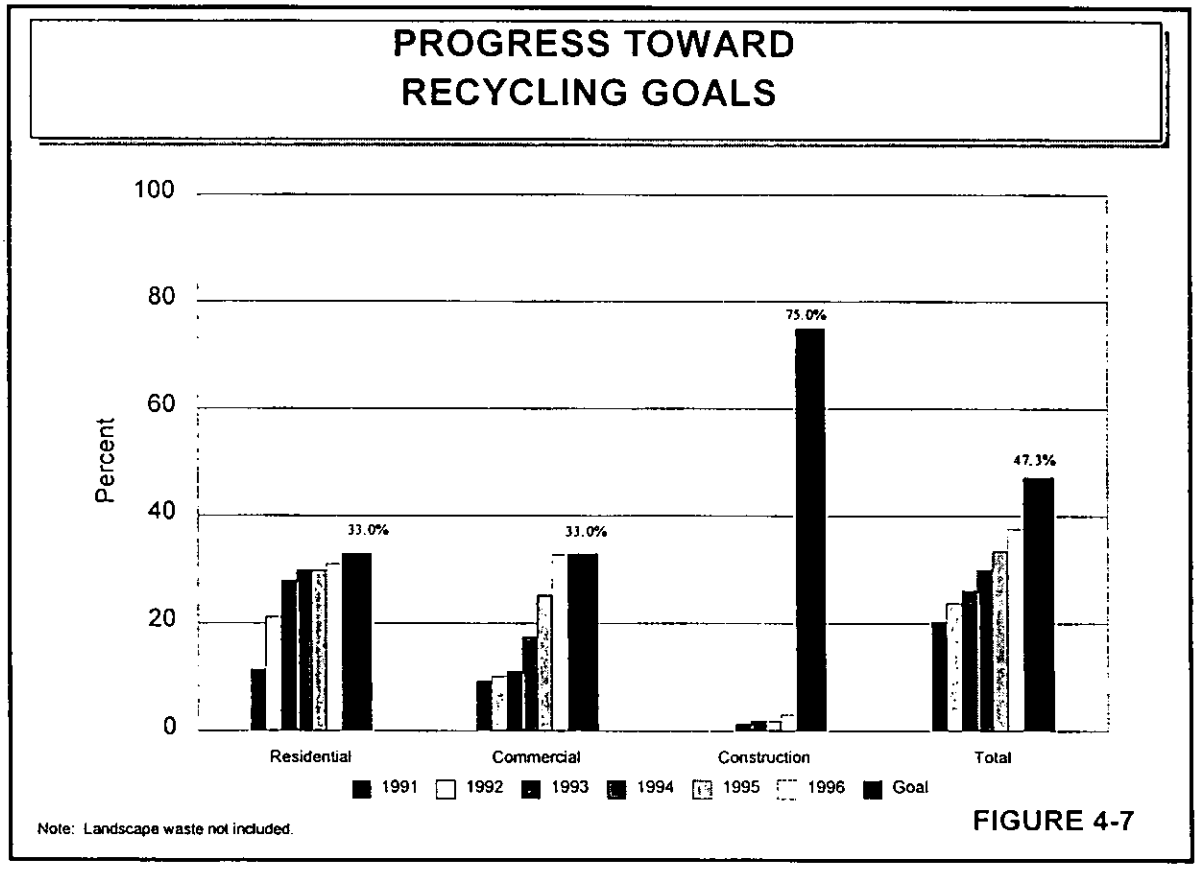
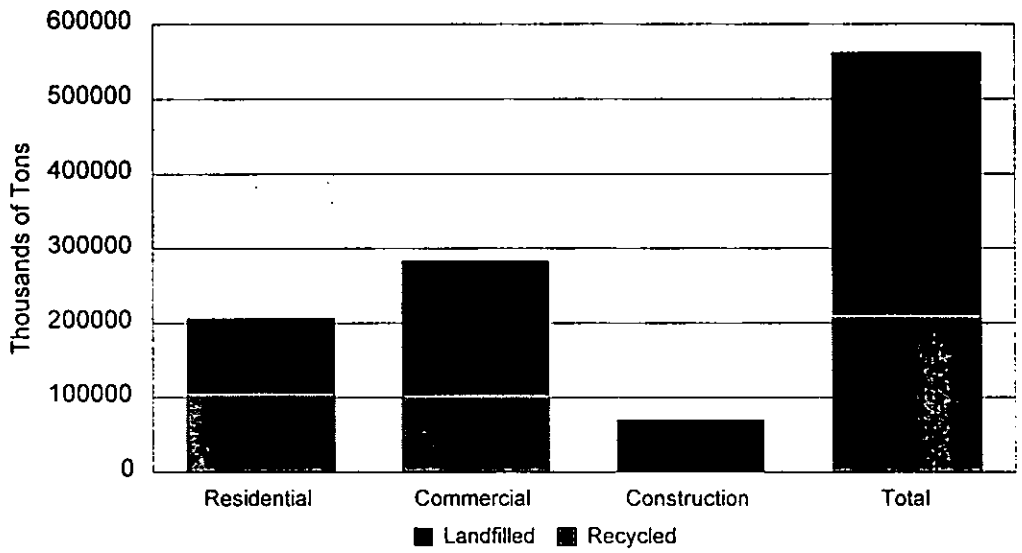


FIGURE 4-7

The target date for the new 52 percent goal should be 2003, with annual goals increasing at two percent each year from the 1996 level of approximately 38 percent (see Figure 4-9). This adjusted schedule reflects, on the one hand, the difficulties in establishing effective programs in the construction sector, and on the other hand the steady progress as additional commercial establishments initiate programs in response to the County's commercial recycling ordinance.

1996
RECYCLED & LANDFILLED VOLUMES



Note: Landscape waste included.

FIGURE 4-8

Recommendation 4.10

Increase the County's recycling goal to 50 percent by the year 2002, with 50 percent individual goals for the residential, commercial, and construction sectors.

RECOMMENDED RECYCLING GOALS

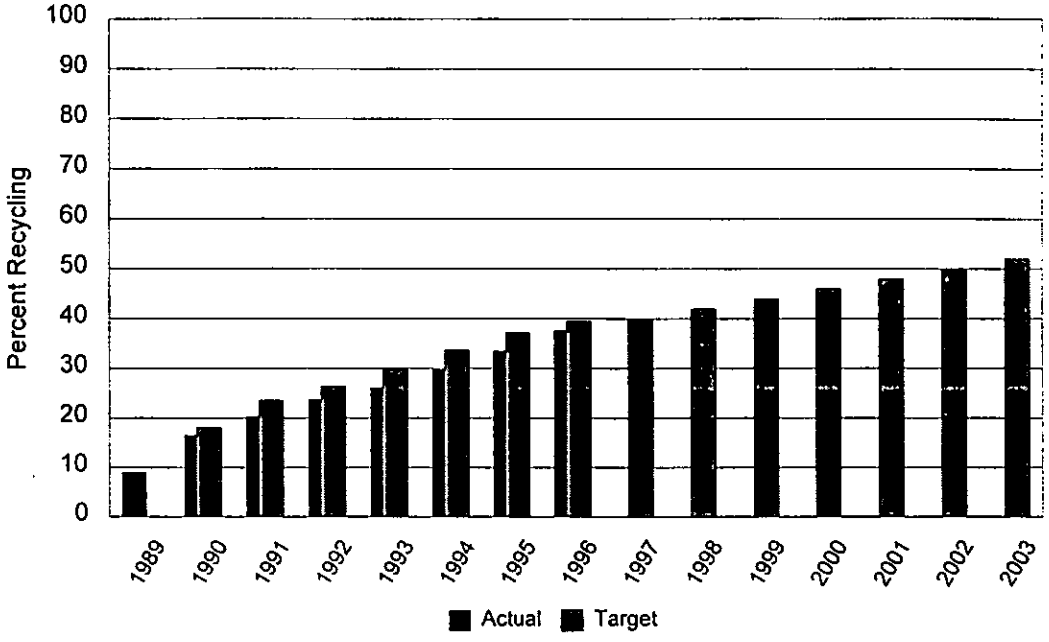


FIGURE 4-9

APPENDIX 1

TABLE 1
WASTE GENERATION AND RECYCLING, BY SECTOR
KANE COUNTY, ILLINOIS
(All figures are tons.)

	Residential	Commercial	Construction	Landscape	Total
1991					
Generation	135,468	245,349	64,364	65,645	510,827
Recycled	15,579	22,743	0	65,645	103,967
Percent	11.5%	9.3%	0.0%	100.0%	20.4%
1992					
Generation	135,890	249,687	65,652	69,821	521,050
Recycled	28,825	25,435	25	69,821	124,106
Percent	21.2%	10.2%	0.0%	100.0%	23.8%
1993					
Generation	138,408	254,315	66,869	71,115	530,707
Recycled	38,748	28,361	1,001	71,115	139,225
Percent	28.0%	11.2%	1.5%	100.0%	26.2%
1994					
Generation	141,211	259,158	68,171	72,499	541,040
Recycled	42,176	45,376	1,324	72,499	161,375
Percent	29.9%	17.5%	1.9%	100.0%	29.8%
1995					
Generation	143,923	264,135	69,480	73,892	551,430
Recycled	42,806	66,676	1,304	73,892	184,678
Percent	29.7%	25.2%	1.9%	100.0%	33.5%
1996					
Generation	146,651	269,141	70,797	75,292	561,881
Recycled	45,489	88,203	2,112	75,292	211,096
Percent	31.0%	32.8%	3.0%	100.0%	37.6%
GOAL:	33.0%	33.0%	75.0%	100.0%	47.3%
1996 Level as % of Goal:	94.0%	99.3%	4.0%	100.0%	79.4%

APPENDIX 1

TABLE 2
RECYCLING ACTIVITY, BY SECTOR AND COLLECTION TYPE
KANE COUNTY, ILLINOIS
(all figures are tons)

							Change	
	1991	1992	1993	1994	1995	1996	95-96	91-96
Residential:								
Municipal Curbside	11,769	19,961	29,170	32,254	32,919	33,619	2.1%	185.7%
Unincorp. Curbside	1,603	2,282	2,527	3,550	4,150	4,609	11.1%	187.5%
Dropoff - public	2,207	808	773	630	542	682	25.8%	-69.1%
Buyback - private	na	5,758	5,875	5,583	4,459	5,767	29.3%	-
Multi-family:*	0	16	403	159	736	812	10.3%	-
Subtotal:	15,579	28,825	38,748	42,176	42,806	45,489	6.3%	192.0%
Commercial:								
Haulers	4,791	5,454	9,653	15,841	17,526	21,991	25.5%	359.0%
Other	17,952	19,981	18,708	29,535	49,150	66,212	34.7%	268.8%
Subtotal:	22,743	25,435	28,361	45,376	66,676	88,203	32.3%	287.8%
Construction:								
Haulers:	0	25	1,001	1,324	1,304	2,112	62.0%	-
Landscape Waste:								
Public Works	9,506	9,003	10,695	8,486	8,170	10,003	22.4%	5.2%
Haulers/Municipal	8,806	16,025	10,474	12,428	12,157	12,828	5.5%	45.7%
Haulers/Unincorp.	-	-	254	254	292	349	19.5%	-
Haulers/Commercial	1,820	489	244	213	259	488	88.4%	-73.2%
Total Collected:	20,132	25,517	21,667	21,381	20,878	23,668	13.4%	17.6%
Total Generated:	65,645	69,821	71,115	72,499	73,876	75,292	1.9%	14.7%
Percent Collected:	30.7%	36.5%	30.5%	29.5%	28.3%	31.4%	11.2%	2.5%
TOTAL:	103,967	124,081	139,225	161,375	184,662	211,096	14.4%	77.6%

APPENDIX 1
TABLE 3
KANE COUNTY RECYCLING TRENDS

	1989	1991	1992	1993	1994	1995	1996
Recycling Rate:	9%	20%	24%	26%	30%	34%	38%
Municipal Programs:							
Households Served	9,850	76,230	82,609	86,413	90,123	91,939	95,266
Participation	na	73%	73%	83%	82%	87%	85%
Tons Recycled	845	11,262	19,413	28,643	32,133	32,919	33,619
Lbs./Household/Month	na	24.6	39.2	55.2	59.4	59.7	55.3
Unincorporated Areas:							
Households Served	na	5,490	9,000	9,990	12,624	16,775	20,032
Participation	na	70%	84%	80%	75%	79%	75%
Tons recycled	na	1,004	2,151	2,508	3,550	4,150	4,609
Lbs./Household/Month	na	30.5	39.8	41.8	46.9	41.2	38.3
Multi-Family:							
Tons Recycled	na	2	16	403	159	736	812
Commercial:							
Businesses Recycling	na	195	480	701	1,027	1,959	2,529
Tons Recycled	5,208	4,791	5,454	9,653	15,840	17,526	21,991
Construction:							
No. of Active Haulers	na	0	1	3	4	6	7
Tons Recycled	na	0	25	1,006	1,324	1,303	2,112
Yard Waste Collected:	5,604	20,080	25,517	21,667	21,381	20,878	23,668
Other Recycling: (Scrap yards, etc.)	32,971	20,159	26,547	25,356	29,320	53,431	72,661
HHW Attendance: (Oil, HHW, paint, batteries)	na	na	1,975	1,984	2,291	3,410	7,052
Total Tons Recycled:	44,628	57,298	79,123	89,236	103,707	130,943	159,472

Note: No data available for 1990.

APPENDIX 2
KANE COUNTY RECYCLING AWARDS RECIPIENTS

1993

Schools
Munhall Elem., St. Charles
Our Lady of Good Counsel, Aurora
Central Middle, Burlington
Dundee-Crown High, Carpentersville
District #300, Dundee
District #U-46, Elgin

Businesses
Arthur Andersen, St. Charles
DuKane Corp., St. Charles
OSI Industries, Aurora
Safety-Kleen Corp., Elgin
Sauber Mfg., Virgil

Government, Municipal
City of Elgin
City of Geneva

Government, Other
Geneva Public Library Dist.

Other
St. Charles Episcopal Church

1994

Schools
Alice Gustafson, Batavia
Wayne School, Wayne
St. Charles H.S. Ecology Club
Larkin Center, Carpentersville
Mooseheart

Businesses
Colonial Ice Cream, St. Charles
Delnor Community Hospital, Geneva
Sherman Hospital, Elgin
Toyota Motor Distributors, Aurora
U.S. Can Co., Elgin

Government, Municipal
City of St. Charles
Village of Lily Lake

Government, Other
St. Charles Public Library Dist.

Other
Batavia League of Women Voters
Park Shore Apartments, St. Charles
Willow Lake Estates, Elgin

1995

Schools
Harrison St. School, Geneva
St. Peter School, Geneva
Batavia Middle School
Thompson Middle, St. Charles
Elgin Community College

Businesses
Maple Park Mortgage, St. Charles
Timbers Professional Ctr, St. Chas.
Dial Corp., Montgomery
General Mills, St. Charles
Grand Victoria Casino, Elgin
St. Joseph Hospital, Elgin

Government, Municipal
Village of West Dundee

Government, Other
-

Other
Dundee Paint Co., West Dundee
Geneva Ace Hardware
Levine's Home Center, Elgin
St. Charles Ace Hardware

APPENDIX 2 (cont'd.)
KANE COUNTY RECYCLING AWARDS RECIPIENTS

1996

Schools
Good Shepherd Lutheran, Elgin
Wasco Elementary
Western Avenue, Geneva
Haines Middle, St. Charles
Rosary High, Aurora

Businesses
Advance Lifts, St. Charles
Baird & Warner, Geneva
Cracker Barrell, Elgin
Printpack, Elgin
Spring Hill Mall. West Dundee
Kennedy Homes, Carpentersville

Other

Friends of St. Charles Library
Landfill Alternatives, Elburn

1997

Schools
Chicago Junior School, Elgin
Dundee Highlands School, West Dundee
Fox Valley Montessori School, Aurora
Schneider Elementary School, North Aurora
St. Edward Central Catholic High School, Elgin

Businesses
Harris Bank, St. Charles
Johnson Controls, Geneva
Pan American Seed Co., Elburn
Pulte Homes, Elgin

Other

Suzi Myers, Allen School, Aurora
Staff of Dundee-Crown High School, Carpentersville

CHAPTER 5
EVALUATION OF ALTERNATIVE WASTE TECHNOLOGIES

On September 12, 1995 the Kane County Board adopted Resolution 95-247, Declaring the Solid Waste Policy of Kane County. This resolution states, "alternative technologies for the disposal of solid waste are to be given a fair and unbiased review." On August 13, 1996 the County contracted Andrews Environmental Engineering, Inc. for professional environmental and consulting services for the feasibility analysis of alternative technologies for municipal solid waste management.

The following two pages are the Executive Summary of this report. The entire report is located in Volume II, Appendix A of the Plan Update.

Executive Summary

Kane County Environmental Management Department is attempting to update its Solid Waste Management Plan. Alternate Technologies available for the processing or disposal of Municipal Solid Wastes were evaluated to determine if one or more technologies could increase the diversion of waste from landfills and extend the life of the current landfill. Four specific technologies were evaluated and compared to landfilling. The technologies evaluated were:

1. Composting of Mixed Municipal Solid Waste
2. Wet/Dry Collection followed by Composting
3. Waste-to-Energy
4. Advanced Recycling

All of the above technologies will help in diverting some of the waste material from landfills. None of the above technologies can eliminate the need for a landfill. All of the technologies are susceptible to the impact of waste flow control.

Composting technologies have been proven to be successful for the volume reduction of organic biodegradable waste materials. Of the waste that Kane County landfills, 47% by weight can be converted to compost and as a result an equal amount of waste can be diverted away from landfills. There are fourteen operating MSW composting facilities in the U.S. today. While the technology has been successfully utilized by some, the technology has had a less than successful track record. The formula for success relies very much on the local cost-competitiveness, proper management, production of a good quality product on a consistent basis, marketing of the product, and the tolerance of facility neighbors to nuisances created by the facility.

Most successful composting facilities are small in size (less than 250 tons per day of processing capacity). Large facilities of up to 1000 tons per day have also been built. Several private vendors offer proprietary designs. Two properties, inherent to MSW, have resulted in some set backs to composting. These two properties are odor, and lack of a consistent composition of the final product (compost). While odors can be engineered to be minimal, they cannot be completely eliminated. The composition of waste input determines the final quality of the compost. Composts made from poorly sorted wastes could have a unacceptable concentration of heavy metals and may not enjoy good markets. While compost have a beneficial affect on the soil, some of the physical and chemical contaminants present in the compost could hinder the use of the compost.

Tipping fees for currently operating facilities range from $ 33-88/ton of waste processed. No revenues can be expected from the sale of compost. A composting plant, built today, could have a tipping fee in the upper end of this range, and substantially higher than the tipping fee at Kane County's landfill. While economics is a major factor to consider in the short run, the future value of saved landfill space should also be taken into consideration. Besides, siting a new composting facility would be no easy task.

The concept of separation of Wet waste from Dry waste at the source has been adopted for wastes destined to composting facilities. Wet wastes are generally biodegradable wastes grouped together in one waste container. The advantage of sorting wastes before composting (rather than composting mixed MSW) are: better quality of compost product generated; faster rate of composting; and the need for less equipment and space.

With this approach, approximately 14-17% of the waste stream can be expected to be diverted from the landfill to farmers land. The success of such a program depends on the participation level of the waste generators. This alternative would have the most impact on collection. The collection costs are likely to increase by 10-20% of regular waste collection. There will be added inconvenience to the home owner. Citizens participating in pilot waste collection programs have been very supportive of this concept and their contributions to the environment. Due to the considerable cost differential between this method and conventional disposal methods, wet/dry separation technology is not considered an economically feasible alternative at this time.

Waste-to-Energy facilities have not been popular in the last two decades because of perceived air quality and residual ash disposal problems. In concept, they would divert 60-90% of waste from a landfill. Sustained energy markets, that are willing to make long-term commitments, are necessary to recover some of cost, and most importantly the energy resource. Therefore, assurances must be obtained from waste collectors and haulers to provide waste flow to the facility.

The permanent nature of a Waste-to Energy facility makes siting of such a facility almost as difficult as landfills. The repeal of the retail rate law did not favor incineration of MSW. Many operating facilities are subsidized by the local governments whose residents are served by the community. Tipping fee of operating WTE facilities range from $25-77 per ton of waste processed. The average tipping fee is about $ 60/ton, substantially higher than the current tipping fee at Kane County's landfill. The construction of WTE facilities is also capital intensive. A single WTE facility in Kane County based on the Rood model is projected to cost an estimated $ 130 million.

Kane County has an excellent recycling program. An estimated 33% of the MSW generated is diverted from landfills by recycling. In addition, virtually all of the landscape waste is presently being diverted away from landfills. It is estimated that 20-30% of the wastes that are landfilled originate from construction and demolition activities. These Construction and Demolition (C&D) wastes offer a large potential for future landfill space savings in Kane County.

A typical 2000 square feet home will generate 3-4 tons of waste during construction. An estimated 50% of these wastes can be diverted from landfills at a cost less than the landfill tipping fee. Cardboard, wood, and metal are three components that can easily be removed and diverted from landfills. The relative success of diversion will depend to some extent on the efficiency of processing, but largely on markets for processed materials. Most concrete and asphalt waste is already being diverted from landfills. The County should consider developing a strategy with an incentive system

(rather than mandates) to encourage private recyclers to divert C&D waste from landfills.

CHAPTER 6
TRANSFER STATIONS

Background

Kane County has historically utilized in-county landfills, such as the Settler's Hill Landfill (owned by the County) and the Woodland Landfill (owned by Waste Management, Inc.), to meet its disposal needs. The County's Solid Waste Management Plan, adopted in November, 1992, outlined a long-term disposal strategy for the County which included the development of a new in-county landfill. A siting study was conducted following adoption of the Plan to identify preferred sites for a new landfill. The siting study was completed in August, 1995.

Since that time, however, the County has modified its position on in-county landfills. On September 12, 1995, the County Board passed Resolution 95-247 which states:

> The Kane County Board will not pursue the acquisition of property, the development of, or siting approval for a new landfill facility in Kane County.

Earlier, in 1994, the County granted approval for a limited expansion of Settler's Hill, on the condition that no future expansions would be allowed. That expansion was contested before the Illinois Pollution Control Board and the courts before being resolved in September, 1997. On September 17, 1997, the County unanimously adopted Resolution 97-261 a three party agreement between the County, the City of Geneva, and Waste Management. The agreement resolved the landfill differences underlying the litigation of the prior three years, and calls for Settler's Hill Landfill to be closed on or before December 31, 2007.

The County has revised its disposal strategy, and is opposed to any new or expanded landfill activities within Kane County. Instead, the County supports a series of transfer stations to meet its solid waste needs. This chapter outlines the County's transfer station program.

Transfer Station Concept

A transfer station is a building where waste from refuse collection vehicles (e.g., the vehicles which pick up household waste at the curb) is consolidated into larger, semi-truck loads for more efficient transport to a landfill or other disposal facility. No waste is buried or otherwise permanently disposed at a transfer station.

Transfer stations enable more efficient transport of waste over long distances. Refuse collection vehicles typically have a payload of 8-10 tons, and may have a multi-person crew. Transfer vehicles typically have a payload of 20-25 tons of refuse, and have a 1-person crew. The capital and operating costs for a packer vehicle are often greater than for a transfer vehicle. Because they have greater payloads and comparable (or lower) capital and operating costs, it is more economical to haul waste over long distances in transfer vehicles than in collection vehicles.

The savings in transportation costs must be weighed against the cost to build and operate the transfer station. Although circumstances vary from area to area, a general industry rule of thumb

is that a transfer station and transfer haul of waste become more economical than direct haul of waste in collection vehicles once the one-way haul distance to the disposal facility exceeds about 15 miles.

Transfer stations have become more prevalent in the Chicago metropolitan area (see Figure 6.1), for a number of reasons:

- Continued land development in the metropolitan area has reduced the availability of large parcels of land for landfill facilities.

- New landfill facilities are being located further away from population centers. Transfer stations enable waste to be transported more efficiently to these remotely located landfills.

- Although fewer landfills are being developed, the facilities which are being built are larger, regional type landfills which require larger wastestreams to be economically feasible. Transfer stations facilitate the flow of waste to these regional facilities.

- Transfer stations are consistent with the "hub and spoke" strategy of private waste companies, in which a company develops or purchases a regional landfill (the "hub"), and then develops or purchases transfer stations (the "spokes") to funnel waste to the landfill.

There is currently one permitted transfer station in Kane County, the Speedway Disposal Transfer Station, which was permitted in 1991. That facility currently handles approximately 200 tons per day of waste. Statewide, there are approximately 70 transfer stations, more than half of which are located in the Chicago metropolitan region.

TRANSFER STATIONS IN CHICAGO METRO AREA

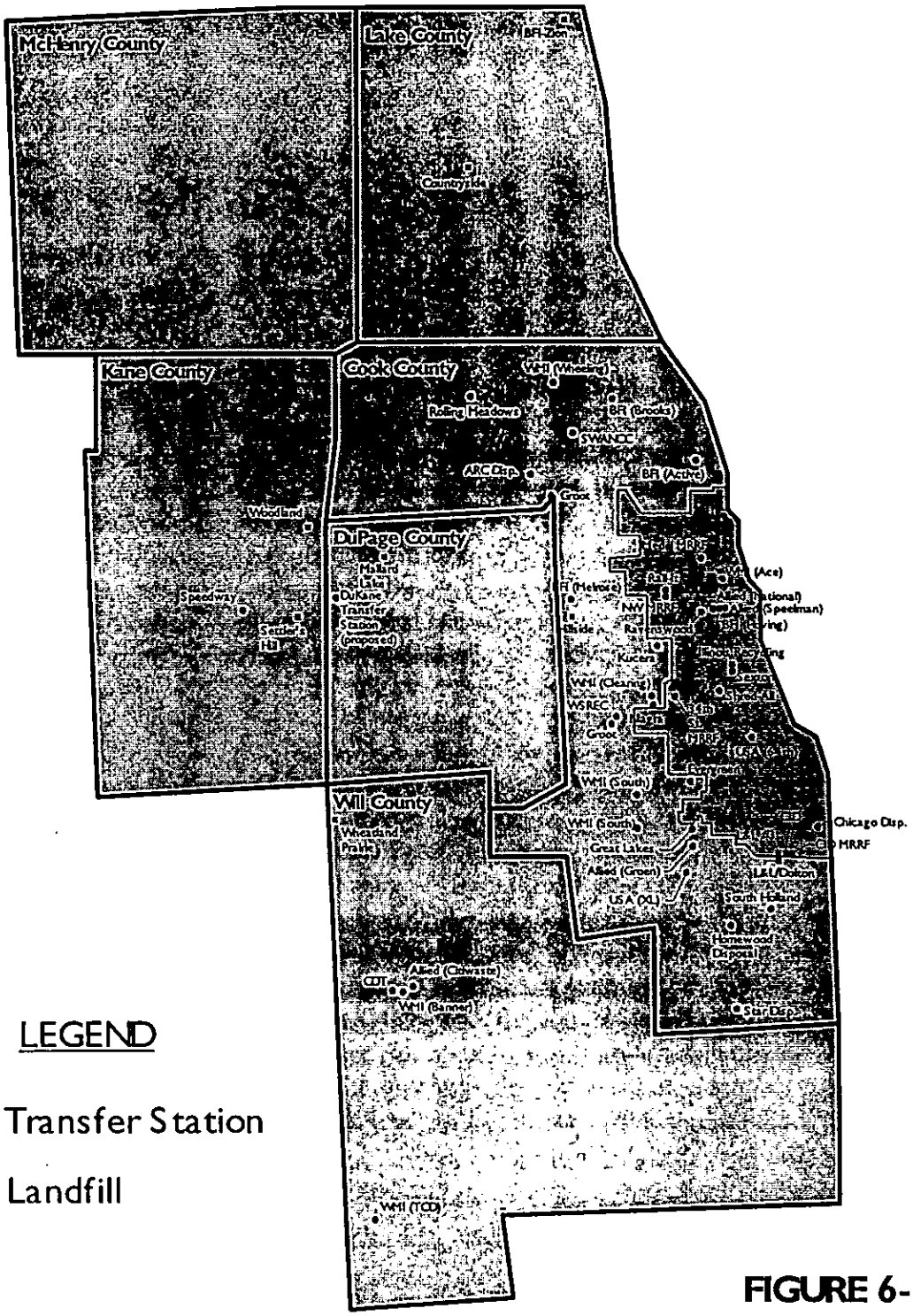


FIGURE 6-1

Regulatory Framework

Transfer stations are defined under Section 3.83 of the Illinois Environmental Protection Act (*the Act*):

> "Transfer station" means a site or facility that accepts waste for temporary storage or consolidation and further transfer to a waste disposal, treatment or storage facility. "Transfer station" includes a site where waste is transferred from
>
> 1. a rail carrier to a motor vehicle or water carrier;
> 2. a water carrier to a rail carrier or motor vehicle;
> 3. a motor vehicle to a rail carrier, water carrier, or motor vehicle;
> 4. a rail carrier to a rail carrier, if the waste is removed from a rail car; or
> 5. a water carrier to a water carrier, if the waste is removed from a vessel.
>
> "Transfer station" does not include (I) a site where waste is not removed from the transfer container, or (ii) a site that accepts or receives open top units containing only clean construction and demolition debris, or (iii) a site that stores waste on a refuse motor vehicle or in the vehicle's detachable refuse receptacle for no more than 24 hours, excluding Saturdays, Sundays, and holidays, but only if the detachable refuse receptacle is completely covered or enclosed and is stored on the same site as the refuse motor vehicle that transported the receptacle to the site.

Note that this definition exempts sites where *containerized* waste is transferred from one mode of transportation to another (e.g., from truck to rail). Hence, a rail facility at which waste-containing intermodal containers were transferred from truck to a rail flat car would not need to be sited or permitted as a transfer station.

The definition also exempts sites where refuse-containing vehicles are parked for less than 24 hours. This would apply to truck yards, for instance, where collection vehicles are parked overnight. Trucks ending the day with partial loads of refuse could be parked overnight before returning to collection routes on the following day. The exemption would also apply to sites used by transportation brokers for overnight storage of loaded transfer trailers. Control over sites exempt from the definition of transfer station would have to be effectuated through local zoning rather than the mandated siting and permitting process for transfer stations.

The Act also defines "storage site":

> "Storage site" is a site at which waste is stored. "Storage site" includes transfer stations but does not include (I) a site that accepts or receives waste in transfer containers unless the waste is removed from the transfer container or unless the transfer container becomes stationary, en route to a disposal, treatment, or storage facility for more than 5 business days, or (ii) a site that accepts or receives open top units containing only clean construction and demolition debris, or (iii) a site that stores waste on a refuse motor vehicles or in the vehicles's detachable refuse receptacle for no more than 24 hours, excluding Saturdays, Sundays, and holidays, but only if the detachable refuse receptacle is completely covered or enclosed and is stored on the same site as the refuse motor vehicle that transported the receptacle to the site.

Again, this definition exempts sites used (solely) for overnight parking of full or partially-loaded refuse collection vehicles and/or transfer vehicles from regulation as a waste storage site. The definition also allows storage of waste in *transfer containers* for up to 5 days. Transfer containers are defined in the Act as follows:

> "Transfer container" means a reusable transportable shipping container that is completely covered or enclosed, that has a volume of not less than 250 cubic feet based on the external dimensions, and that is constructed and maintained to protect the container contents (which may include smaller containers that are or are not transfer containers) from water, rain, and wind, to prevent the free movement of rodents and vectors into or out of the container, and to prevent leaking from the container.

It appears that the 5-day storage period for waste in *transfer containers* was developed with intermodal rail facilities in mind.

Section 22.14 of the Act prohibits a transfer station from being developed within 1000 feet of the nearest dwelling or residentially zoned area.

Transfer stations are pollution control facilities and must secure local siting approval as well as IEPA permit approval. Section 39.2 of the Act governs the local siting process. If a transfer station is proposed to be located in unincorporated Kane County, the County is vested with siting authority. If a transfer station is proposed to be located in an incorporated area, the municipality is the appropriate siting authority. In order to receive local siting approval, transfer stations must demonstrate compliance with nine criteria:

1. The facility is necessary to accommodate the waste needs of the area it is intended to serve;

2. The facility is so designed, located and proposed to be operated that the public health, safety and welfare will be protected;

3. The facility is located so as to minimize incompatibility with the character of the surrounding area and to minimize the effect on the value of the surrounding property;

4. The facility is located outside the boundary of the 100 year floodplain or the site is flood-proofed;

5. The plan of operations for the facility is designed to minimize the danger to the surrounding area from fire, spills, or other operational accidents;

6. The traffic patterns to or from the facility are so designed as to minimize the impact on existing traffic flows;

7. If the facility will be treating, storing or disposing of hazardous waste, an emergency response plan exists for the facility which includes notification, containment and evacuation procedures to be used in case of an accident release;

8. If the facility is to be located in a county where the county board has adopted a solid waste management plan consistent with the planning requirements of the Local Solid Waste Disposal Act or the Solid Waste Planning and Recycling Act, the facility is consistent with that plan; and

9. If the facility will be located within a regulated recharge area, any applicable requirements specified by the Board for such areas have been met.

The County Board (or other appropriate municipal body) has 180 days from the day an application for local siting approval is filed to approve or reject the application. During that period, the County Board must hold at least one public hearing on the application, and accept written comments up until 30 days following the last public hearing date.

Kane County has a local siting ordinance to implement the requirements of Section 39.2. The ordinance specifies the types of information that applicants for local siting approval must provide, and describes the procedures for conducting the public hearings and the review process.

Transfer stations which are used for exclusively for landscape waste, and at which landscape waste is not stored for more than 24 hours, are exempt from the Section 39.2 process. Such facilities must obtain zoning approval, however, as well as IEPA permit approval.

Transfer stations must also secure a development permit and an operating permit from the IEPA. The IEPA has 90 days to review development permit applications, and 45 days to review operating permit applications. The development permit application must be filed prior to construction of the facility, but only after the facility has received local siting approval. The application must demonstrate that construction and operation of the facility will not violate the Act.

The operating permit application is filed after the transfer station has been constructed, but before any waste is accepted. This second permit application must demonstrate that the transfer station has been constructed as specified in the development permit application.

There may be additional approvals that transfer stations must secure. These can include stormwater permits, building permits, and occupancy permits. After they are constructed and commence operations, transfer stations are inspected by the IEPA.

Transfer stations are thus highly regulated facilities, which must secure a number of approvals, including local siting approval from the County (or a municipality in the County), development permit approval from the IEPA, operating permit approval from the IEPA, as well as other approvals before they can be built and operated.

Kane County Transfer Program

As is discussed in Chapter 7 (Landfilling), the number of landfills within the State of Illinois has dramatically decreased, while landfill capacity statewide appears to have stabilized, increasing over 30% from 1994 to 1995. Reported landfill capacity in Illinois in January, 1996 is 20% higher than the reported capacity of any other year since reporting began in 1987. This reflects the trend in landfill development toward building fewer, but larger, landfill facilities. These regional landfills are designed for and capable of handling large waste streams. Many of the facilities have been developed specifically to handle transfer volumes from urbanized areas, and in particular the Chicago metropolitan area and Kane County.

The County views transfer stations as a viable alternative for meeting the future disposal needs of its residents and businesses. The County does not intend to pursue the development of a County-owned transfer station. Rather, the County will allow the private sector to develop a transfer station network as it deems appropriate. The Plan reiterates that Waste Management has agreed not to seek a site or operational permit for a transfer station within Geneva Township. If an adequate transfer station network does not develop over the next five years, the County will re-evaluate this position in its 2002 Update to the Solid Waste Management Plan.

The goal of the County's Solid Waste Management Plan is to develop a comprehensive, integrated solid waste management system to accommodate the needs of the County for at least 20 years. Among the objectives of the plan is "to comply with all relevant State and Federal requirements regarding solid waste planning, recycling, and facility design and operation." The Illinois stature governing the siting of transfer stations, Section 39.2 of the Act, states that siting approval may only be granted if "sufficient details" demonstrating compliance with the nine criteria of Section 39.2 are included in siting applications. Therefore, in order to comply with this statute, and in order to insure that sufficient information is presented on proposed transfer stations, applications for local siting approval for any transfer station to be located anywhere in Kane County shall contain at a minimum the information detailed within the outline shown in Figure 6.2. It is the opinion of the County Board that unless an application contains all the information as defined and required in Figure 6.2, the application is incomplete and does not contain the necessary information for the siting authority to adequately review and objectively rule on the proposed facility. Any siting application filed within Kane County which does not contain all of the information identified in Figure 6.2 is inconsistent with the County's Solid Waste Management Plan, and therefore inconsistent with criterion 9 of Section 39.2

FIGURE 6.2 - REQUIRED CONTENT OF APPLICATIONS FOR LOCAL SITING APPROVAL OF TRANSFER STATIONS TO BE LOCATED WITHIN KANE COUNTY

Written Presentation

I. The Facility Is Necessary To Accommodate The Waste Needs Of the Area It Is Intended To Serve
   - A. Introduction
   - B. Economic Benefits Of Facility
   - C. Service Area Identification *
   - D. Demographics Of Service Area
   - E. Waste Generation Rates Of Service Area
   - F. Existing Waste Disposal Network For Service Area
   - G. Future Waste Disposal Network For Service Area
   - H. Conclusion, Signed By Professional Expert

II. The Facility Is So Designed, Located And Proposed to Be Operated That The Public Health, Safety And Welfare Will Be Protected
   - A. Introduction
   - B. Site legal And General Description *
     1. Survey Plat With Existing Structures *
     2. Identification Of Property Owners
     3. Existing Topography Of Site (Minimum Two Foot Contours) *
     4. Title Search Of Property
   - C. Existing Conditions Of Site And Adjacent Properties *
     1. Historical Property Uses
   - D. Location Standards
     1. Residential Properties *
     2. Floodplain Limits *
     3. Archaeologic Study
     4. Airport Study
     5. Groundwater Study
     6. Endangered Species Study
     7. List Covenants Recorded With The Property Deed
     8. Identification Of Wetlands On Property
   - E. Site Design
     1. Entrance *
     2. Landscaping Plan *
     3. Access Roads And Interior Traffic Circulation *
     4. Security Measures To Be Implemented
     5. Weight Station Location And Design *
     6. Parking On Site *
     7. Vehicle Stacking Procedures *
     8. Utilities On Site *
     9. Office Structures
     10. Transfer Station Structure And Detailed Floor Plan *
     11. Water Supply, Water Capacity, And Facility's Water Requirements
     12. Stormwater Management Measures
        - a. Two Year, 24 Hour Design
        - b. 100 Year, 24 Hour Design
        - c. Basin Design And Release Rate
        - d. Sediment Control Measures
        - e. Erosion Control Measures (On-Site And Off-Site)
        - f. Drainage Flow Off-Site *
        - g. Site Location On USES 7.5 Minute Quadrangle Map *

FIGURE 6.2 - REQUIRED CONTENT OF APPLICATIONS FOR LOCAL SITING APPROVAL OF TRANSFER STATIONS TO BE LOCATED WITHIN KANE COUNTY (cont'd.)

F. Operations
   1. Hours Of Operation
   2. Quantity Of Waste Accepted
   3. Anticipated Quantities Of Waste Received By Waste Type
   4. Identification Of Acceptable Waste Types
   5. Waste Screening Procedures
   6. Waste Transfer Operational Plan *
   7. Overnight Storage Of Waste On Site
   8. Waste Volume Throughput Analysis
   9. Identification Of Disposal Sites And Permits
   10. Identification of Proposed Railroad Activities
   11. Recycling Activities On Site
   12. Equipment Requirements
   13. Facility Cleaning Procedures
   14. Load Checking Program
   15. Traffic Pattern (On-Site) *
   16. Facility For Employees
   17. Fueling Procedures
   18. Litter Control
   19. Vector Control Procedures
   20. Indoor Air Quality
   21. Outdoor Air Quality
   22. Odor Control Procedures
   23. Noise Control Procedures
   24. Training Personnel
   25. Fire Control Protection
   26. Lockout/Tagout Procedures
   27. Insurance Coverage
   28. Record Keeping Procedures
      a. Daily Tonnage Receipts By Waste Type
      b. In-County Daily Tonnage Receipts
      c. All Regulatory Correspondence
      d. All Environmental And Regulatory Inspections
      e. Wastewater Generation And Disposal Records
      f. Load Inspection And Load Discrepancy Records
      g. Accident Records
   29. Wastewater Generation And Handling
      a. Wastewater Generation Calculations
      b. Wastewater Storage Procedures
      c. Wastewater Disposal/Treatment Procedures
   30. Operational Contingency Plans
      a. Equipment Failure
      b. Interruption Of Utility Service
      c. Inclement Weather
   31. Proposed Life Of Facility
   32. Final Closure
      a. Waste Removal
      b. Equipment Removal
      c. Equipment Cleaning
      d. Cost Estimate
      e. Schedule

FIGURE 6.2 - REQUIRED CONTENT OF APPLICATIONS FOR LOCAL SITING APPROVAL OF TRANSFER STATIONS TO BE LOCATED WITHIN KANE COUNTY (cont'd.)

G. Operator Information And Experience
   1. Articles Of Incorporation
   2. Audited Financial Statements
   3. Transfer Station Experience Within Illinois
   4. Summary Of All Transfer Station Violations In Illinois
   5. Transfer Station Experience Outside Illinois
   6. Resume Of Facility Manager

H. Conclusion, Signed By Professional Expert

III. The Facility Is Located So As To Minimize Incompatibility With The Character Of The Surrounding Area And To Minimize The Effect On The Value Of The Surrounding Property
   A. Introduction
   B. Land Use/Zoning/Planning Study
      1. Site Zoning
      2. Adjacent And Surrounding Zoning *
      3. Adjacent And Surrounding Land Uses *
      4. Landscape Plan *
      5. Setbacks *
      6. Conformity With The Kane County 2020 Land Resource Management Plan
   C. Real Estate Impact Study
      1. Proposed Improvements
      2. Chicago Metropolitan Area Data and Kane County Area Data
      3. Transfer Site Area Study
      4. Property Value Impact Study
   D. Conclusion, Signed by Professional Expert

IV. The Facility Is Located Outside The Boundary Of The 100 Year Flood Plain Or The Site Is Flood-proofed
   A. Introduction
   B. Location Of 100 Year Floodplain *
   C. Conclusion, Signed By Professional Expert

V. The Plan Of Operations For The Facility Is Designed To Minimize The Danger To The Surrounding Area From Fire, Spills, Or Other Operational Accidents
   A. Introduction
   B. Fire Prevention Measures
   C. Spill Prevention Measures
   D. Accident Prevention/Risk Management
   E. Operational Contingency Plan
   F. Conclusion, Signed By Professional Expert

VI. The Traffic Patterns To Or From The Facility Are So Designed As To Minimize The Impact On Existing Traffic Flows
   A. Introduction
   B. Methodology Used
      1. Traffic Characteristics Of The Facility
      2. Traffic Assignment And Analysis
      3. Roadway And Site Access Requirements
   C. Site Accessibility
      1. Site Location *
      2. Area Roadways *
      3. Proposed Roadway Improvements *
      4. Existing Traffic Volumes

FIGURE 6.2 - REQUIRED CONTENT OF APPLICATIONS FOR LOCAL SITING APPROVAL OF TRANSFER STATIONS TO BE LOCATED WITHIN KANE COUNTY (cont'd.)

D. Develop Traffic Characteristics
    1. Directional Distribution
    2. Estimated Site Traffic Generation
    3. Future Growth
E. Accident History Of Key Intersections To And From Facility
F. Traffic Impact Analysis
    1. Site Access
G. Identification Of Routing To Disposal Facility
H. Gap Study
I. Conclusion, Signed By Professional Expert

VII. If The Facility Will Be Treating, Storing Or Disposing Of Hazardous Waste, An Emergency Response Plan Exists For The Facility Which Includes Notification, Containment And Evacuation Procedures To Be Used In Case Of An Accidental Release
    A. Introduction
    B. Emergency Response Plan
    C. Conclusion, Signed By Professional Expert

VIII. If The Facility Is To Be Located In A County Where The County Board Has Adopted A Solid Waste Management Plan Consistent With The Planning Requirements Of The Local Solid Waste Disposal Act Or The Solid Waste Planning And Recycling Act, The Facility Is Consistent With That Plan
    A. Introduction
    B. Benefits Of Facility
    C. Consistency With The Solid Waste Plan
    D. Conclusion, Signed By Professional Expert

IX. If The Facility Will Be Located Within A Regulated Recharge Area, Any Applicable Requirements Specified By The Board For Such Areas Have Been Met
    A. Introduction
    B. Location Of Regulated Recharge
    C. Conclusion, Signed By Professional Expert

NOTE: *Denotes that a graphic presentation or figure is required with the text.

CHAPTER 7
LANDFILLING

Overview

Kane County has historically relied upon two landfills in the County to dispose of the waste generated by the County: 1) the Settler's Hill Landfill, located in unincorporated Geneva Township, which is owned by the County and operated by Waste Management of Illinois, Inc. (WMI); and, 2) the Woodland Landfill, located in unincorporated St. Charles Township, which is owned and operated by WMI. The County's initial Solid Waste Management Plan, adopted in 1992, called for the development of a new landfill to provide replacement disposal capacity when these two facilities closed. As was noted in Chapter 6, however, the County has determined that it will not pursue the development of a new landfill in Kane County, but rather will rely upon the private sector to dispose of waste outside the County once Settler's Hill and Woodland close. This revised policy anticipates that the private sector waste industry may site one or more transfer stations within (or near) the County in order to make the use of out-of-county disposal facilities more cost-effective.

Status of Settler's Hill Landfill

Settler's Hill Landfill is located in unincorporated Geneva Township, north of Fabyan Parkway and west of Kirk Road. This facility is owned by Kane County and operated under contract by Waste Management of Illinois, Inc. The Settler's Hill Facility, along with the Woodland Landfill in South Elgin, have historically been the primary disposal facilities within Kane County.

The Kane County Board approved an expansion of Settler's Hill in 1994. This approval was appealed to the Illinois Pollution Control Board (IPCB), which upheld the County's granting of siting approval. However, the IEPA denied the County's subsequent application for a permit. The County appealed the IEPA's decision to the Pollution Control Board, which upheld the denial. Both IPCB decisions, (i.e., the decision upholding the County's granting of siting approval and the decision upholding the IEPA's permit denial) were subsequently appealed, leaving the status of the expansion uncertain.

In September, 1997, two actions occurred which greatly clarified the future of Settler's Hill. First, on September 3, 1997, the Second District Court upheld the County Board's siting approval for the expansion of Settler's Hill and ruled that no other governmental unit possessed siting jurisdiction over the expansion. The County's Solid Waste Management Plan and this Update support this final expansion of Settler's Hill.

Second, on September 17, 1997, the Kane County Board unanimously adopted Resolution 97-269. The resolution approves a three-party intergovernmental agreement reached between Kane County, the City of Geneva, and Waste Management of Illinois, Inc. The agreement states that Settler's Hill will permanently close on or before December 31, 2007. The agreement also states that Waste Management of Illinois, Inc. is prohibited from operating or engaging in any type of waste incineration, landscape waste composting, or municipal waste composting at

Settler's Hill, and prohibits any waste transfer stations from being located at Settler's Hill. The agreement further states that Waste Management of Illinois Inc. shall not seek permitting for any other landfill site or a transfer station within Geneva Township. The Solid Waste Management Plan Update supports all of the conditions contained within this intergovernmental agreement.

Projected Landfill Capacity for Kane County Waste

Settler's Hill has a permitted remaining capacity of approximately 3,700,000 tons, not including the 1994 expansion. Kane County and Waste Management of Illinois, Inc. are currently completing the landfill expansion permit application for submittal to the Illinois Environmental Protection Agency. Approval of the expansion is anticipated in twelve to eighteen months. The expansion is for 5,500,000 cubic yards or approximately 3,600,000 additional tons of disposal capacity. It is likely, based on current intake rates, that the facility will be filled to capacity and cease accepting waste prior to the agreed upon December 31, 2007 closure date. However, the exact closure date will be dictated by market conditions and waste receipts at the facility.

As of January 1, 1997, the Woodland Landfill had approximately 1,400,000 tons of remaining capacity. This represents a remaining useful life of a little over three years based on 1996 intake levels.

It is apparent that the County will have to utilize out-of-county disposal facilities sometime on or before the year 2007. In the past, because the County had two in-county landfills to dispose of its waste, the availability of out-of-county disposal capacity was less of a concern. While at present this is still the case, as the closure dates for the Settler's Hill Landfill and Woodland Landfill approach, the County will need to monitor out-of-county landfill capacity more closely.

The IEPA produces an annual report discussing landfill capacity in Illinois. The latest published report is for the year 1995 (unpublished data is also available for 1996). Figure 7.1 contains the Executive Summary for this latest report. A key statistic in the IEPA's capacity report is the Capacity to Disposal Ratio. In 1987, Illinois had 5.4 years of remaining landfill capacity (calculated by dividing the amount of permitted landfill capacity in Illinois by the annual amount of waste disposed in Illinois). By the end of 1995, this ratio has grown to 7.9 years, due in part to a 30% increase in landfill capacity in 1995. The increase in landfill capacity stems from both landfill expansions and development of new landfills in Illinois.

According to the annual data from the IEPA, the amount of landfill capacity in Illinois has stabilized and even increased in recent years (see Figure 7.2). The amount of waste disposal has also increased slightly in recent years (see Figure 7-3). The development of new landfill capacity has occurred primarily outside of the Chicago metropolitan area (see Figure 7-4), due to the decreasing availability of large parcels of land in the metro area.

Figure 7-1

Executive Summary

The Illinois Solid Waste Management Act of 1986 requires Illinois Environmental Protection Agency (EPA) to publish an annual report "regarding the projected disposal capacity available for solid waste in sanitary landfills." This publication fulfills that requirement.

Reporting Periods - Landfills report disposal volumes quarterly and capacities annually. Disposal volumes for 1995 include all nonhazardous solid wastes landfilled in Illinois from Jan. 1 to Dec. 31, 1995; available disposal capacity is that which remained on Jan. 1, 1996.

Disposal Volumes - Since tracking began in 1987, nonhazardous solid wastes landfilled in Illinois dropped from that peak year's total of 50.5 million cubic yards, to a low of 41.0 million cubic yards during 1992 and 1993, then climbed to 46.8 million cubic yards in 1995.

Nonhazardous Solid Waste Landfills -The number of landfills accepting nonhazardous solid waste for at least a portion of a calendar year has fallen from 146 in 1987, to 58 in 1995. This decline is expected to continue. Nearly 85 percent of Illinois landfills are privately owned and operated; the remainder are publicly owned and are either publicly or privately operated.

Counties With Landfills - Forty-two of the state's 102 counties had one or more active landfills in 1995.

Disposal Capacities - Since tracking began in 1987, landfill capacities have grown from a low of 273.6 million cubic yards, on Jan. 1, 1988, to a high of 473.8 million cubic yards, on Jan. 1, 1996.

Capacity Growth - Available capacity has grown sharply on two occasions: 1988's growth of 106.7 million cubic yards preceded seven years of capacities in the upper 300-million-cubic-yard range; during 1995 capacity leaped by another 111.7 million cubic yards, to its current peak of 473. 8 million cubic yards.

Capacity-to-Disposal Ratio - Dividing reported remaining capacity by total wastes landfilled annually yields a doubly useful ratio: For example, for each cubic yard of waste landfilled in 1987 there remained 5.4 cubic yards of available capacity. By the end of 1995, this ratio had grown to 9.9 cubic yards, which is just another way of saying the state currently has 9.9 years of remaining landfill capacity, assuming no new capacity is added and disposal rates remain unchanged.

Figure 7-1 (Cont'd.)

Factors Affecting Capacity - Landfill capacity increased when existing facilities are expanded or new facilities are built. Capacity is reduced when disposal rates rise or when landfills close prematurely. Capacity is conserved when selected wastes are prohibited from landfilling, when wastes are diverted to out-of-state facilities, when they are incinerated, or are reduced at their source or are selectively recycled.

Waste Imports and Exports- Thirty-five Illinois landfills reported receiving 4.3 million cubic yards of nonhazardous solid wastes from other states during 1995, or 9.2 percent of all such wastes landfilled in Illinois during the calendar year. There is no requirement for reporting the diversion of wastes to out-of-state landfills.

Local Siting Requirements- County and municipal governments, and not the Illinois EPA, decide if a site is suitable for a new pollution control facility. The Illinois Environmental Protection Act limits the Agency's review to design and engineering issues exclusively. Local siting must be received before the Agency can consider a developer's permit application. Local governments have thus far approved siting for eight landfill expansions and six new landfills; pending are local decisions for three landfill expansions and two new landfills.

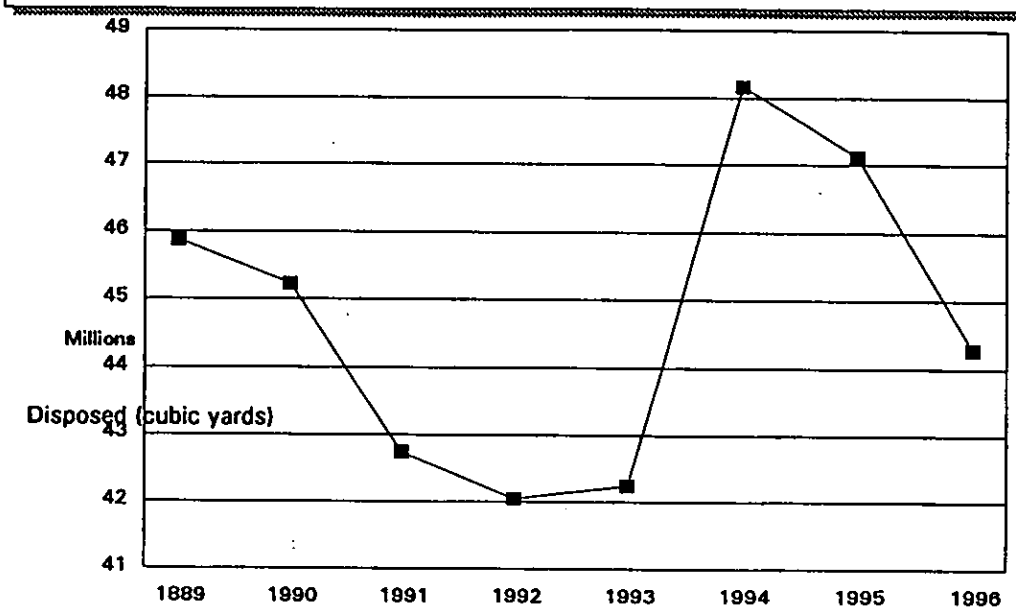
Waste Transfer Stations - These facilities seek efficiency by consolidating wastes into cost-effective loads for shipment to disposal sites. In 1995, Illinois had 66 active transfer stations. Of this number, 35 were in Cook County and 16 were in Chicago. Current municipal waste-management plans call for the development of up to 14 new transfer stations.

Annual Waste Generation - Multiplying the average waste-generation rate of 6.2 pounds per capita per day, by an estimated 1995 Illinois population of 11,829,940, suggests the state's residents generated some 13.4 million tons of solid waste. To this amount can be added some 1.3 million tons of wastes received from other states. Records show that 14.1 million tons of solid waste were landfilled, 278,000 tons were composted and 84,000 tons were incinerated during 1995. Roughly 3.4 million tons of materials were removed from the state's waste stream through recycling; however, this is an imprecise number because recycling information is estimated and more than half of reported recycling data covers time periods other than calendar year 1995.

Recycling Rates - Each county's recycling coordinator, plus their counterparts in solid waste planning agencies in Cook County and Chicago, were asked to provide recycling data. Of 106 recycling surveys distributed, 85 were completed and returned. These surveys revealed local recycling rates of less than one percent to 38 percent, for a weighted statewide average of 21 percent.

Adapted from: Available Disposal Capacity for Solid Waste in Illinois Ninth Annual Report, December 1996 Illinois Environmental Protection Agency, Bureau of Land IEPA/BOL/96-0

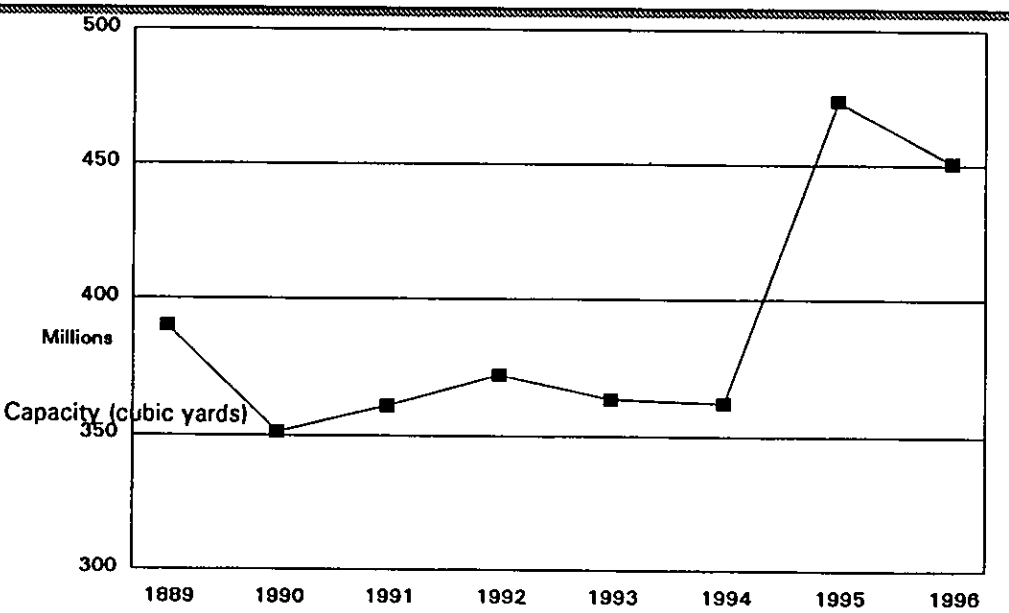
WASTE DISPOSED IN ILLINOIS LANDFILLS



Notes:
1. Source: Illinois Environmental Protection Agency data.

FIGURE 7-2

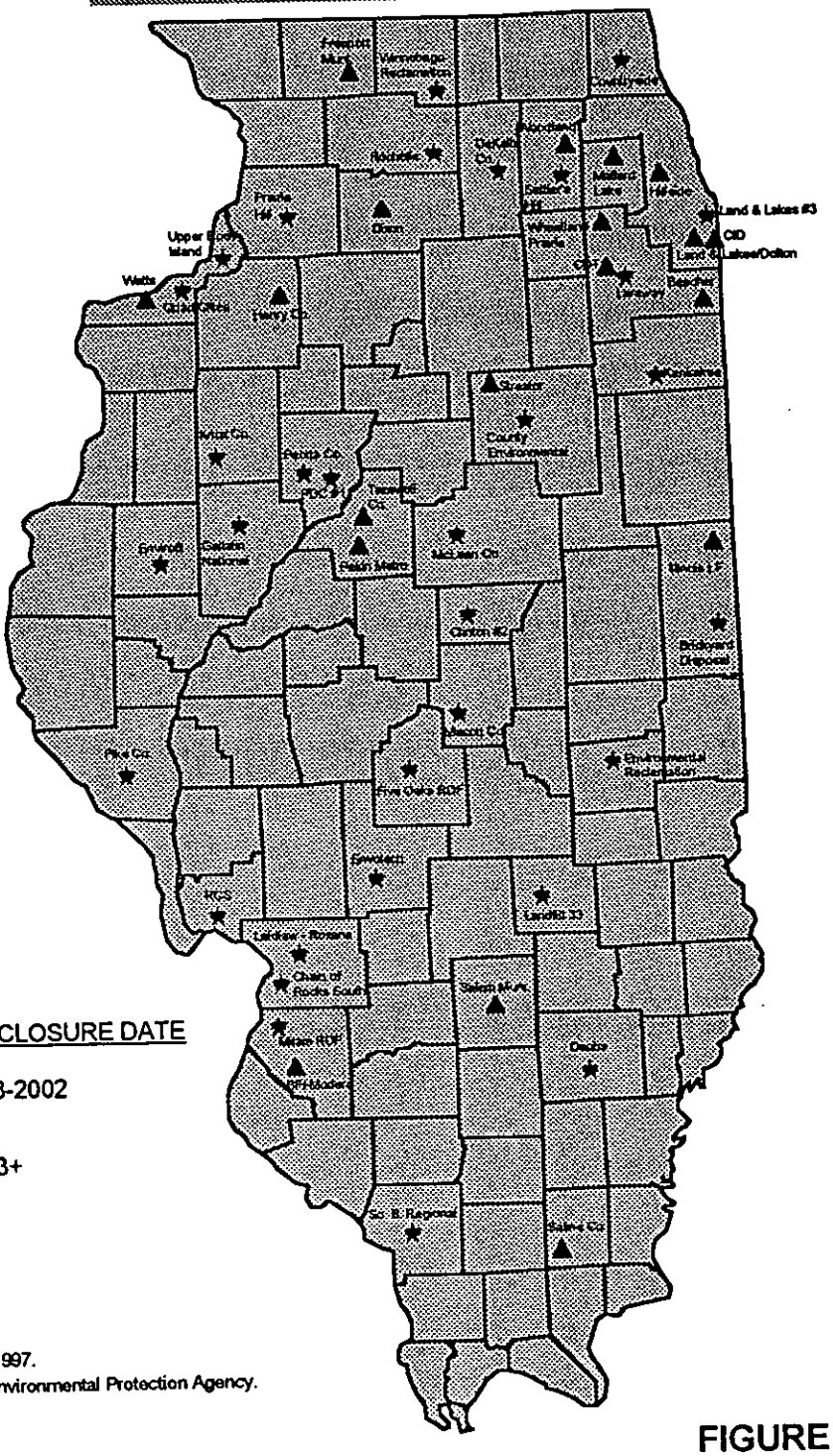
ILLINOIS LANDFILL CAPACITY



Notes:
1. Source: Illinois Environmental Protection Agency data.

FIGURE 7-3

ILLINOIS LANDFILLS



PROJECTED CLOSURE DATE

▲ 1998-2002

★ 2003+

Notes:
1. As of January 1, 1997.
2. Source: Illinois Environmental Protection Agency.

FIGURE 7-4

As a result of this trend, more waste from the metropolitan area, including Kane County, will be exported to other regions of the state and to out-of-state facilities. With its large number of transfer stations, Cook County has been exporting much of its waste for a number of years. DuPage County has also indicated in its Solid Waste Management Plan Update that it too will become an exporter of waste.

In 1996, a report was prepared for Kane County (see Volume II, Appendix B) to assess the existing and projected market for solid waste management in northern Illinois, northwestern Indiana, and southern Wisconsin. This report concluded that:

> Numerous landfills with sufficient capacity beyond the year 2000 are located within the State of Illinois. Landfills in Wisconsin and Indiana may also have capacity for Kane County issues.
>
> HDR Engineering, *Evaluation of Waste Markets Report*, August, 1996, p.2.

Kane County will need to continue to monitor the availability of statewide and out-of-state disposal capacity in future 5-year Plan Updates.

Future Landfill Activities Within Kane County

The original Solid Waste Plan called for the formation of a Public Siting Advisory Committee to examine the unincorporated portion of Kane County and to locate potential sites for development of a new landfill facility. The Kane County Board carefully monitored the landfill siting study, and reviewed its findings in September, 1995.

At that time, the Kane County Board revised the original Solid Waste Plan and future Plan Updates to state the following (see Figure 7-5):

> The Kane County Board will not pursue the acquisition of property, the development of, or siting approval for a new landfill facility in Kane County (Ordinance 95-247).

As a result of the siting study which was performed in 1995, the Kane County Board further believes that adequate site locations for a landfill facility does not exist within unincorporated Kane County. Therefore, the Plan Update does <u>not</u> support the development of a new landfill facility within unincorporated Kane County by Kane County or any other individual or organization.

As previously stated in this chapter, the County Board has committed that Settler's Hill will not be expanded beyond that approved by Ordinance 94-19. The only other existing landfill within Kane County is Woodland Landfill. In 1988, Waste Management formally stated they will not attempt another expansion of this facility. Kane County supports this decision, therefore, the Plan Update hereby formally opposes any further landfill expansion of the Woodland Landfill.

STATE OF ILLINOIS

COUNTY OF KANE

RESOLUTION NO 95 - 247

DECLARING THE SOLID WASTE POLICY OF KANE COUNTY

WHEREAS, on November 10, 1992, the Kane County Board adopted a Solid Waste Management Plan (the "Plan"); and

WHEREAS, the Plan as then adopted called for the establishment of a new landfill within the County to be sited by the County Board after and in conjunction with an analysis and report of a Public Siting Advisory Committee (the "Siting Committee"); and

WHEREAS, the Kane County Board has carefully overseen and monitored the landfill siting study now completed by the Siting Committee and has observed and acknowledges the public concern related to this study; and

WHEREAS, the Kane County Board has received and carefully reviewed the Final Report of the Siting Committee and does not desire a new landfill in Kane County; and

WHEREAS, the Environmental Protection Act and Article V of the Kane County Code require that any regional pollution control facility in order to receive siting approval, must be consistent with the adopted solid waste plan.

NOW, THEREFORE, BE IT RESOLVED by the Chairman and the Kane County Board that the Kane County Solid Waste Management Plan be amended to include the following language:

The Kane County Board will not pursue the acquisition of property, the development of, or siting approval for a new landfill facility in Kane County.

BE IT FURTHER RESOLVED that the Department of Environmental Management is directed to begin a revision of the Plan. In such revision, reduction, reuse and recycling of solid waste is to be given primary importance. Alternate technologies for the disposal of solid waste are to be given a fair and unbiased review. A volume-based system of solid waste disposal within the County shall be evaluated and a draft ordinance providing for volume-based disposal within the unincorporated areas of the County shall be prepared for review. The siting of a new sanitary landfill within the County is not to be considered as an acceptable option in any such revised plan and the revised plan shall reiterate and confirm conditions 3(e) and 3(f) of Kane County Ordinance 94-19.

Passed by the Kane County Board on September 12, 1995.

Clerk, County Board
Kane County, Illinois

Chairman, County Board
Kane County, Illinois

9swpolicy.1wh

FIGURE 7-5

KANE COUNTY

SOLID WASTE MANAGEMENT PLAN

FIVE YEAR UPDATE

November, 1997

DRAFT

VOLUME II

APPENDICES AND PUBLIC COMMENT

Adopted by the
Kane County Board

_____

Kane County Solid Waste Plan
Five Year Update

Volume II - Appendices
Table of Contents

FINAL REPORT

EVALUATION OF ALTERNATE WASTE TECHNOLOGIES

MAY, 1997

PREPARED FOR

KANE COUNTY ENVIRONMENTAL MANAGEMENT DEPARTMENT

PREPARED BY

ANDREWS ENVIRONMENTAL ENGINEERING INC.
29W100 Butterfield Road, Suite 105, Warrenville, Illinois 60555/(708) 393-9474

APPENDIX A

Evaluation of Alternative Waste Technologies
May, 1997

Table of Contents

5 **Advanced Recycling**

Executive Summary

Kane County Environmental Management Department is attempting to update its Solid Waste Management Plan. Alternate Technologies available for the processing or disposal of Municipal Solid Wastes were evaluated to determine if one or more technologies could increase the diversion of waste from landfills and extend the life of the current landfill. Four specific technologies were evaluated and compared to landfilling. The technologies evaluated were:

1. Composting of Mixed Municipal Solid Waste
2. Wet/Dry Collection followed by Composting
3. Waste-to-Energy
4. Advanced Recycling

All of the above technologies will help in diverting some of the waste material from landfills. None of the above technologies can eliminate the need for a landfill. All of the technologies are susceptible to the impact of waste flow control.

Composting technologies have been proven to be successful for the volume reduction of organic biodegradable waste materials. Of the waste that Kane County landfills, 47% by weight can be converted to compost and as a result an equal amount of waste can be diverted away from landfills. There are fourteen operating MSW composting facilities in the U.S. today. While the technology has been successfully utilized by some, the technology has had a less than successful track record. The formula for success relies very much on the local cost-competitiveness, proper management, production of a good quality product on a consistent basis, marketing of the product, and the tolerance of facility neighbors to nuisances created by the facility.

Most successful composting facilities are small in size (less than 250 tons per day of processing capacity). Large facilities of up to 1000 tons per day have also been built. Several private vendors offer proprietary designs. Two properties, inherent to MSW, have resulted in some set backs to composting. These two properties are odor, and lack of a consistent composition of the final product (compost). While odors can be engineered to be minimal, they cannot be completely eliminated. The composition of waste input determines the final quality of the compost. Composts made from poorly sorted wastes could have a unacceptable concentration of heavy metals and may not enjoy good markets. While compost have a beneficial affect on the soil, some of the physical and chemical contaminants present in the compost could hinder the use of the compost.

Tipping fees for currently operating facilities range from $ 33-88/ton of waste processed. No revenues can be expected from the sale of compost. A composting plant, built today, could have a tipping fee in the upper end of this range, and substantially higher than the tipping fee at Kane County's landfill. While economics is a major factor to consider in the short run, the future value of saved landfill space should also be taken into consideration. Besides, siting a new composting facility would be no easy task.

The concept of separation of Wet waste from Dry waste at the source has been adopted for wastes destined to composting facilities. Wet wastes are generally biodegradable wastes grouped together in one waste container. The advantage of sorting wastes before composting (rather than composting mixed MSW) are: better quality of compost product generated; faster rate of composting; and the need for less equipment and space.

With this approach, approximately 14-17% of the waste stream can be expected to be diverted from the landfill to farmers land. The success of such a program depends on the participation level of the waste generators. This alternative would have the most impact on collection. The collection costs are likely to increase by 10-20% of regular waste collection. There will be added inconvenience to the home owner. Citizens participating in pilot waste collection programs have been very supportive of this concept and their contributions to the environment. Due to the considerable cost differential between this method and conventional disposal methods, wet/dry separation technology is not considered an economically feasible alternative at this time.

Waste-to-Energy facilities have not been popular in the last two decades because of perceived air quality and residual ash disposal problems. In concept, they would divert 60-90% of waste from a landfill. Sustained energy markets, that are willing to make long-term commitments, are necessary to recover some of cost, and most importantly the energy resource. Therefore, assurances must be obtained from waste collectors and haulers to provide waste flow to the facility.

The permanent nature of a Waste-to Energy facility makes siting of such a facility almost as difficult as landfills. The repeal of the retail rate law did not favor incineration of MSW. Many operating facilities are subsidized by the local governments whose residents are served by the community. Tipping fee of operating WTE facilities range from $25-77 per ton of waste processed. The average tipping fee is about $ 60/ton, substantially higher than the current tipping fee at Kane County's landfill. The construction of WTE facilities is also capital intensive. A single WTE facility in Kane County based on the Rood model is projected to cost an estimated $ 130 million.

Kane County has an excellent recycling program. An estimated 33% of the MSW generated is diverted from landfills by recycling. In addition, virtually all of the landscape waste is presently being diverted away from landfills. It is estimated that 20-30% of the wastes that are landfilled originate from construction and demolition activities. These Construction and Demolition (C&D) wastes offer a large potential for future landfill space savings in Kane County.

A typical 2000 square feet home will generate 3-4 tons of waste during construction. An estimated 50% of these wastes can be diverted from landfills at a cost less than the landfill tipping fee. Cardboard, wood, and metal are three components that can easily be removed and diverted from landfills. The relative success of diversion will depend to some extent on the efficiency of processing, but largely on markets for processed materials. Most concrete and asphalt waste is already being diverted from landfills. The County should consider developing a strategy with an incentive system

(rather than mandates) to encourage private recyclers to divert C&D waste from landfills.

MSW COMPOSTING

Introduction

Composting is the controlled biological decomposition of organic materials. Compost is the product resulting from the decomposition of organic material during the composting process. Composts are generally dark in color and humus like, having a crumbly texture, and an earthy odor. The final product has little resemblance in physical form to the original wastes from which the compost was made.

Composting is a natural biological process; but for the process to proceed rapidly, environmental conditions in the composting operations should be carefully engineered and controlled. Controlling environmental conditions in the composting process plays a key role in determining the rate of decomposition and quality of compost produced.

Composting is a waste reduction alternative that can save landfill space. However, this alternative requires a landfill for the disposal of the non-compostable fraction of the waste stream. Typical volume reductions to landfills, from composting, range from 50% to 60% of the original volume of mixed municipal solid waste (MSW). Source separated waste will result in slightly higher volume reduction over that of mixed MSW.

Composts have been used to improve the physical conditions of soil and to supply nutrients for plant growth. Compost are also used for erosion control. A good quality compost is generally devoid of plant or human pathogens, weed seeds, physical contaminants such as glass or plastic, has a balanced level of carbon/nitrogen and other essential plant nutrients, and contains minimal amounts of heavy metals.

Application of Composting Technology

Composting technology has been used for centuries for human wastes, animal wastes, and plant residues. Recently the technology has been applied to industrial waste, landscape wastes, hazardous wastes, and municipal solid waste (MSW).

Generally, all bio-degradable material is compostable. Municipal solid waste contains biodegradable organic wastes in the paper, food waste, and landscape waste fractions. A typical MSW may contain as much as 40-75% by weight of organic biodegradable material (after the removal of recyclable materials and the landscape waste). The amount of compostable material in a waste will depend on the composition of the waste before recycling, the amount of waste recycled via backyard composting (landscape waste and food waste), the amount of landscape waste diverted to full-scale composting operations, and the extent of diversion of the marketable recycled paper fraction in the wastes.

The composition of mixed MSW generated in Kane County is conducive to composting. Kane County's solid waste composition data suggests that 47% (38% paper and 9% food waste) of the post-recycled waste is compostable. Theoretically, if all the compostable materials were removed from the waste stream and composted, Kane County could achieve a 47% savings in landfill space due to composting. If MSW composting is part of Kane County Solid Waste Management Plan, the composition of MSW landfilled is likely to change because of the diversion of certain materials to composting.

Communities that have a MSW composting program normally incorporate their landscape waste with mixed MSW, rather than compost their landscape waste separately. This practice does not alter the composition or the amount of waste landfilled, but rather generate a savings in the collection and processing of the landscape waste stream.

MSW Composting

Composting technology, for processing MSW, has been utilized by Europeans over the last four decades. Composting technology, in the U.S., has been gaining momentum as a viable technology only since the mid 1980's. At the present there are several hundred large scale composting facilities operating in the US today. Majority of these facilities process only landscape waste. Only fourteen MSW composting facilities are in operation today. (Table 1) The numbers of MSW composting facilities have not grown as rapidly as landscape waste compost facilities. Reasons for the popularity of the landscape facilities over MSW facilities include:

- a ban placed on landfilling of landscape wastes in most States,
- less stringent regulations for the construction and operation of landscape waste facilities
- quality of product generated by landscape waste facilities and the ease of marketing such a product
- relative costs of composting landscape waste vs. landfilling
- more complex design requirements of MSW composting facilities compared to landscape waste compost facilities
- the lack of a clear set of regulations for compost products resulting in reluctance of markets to accept MSW compost
- failures of a few of the MWS compost facilities in the early stages of the development of this technology may have also resulted in the diminished enthusiasm for this alternative in the 90's.

Table 1. Summary of currently operating MSW composting facilities

Plant name	*Year Started*	*Throughput to Composting (tons/day*	*% Rejects Recycled/ Landfilled*	*Capital Investment*	*Tipping Fee $/Ton*
Pinetop-Lakeside, AZ	1991	10 (w/5 wet tons/day biosolids)	25	0.8	38
Sumpter County, FL	1988	40-45	30	12	35
Buena Vista County, IA	1990	30		1.9	37
Mackinac Island, MI	1992	8		2.3	45
Filmore County, MN	1987	12 SS	10*	1.8	52
Lake of the Woods County, MN	1989	5		0.7	
Pennington County, MN	1987	24		1.7	45
Swift County, MN	1990	5.5 SS		1.7	80
Truman, MN (Prairieland Solid Waste Board)	1991	95-100 (throughput)	10*	7.1	83
East Hampton, NY	1994	4			
Sevierville, TN	1992	225-250	25	6.5	33
Ferndale, WA	1996*	30		8	33
Columbia County, WI	1992	70		3.8	38
Portage, WI	1986	20	43	1.1	35

**The Ferndale plant began composting mixed MSW again in 1996. The facility opened in 1991.*

Communities that have chosen composting of MSW as a waste reduction alternative have done so for one or more of the following reasons:

- were short on landfill space or were having difficulty siting a landfill
- had large quantities of wastes that were not landfillable (sewage sludge biosolids)
- needed to meet waste reduction (recycling) targets
- had some kind of financial incentive offered by the State (Minnesota) to adopt this alternative
- State regulations relative to MSW composting were well defined (no lack of uncertainty),
- the economics of composting were favorable over other alternatives at specific locations

Successful MSW Composting Operations:

While the technology has been successfully utilized by some, the technology has had a less than successful track record. The formula for success relies very much on the local cost-competitiveness, proper management, and the tolerance of facility-neighbors to nuisances created by the facility. The following elements are essential for the success of a composting facility:

1. Assurance of adequate flow of waste materials to approach design capacity
2. Economic competitiveness at the design capacity to other waste alternatives
3. Design based on sound engineering principles
4. Proper siting, with adequate buffer zones to minimize public complaints from odors
5. Adequate capital to design, build, operate, and maintain the facility
6. Production of a high quality product that is marketable and meets all State and Federal regulations
7. No expectation of revenue for the product
8. Minimal environmental risks from fugitive dusts, spores, odors that are likely to escape off-site.

Several facilities have been in continuous operation since the mid 1980s. The long term operability of a composting facility will depend on the economics of composting as compared to other processing/disposal alternatives, the regulatory environment, and the market demand for the compost. Many facilities that have been constructed in the last decade with a capacity of over 300 tons per day have been closed for various reasons. These facilities lacked one or more of the above listed criteria for success, and had failed only a short time after the establishment of the facility. Facilities closed down include FERST in Baltimore, Md. 520 t/day, Recomp, St.Cloud, MN. 75t/day; Coffeeville, KS 60t/day; O'Neill, NE, 100t/day, Portland, OR, 500 t/day; Dade County, FL 800 t/day. Some of the reasons these facilities have closed down were because of :

- lack of markets for the product generated
- distance to available markets (for the compost)
- intensity of odors and the resulting public pressure to close
- perceived health risks by the public
- design that had not included all the elements for success
- lack of waste due to flow control, to achieve economies of scale
- lower cost alternatives available
- under capitalized initially, and lack of capital to deal with unforeseen needs

There have been fewer, smaller capacity facilities (less than 300 tons per day) that have closed down for the above reasons. Therefore, several smaller facilities may offer greater long-term advantages over the operation of one large facility.

According to a BioCycle, 1996 survey of facilities, (Table 2), twenty three MSW composting facilities are in some stage of development or construction. The optimism expressed by these 23 facilities may be because of the belief of some, that composting offers a better long term environmental solution than landfilling or incineration.

Table 2. 1996 BioCycle Survey of MSW Composting Projects			
			Tons/Day
Project	*Status*	*System*	*(Unless noted)*
ARIZONA			
Pinetop-Lakeside	Operational	Digester (Bedminster)	10 (w/5 wet tpd biosolids)
ARKANSAS			
Pulaski County	Consideration	n/a	n/a
CALIFORNIA			
Mariposa County	Consideration	In-vessel	12,650 tons/year (w/biosolids)
Palm Springs	Bid evaluation	Digester (Bedminster)	150 (w/biosolids)
FLORIDA			
Alachua County	Consideration	Digester (Bedminster)	n/a
Sumpter County	Operational	Windrow	40-45 (stockpiled MSW)
GEORGIA			
Cobb County	Closed for repairs	Digester (Bedminster)	300 (w/150 wet tpd biosolids)
Conyers	Planning	Static pile (Microlife)	n/a (w/biosolids)
IOWA			
Buena Vista County	Operational	Windrow (w/ Lundeen processing line)	10,000/yr
Clinton County	Consideration	Drum w/ windrow	n/a
LOUISIANA			
Iberia Parish	Consideration	In-vessel	50-75
ST. Mary's Parish	Consideration	Drum w/windrow	500
MARYLAND			
Anne Arundel County	Consideration	n/a	250
Carroll County	Planning	Digester (Bedminster)	320 (w/100-150 wet tpd biosolids)
MASSACHUSETTS			
Marlborough	Construction (11/96) (by Waste Options, Inc.)	Digester (Bedminster)	80 (w/7 dry tpd biosolids)
Nantucket	Consideration	n/a	n/a
MICHIGAN			
Mackinac Island	Operational	ASP	8 (w/manure, yard trimmings)
MINNESOTA			
Filmore County	Operational	Aerated windrow	12
Goodhue	Planning	In-vessel (OTVD)	150
Hutchinson	Pilot in planning	In-vessel (NaturTech)	n/a
Lake of the Woods County	Operational	Windrow	3 to 5
Mora (East Central SWC)	Closed for overhaul	Static pile/windrow	n/a
Pennington County	Operational	Windrow	24
Swift County	Operational	Windrow (w/passive aeration vents)	5.5

Table 2. (CONTINUED)			
			Tons/Day
Project	*Status*	*System*	*(Unless noted)*
MINNESOTA (CONTD)			
Truman (Prairieland Solid Waste Mngt.)	Operational	In-vessel (OTVD)	95-100 (35 tpd to composting
Wright County	Closed	Enc. aerated windrow (Buhler)	90
NEBRASKA			
Lexington	Construction	Silo/bay (Agranom)	100
O'Neill	Closed due to fire	Windrow	100
NEW JERSEY			
Ocean County	Construction (by Ocean County Landfill Corp.)	In-vessel (Dalsem Veciap)	300
NEW YORK			
Delaware County	Bid evaluation	In-vessel	100 (design)
East Hampton	Operational	In-vessel (IPS)	1,400/yr (w/biosolids)
Riverhead	Planning (by Omni Technical Services)	Agitated bed (Koch)	400+
OHIO			
Medina	Permitting	Windrow	35-40 (w/yard trimmings)
PENNSYLVANIA			
Adams County	Bid evaluation	In-vessel	150 (w/100 wet tpd biosolids)
SOUTH DAKOTA			
Rapid City	Construction	In-vessel (Dano) w/aerated windrow	183
TENNESSEE			
Lawrenceburg	Consideration	Drum w/windrow	40 (w/biosolids)
Sevierville (Sevier Solid Waste)	Operational	Digester w/aerated windrows (Bedminster)	225-250 w/40-45 wet tpd biosolids)
WASHINGTON			
Ferndale	Operational (by Recomp of Washington)	Digester w/agitated bed (Royer)	1,000/month
WEST VIRGINIA			
Fayette County	Planning	Digester	200 (w/100 wet tpd biosolids)
WISCONSIN			
Columbia County	Operational	Drum w/enc. windrow	70
Portage	Operational	Drum w/windrows	20 (w/biosolids)

Another reason for the optimism could be, that, as an industry, the composting services companies have learned from their past failures and are more realistic to the weakness of composting as a solid waste reduction alternative. The failures have raised the expectations of project sponsors for a higher level of performance guarantee and to pass on a larger portion of the risk to private operators.

Facility Size

Municipal waste composting facilities, operating today, vary in their capacity to process MSW. Presently MSW composting facilities have operational capacities of less than 10 tons per day to as high as 250 tons per day of mixed MSW. Facilities with design capacities of up to 1000 tons per day have been built in the US. These large capacity facilities are often located near the centers of waste generation. Most of the larger capacity facilities have become inoperable in the last five years because of various reasons (listed in the previous section).

Kane County generates most of its waste in two population centers, the south eastern part of the county including Aurora, and the north eastern part of the county including Elgin. The remainder of the waste is generated in rural areas across the county. Kane County currently generates an estimated 1000 tons per day of landfillable MSW. There is no single composting facility in the U.S. that process the amount of waste generated by Kane County. Composting 1000 tons per day at a single site would require considerable transportation of either of the waste or the finished compost (assuming agricultural markets). Therefore, if waste were to be trucked to a central compost facility located in an urban area in Kane County, and the compost were to be marketed to the rural farm lands of Kane County, the transportation costs for the waste

and/or the finished compost when added to the processing cost of the composting facility, are likely to increase overall costs to the generator.

To overcome the increased transportation costs due to a single facility in the county, several smaller composting facilities should be considered so that distances from the collection points, or to the compost markets are reasonable from the compost facility. Two composting facilities exist in one county (Columbia) in Wisconsin, each processing less than 100 tons per day, and both facilities are operating well and are able to market their products. Columbia county, in Wisconsin, is largely a rural agricultural county. Similarly Kane county may be able to construct and operate multiple facilities. The location of the landfill could also have an impact, on the overall economics of the composting operation.

Capital and operating costs of a facility are more a function of the type of composting technology adopted, equipment already available on hand or that can be shared among facilities, than the capacity of the facility. Therefore, a larger capacity facility does not necessarily mean that the cost per ton for processing will be cheaper.

Most currently operating compost facilities range in capacity from 5-300 tons per day of MSW processed. Operating facilities may offer proprietary technology or non-proprietary technology. There are a wide variety of technologies available for the composting of MSW today. Some of the facilities process mixed MSW, while others operate with source separated organic feedstocks. Depending on the decision to implement composting as a waste management alternative, and depending on whether the waste is a source separated wet waste or mixed MSW, the size of the facility and the quality of product generated are likely to be quite different.

New facilities may have to be designed and built at one or more locations. Because of the specific requirements for siting and design of facilities, it may not be possible to use an existing structure in the county. Further evaluation of any existing structures will have to be made in order to determine if the site and structure are feasible for the design of the facility. These facilities, if properly operating are likely to be permanent structures in the community.

Product and byproduct:

One of the key factors in the successful operation of a composting facility is the ability to maintain quality control in the process, as well as the product. The quality of the product is dependent on the input composition of the waste and the processing of the waste. Assuming that the processing of the material will be at the most efficient level, the quality of raw material used will determine the quality of the product. It is difficult to control the incoming composition of the mixed MSW without implementing and enforcing strict requirements for the separation of the compostable component of the solid waste stream. Source separated waste as input to a composting operation will result in a more consistent and better quality end product.

The composition of compost generated from source-separated MSW as opposed to mixed MSW varies in the heavy metal concentration and the extent of physical contaminants in the compost. The amount of heavy metal applied to land via compost will eventually determine the maximum allowable amount ever applied on a given piece of land. The lower the metal concentration of the compost, the larger the amounts of compost may be applied to the land resulting in cost savings during application.

Active recycling programs are complementary to a successful composting program. Source separation of the noncompostable fraction of the waste has resulted in significant improvement in compost quality, reduce initial capital investment, reduce operational costs, and reduce the amount of waste that will be landfilled after composting (see section on wet/dry separation).

Composts have been successfully marketed in the Midwestern United States. Common markets are for agriculture, forestry, sod production, nurseries. Agricultural uses are less sensitive to compost quality. The primary plant nutrients such as nitrogen, phosphorus, and potassium available to the plant during the first year of compost application will provide a short term economic benefit to the farmer. Farmers are likely to compare the cost savings in fertilizer application to the net cost of applying the compost in order to make a favorable decision for using the compost. Most farmers however expect the compost to be delivered and spread at no cost to their operations. The marketing costs therefore, should include all costs in order to make reasonable economic comparisons. Columbia County in Wisconsin and several Minnesota Counties that generate relatively large amounts of compost annually have found markets for their compost.

The end product - compost generated from MSW composting operation varies in quality depending on the waste material processed. Of particular importance is the assurance that each batch of compost generated will have a guaranteed minimum quality. For most mixed MSW plants, minimum compost quality guarantees are difficult to achieve because of a lack of consistent input. Even if the same quality product could be generated through out the year, the chemical composition, and the physical and biological properties determine the end use/markets for the compost. Of concern are:

particle size, and physical contaminants such as glass and plastic fragments, chemical composition relative to pH, salt content, plant nutrient concentrations, and heavy metal concentrations, biological properties include the presence of pathogenic organisms, weed seeds, and the stability of the product.

Any negative properties of the compost could have an impact on marketing. For example, physical contaminants such as glass or plastic may not be conducive to retail sales for consumption by the home owner. Nurseries, and horticultural markets would prefer a product that can serve all their plant needs, such as pH, nutrients, weed seeds, plant pathogens, stability, waterholding capacity etc. MSW composts, because of an excess or lack of one of the above parameters, they may not be as conducive to horticultural uses in nurseries as conventional soil conditioners. Agricultural and silvicultural markets are the markets that can tolerate slight variations in compost quality. These markets also have the potential to utilize large quantities of compost. Other uses for marginal compost include highway soil erosion and turf-building projects, landfill daily cover and final cover.

Environmental standards set by the State and Federal agencies must be met in order to be able to successfully market compost. Permits may be required by State regulatory agencies for the use of some MSW compost. In addition to State and Federal standards that safeguard the environment, customers and users of compost have their own standards for specific uses. The specific requirements of users may be more stringent than regulatory requirements, further hindering the marketing of MSW compost.

At the present only a few of the composting facilities are able to sell their compost to generate revenues. Compost that meet specific local needs are able to obtain revenues. Besides, these revenues, in some cases, are not enough to pay for

transportation of the compost. Some of the facilities are able to get rid of their compost by paying for transportation themselves. In fact, some users expect the compost facility to pay for the transportation and the land spreading of the compost. Normally the revenue received is as high as $ 5.00 per ton of compost. There will always be a continued demand for compost, however this demand depends on the quality of the compost and the selling price.

By-products generated during composting are placed in two categories: hand-sorted materials before composting; and screenings that are retained while the compost is sifted through a screen. The material that does not pass through a screen generally is made up of non-compostable material, this material is landfilled. An estimated 40-50% by weight of materials processed at a mixed MSW composting facility are likely to become part of the rejects. The quantity of rejects is dependent on the extent of recycling in the community, the extent of preprocessing before composting, the maturity of the compost, the moisture content at the time of screening, the opening size of the screen, etc. One community packs the rejects into a compactor/trailer to be transported to an incinerator where energy is recovered from the rejects. Another community that accepts only source separated wastes has limited its rejects content to less than 10% of the incoming source separated waste.

Regulatory Impact

Most composting facilities in the United States are located in States that have well defined rules for the installation of a composting operation as well as rules for the use of compost. These states have also offered financial incentives for composting facilities. Illinois EPA has detailed rules for landscape composting facilities including rules for compost quality and/or composting facility operating standards. It is not clear

however, if these rules will be applicable to MSW composting facilities as well. The Illinois Pollution Control Board is expected to issue rules for solid waste composting later in 1997. Since there are no operating or permitted MSW composting facilities in Illinois it is not clear what interpretation of rules for MSW facilities will be.

There are no existing composting facilities within Kane county, or in nearby counties that have the ability to take the waste generated by Kane county. The closest MSW composting facility is located in Columbia County, WI. 180 miles away. The Columbia County, WI facility processes 50 tons of post-recycled waste per day. If Kane County chose to compost part or all of their waste, it would require the construction of new facilities. Construction of new facilities in Kane County will require siting and permitting. Both siting and permitting will require substantial support from local residents of the host community..

Siting

Siting of a MSW compost facility can be just as difficult, or more difficult than siting a landscape waste compost facility. People have a stigma for such facilities because of the odors generated during the operation of the facility. Many large composting facilities were shut down shortly after beginning operation due to the generation of odors by the composting facility. No matter how well controlled the facility is operated, there will be odors because of the unprocessed waste that are dumped out of the trucks that have transported the waste to the facility.

Illinois EPA has certain minimum setbacks, and locational standards described in Ill 35: G:I: Parts 830 and 831. Site requirements listed in the EPA regulations should be considered minimal. Siting of a MSW compost facility may require more stringent controls over the location. Some of the controls include: distance from population;

buffer zones to control noise, odor, dust and particulate fall out; micro-meteorological conditions at the site that may allow stagnant air/odors to accumulate; wind direction; access to the facility; depth to groundwater; distance to waste source; and distance to markets; access to utilities such as water, sewer, electricity etc. .

The composting method used determines the rate of composting, a faster rate could mean less processing time and therefore, less land. Land area should be large enough to accommodate a processing time of 90 days to 180 days. In addition, storage of finished compost over winter months will require additional land. Sites should be large enough to create their own buffer zone so as to control odors, dust and fugitive aerosols. It is difficult to use a standard land area for a facility based on tonnage alone. Variables such as distance to nearest down-wind neighbor, site layout-inefficiencies, inefficiencies due to roads, parking and buildings. and amount of compost stored on-site, will all determine the land area required by the facility.

Local zoning ordinances, and any other required approvals at the local government level will determine the siting of a MSW compost facility. For Kane county, depending on how many facilities are to be constructed to divert the wastes, each facility may require a need to evaluate site specific conditions at alternate locations to determine the best location for a future MSW composting facility. Locating such facilities at landfills (closed or open) could minimize public opposition, as well as provide economies of scale because of the availability of support from the existing infrastructure.

Environmental Impacts/Health /Safety Issues

Several occupational and public health concerns have been associated with the composting facilities and the utilization of compost generated from MSW. The concerns can be categorized in the following categories:

- release of biological agents and odors into the air and the inhalation of such agents
- inadvertent ingestion of material in contact with humans including, unprocessed MSW, compostable MSW, compost, leachate etc.
- adsorption through the skin
- exposure to vectors, disease and noise
- product related hazards
- environmental impacts
- impact on land
- impact on water
- impact on traffic

Release of Biological agents and odors into the air:

The processing of MSW into compost has the potential to release biological agents and odors into the air. Workers at MSW composting facilities as well as to the general public residing adjacent to MSW composting facilities are more likely to be exposed to these agents and to odors. The distribution and utilization of compost could also result in the release of biological agents.

During the processing of MSW to compost there are many opportunities for plant workers to inhale a variety of air-borne contaminants. Dust is a common contaminant of any MSW unloading and processing operation. Any mechanical manipulation of waste or compost is likely to generate dust if the MSW is dry. Debagging, shredding, mixing,

pile turning, screening, and loading/bagging operations are the primary source of dust. Sweeping of compost facility floor surfaces, and wind blowing across the surface of a dry compost pile could also result in fugitive dusts being lifted into the air to be carried over short distances. Dust, therefore, is of concern not only in the compost plant but also outside the plant.

Dust particles may contain biological agents or traces of chemicals. Worker exposure to dust can be minimized by maintaining a slight negative pressure in the processing area (if enclosed) and keeping the piles moist. The use of negative pressure to draw air through work areas and the compost piles, followed by releasing the air to the atmosphere via a moist biofilter has resulted in a lower exposure to dust. Typically moisture in excess of 40% can control dust in the ambient air, drier waste is likely to generate more dust. Workers at compost facility must be required to wear protective respiratory masks in order to reduce their exposure to dust.

Chemical vapors from commonly used household products may be released during the processing of MSW. Common vapor generating items include pesticides, paints, cleaners, adhesives, oils, colognes and liquors, lighter fluid, medicinals. Worker risk from chemical vapor release can be minimized be providing adequate air circulation and maintaining negative pressure in the processing area where vapors are likely to be released.

A variety of microorganisms are present in MSW depending on the source at which the waste was generated. These organisms may be of intestinal origin such as in diapers, organisms that develop and grow during the composting process, and allergens and toxins generated by fungi and bacteria. Organisms of intestinal origin include *E. coli* and other coliform group of organisms, food borne organisms such as *Salmonella sp.*, *Shigella sp*, may also be present. There has been no direct link established between

the health of workers at a MSW composting facility and the presence of disease causing organisms in the waste stream.

Aspergillus fumigatus, a mold, is common in compost piles. The spores of *Aspergillus* become air borne during the processing of compost and are found in large populations in the air at the composting facility, as well as a short distance from the facility. Spore concentrations at composting facilities, are several orders of magnitude larger than ambient air. A short distance from the composting facility, spore concentrations in the air are only slightly above ambient levels.

The risk from the inhalation of *Aspergillus* spores to healthy individuals is minimal. Prolonged inhalation of *Aspergillus* spores causes a respiratory illness called Aspergillosis. The pathogen grows in bronchial tissue, or pulmonary tissue and results in expectoration of mucous or blood. Other fungi present in compost, and associated with dust particles, are likely to produce mycotoxins and may also cause hypersensitivity reactions. To date, there has been no report, of fatal consequences due to aerosols on compost facility workers.

Uncontrolled particulate emissions can be avoided by controlling all the air that leaves the building. The air in the compost processing area is likely to have aerosols and odor causing agents as well. Odors and aerosols can be controlled by using biofilters that are capable of trapping dust, aerosols and absorb/neutralize odors.

Besides fugitive dust, and chemical and biological aerosols generated at compost facilities, the air may be odorous. Odors are an inherent part of any waste processing facility. Odors are enhanced due to certain activities at the facility and may not be present at all times. Odors released in the air will travel downwind resulting complaints from neighbors. Odor is not easily quantifiable. Human sensitivity to odors varies widely among members of the population. People living near compost facilities

have complained of chronic headaches, nausea, stomach upset and rashes due to odors. Public pressure and opposition to obnoxious odors has resulted in the closing of many compost facilities. Therefore, minimizing and mitigating odors are critical to maintaining good relationships with site neighbors, which in turn determines the long term survival of the facility..

Odor management involves several strategies, some of these include:

- proper planning, such as siting of the compost facility to maintain buffer zones, local meteorological conditions, distance to neighbors (especially down wind)
- selective acceptance of wastes to be processed (avoiding wastes that are likely to generate more odors) and increasing the frequency of waste collection
- wastes processed immediately after they are received at the facility proper engineering controls such as particle size, temperature, moisture, oxygen and nutrients
- capture all air at the facility and strip the odor causing agents using a biofilter
- use of masking agents for the air released (has had minimal success)

Inadvertent Ingestion

The probability of inadvertent ingestion of compost, groundwater or surface water containing chemical constituents transported from unprocessed MSW or compost feedstock, or finished compost products, is very low. Leachate generation and contamination of surface waters from MSW composting facilities is likely to be minimal since all MSW composting or waste processing surfaces are paved and under roof. Liquids generated from outdoor (unroofed areas) are required to be contained and later treated by recirculation in the compost facility or treated at a wastewater treatment facility. Ingestion of disease causing microorganisms due to unintentional hand-to mouth contact by compost facility workers is likely. However, the probability is very low. Good hygiene and worker habits will minimize such exposure.

Dermal Contact:

Many chemicals found in MSW are likely to cause allergic reactions, or may be absorbed through the skin, when in contact with humans. These reactions may be caused by microbial contact with the skin or chemical contact, or dust laden with chemicals or microorganisms. Workers, at the compost facility, that handle waste material are likely to be exposed to such a pathway. These concerns can be minimized by having minimum skin exposure, and by workers wearing protective respiratory filter masks while working in the compost facility.

There have been no long term studies done on the exposure of waste related contaminants or pathogens and their impact on the health of compost facility workers. Studies done to date, on compost facility workers, have not shown an increase in disease symptoms any more than workers in other fields. Process related risks can be minimized by adopting proper engineering principles at each step during processing, good management practices, use of protective equipment, can all minimize the potential for worker health and safety risks.

Vectors:

Disease vectors, rodents and insects can also pose occupational hazards. Flies are the most common insects. Use of insecticides is not recommended. Open waste surfaces can be covered with a larger of finished compost minimize the nuisance due to flies. Rodents or birds have not been a problem with composting facilities if waste is processed in a timely manner and general good housekeeping techniques are used.

Product related hazards

Compost product can be of varying quality depending on the feedstock used for composting and the method of processing. The quality will determine the final end use. Most common end-use is for agricultural soil amendment., domestic landscaping use, nurseries, or for stabilization of slopes and erosion control. The chemical concentration of most inorganic metals such as Cd, Cu, Zn, Cr, Ni, Pb etc., and certain organic compounds that are not likely to degrade, these constituents are likely to increase because of a loss of mass during composting. Many of the non-biodegradable chemicals when applied to the soil via compost are likely to buildup with repeated additions of compost. These constituents can be taken up by the plants, consumed by animals and eventually become part of human diet. Although many field crops are not likely to accumulate heavy metals in the grain, leafy materials of plants tend to concentrate the heavy metals introducing them into the food chain (only if consumed). Current federal regulations for the application of compost limits the application levels to those that pose little or no risk to the plant, soil, environment and humans. The federal regulations, also adopted by the Illinois EPA, will tend to minimize the risk due to metals.

Concentration of certain constituents such as pesticides and herbicides, volatile organic compounds, are likely to be lower after composting because of decomposition and volatilization of some of these constituents.

Another product related concern is due to the presence of physical contaminants present in the compost. Common physical contaminants are particles of glass and plastic. When present in large amounts, these particles are likely to lower the aesthetic value of the compost and the land on which it us applied. Compost soil mixtures containing glass, can pose a risk of injury when handled in nurseries or as potting soil

with bare hands. Protective gloves can minimize risk of injury from glass shards. Presence of physical contaminants can be minimized by proper processing of the waste to remove these materials, use of varying sizes of screens, and adjusting the particle size during shredding so most inert particles are likely to remain large so as to later screen out these particles from the compost.

The method of processing will determine the relative extent of pathogen destruction. Physical manipulation of the product during pile turning, or bagging, could also release air borne organisms and aerosols.

Product related risks can be minimized or eliminated by selecting the proper feed-stock (including source separation, proper sorting of the waste prior to composting, particle size adjusted so as to not breakup glass or plastic particles to a size that will pass through a final product screening.

The health risks discussed above have been derived from experiences at sewage sludge, MSW, and landscape waste composting facilities. The composition of solid waste generated in Kane County that is likely to be composted (if this technology were adopted) are more or less similar to wastes composted at other composting facilities across the US. Therefore, a separate health risk assessment for Kane County conditions will not be necessary before a feasibility determination is to be made by Kane County officials.

Impact on Land:

The end use of the compost is most likely to be incorporated into soil (agricultural, silvicultural or horticultural). Compost has the ability to improve many physical properties of soils. Compost additions can improve soil structure, water retention and drainage, buffering and pH management, weed control, nutrient

management and increase in cation exchange capacity, temperature management, and erosion control. Addition of compost results in improved overall vegetative growth. The nutrients in compost can reduce fertilizer costs to farmers and horticulturists. Savings in fertilizer costs due to compost application are likely to be minimal over the short term. Compost applications at relatively large application rates, and over several years could result in a substantial buildup of potentially available plant nutrients resulting in a future savings in fertilizer costs.

However, depending on the chemical constituents of the compost and the relative degree of maturity, addition of compost that has not been fully decomposed can create an imbalance between carbon and nitrogen and increase oxygen demand in the soil, resulting in competition with the higher plant.

Excess amounts of heavy metals if present in the compost are likely to accumulate over time. These metals are likely to be transferred in small amounts into the food chain and become part of the human body. Studies with field crops (corn, soybeans) have shown that there is little risk from metal accumulation even when the maximum allowable amount of metals are applied via compost. Crops are likely to accumulate slightly higher amounts of metals in their leaves than their seed/fruit. Therefore, the risk to humans from the consumption of fruit or seeds produced on land receiving compost is minimal.

Another risk from compost that is not fully processed is the presence of viable weed seeds or plant pathogens in the compost. Application of such compost could result in the introduction of new species on the receiving land, causing a nuisance to the user.

Impact on Water:

The impact on surface and ground water at a composting facility are likely to be negligible, especially if all liquids that come in contact with the waste are contained and treated at the compost facility. Very few studies have been done to evaluate the impact of surface runoff from land receiving compost made from MSW. Compost has the ability to improve the CEC of the soil, and the physical properties of the soil. Both these properties are likely to retain more water and plant nutrients, minimizing running off. However, there is the potential for some release of compost particles as well as soluble constituent of the compost into surface waters.

Impact on ground water due to compost application on land is likely to be minimal. Several studies conducted with MSW compost, using gravity and suction lysimeters, on various soil types. These studies have concluded that the majority of the metals, and organic compounds are likely to remain in the upper three feet of the soil and would not leach out. Soluble compounds such as nitrates are more likely to leach through the soil and enter the ground water. When compared with commercial fertilizer, an equivalent amount of nitrogen addition via compost is likely to contribute less nitrates to the groundwater than commercial fertilizers. Therefore the impact from nitrates present in compost to groundwater, is likely to be less than that of fertilizers used in conventional agricultural practices.

Impact of Traffic:

Traffic on roads leading to a new compost facility would increase because of the incoming trucks (waste) and those that remove compost and byproducts. In-coming waste trucks will increase traffic to the compost facility. Once composted, the rejects and the compost must be removed from the facility. Removal of finished compost to

bulk markets, may involve rail haul if the facility has access to a railroad spur. If the compost facility accepts only selected wastes that are mostly compostable, then the amount of traffic is likely to be less than that of a facility that accepts mixed MSW. Besides increase in traffic, noise, dust, and dirt due to traffic are likely to increase. Having paved roads within the facility and a relatively long driveway from the public access road will alleviate dust and dirt problems somewhat.

Economics:

The cost of installing a compost plant varies depending on the type of technology utilized. Several of the composting systems are proprietary systems, while others are generic systems. The degree of preprocessing of wastes varies from facility to facility depending on whether there is source separation or it is a mixed waste processing facility. The extent of processing after composting and in preparation for markets will determine the type of equipment and its relative cost. Some facilities have virtually no tail-end processing equipment, while others may have many. Some systems are capital intensive while others are labor intensive. Some of the facilities have used local know-how and have tried to be innovative while others have contracted out all of the work. Some have utilized salvaged equipment effectively while others have used new equipment.

Considering all of the above variables, higher capital costs does not make he facility operate any better. However, for the type of waste being processed and the quality of product that must be generated, the proper sizing of building and equipment is essential for success. Being a biological process, the land and building area needed to process the material is directly proportional to the volume of waste processed. Larger plants do not necessarily have the advantage of economies of scale.

Table 1 is a list of all existing composting facilities currently operating and their capital costs. In reviewing this information one must keep in mind that depending on the process the costs will vary.

Financing for most of the facilities have mostly been through government backed bonds, some of the smaller facilities were able to place the capital costs on property taxes spread over a short period. Some have obtained up to 50% in grants from state government. Private companies are willing to design, construct, and operate facilities, but very few are willing to take the risk with their own capital. Without long term commitments for flow control it is highly unlikely that private companies will be financing facilities in the future.

Operation and maintenance cost will depend on the labor intensiveness of the process, the debt service costs, long term capital equipment replacement costs, transportation of products, landfill disposal fee. In each case the operational costs are different to the extent that they are not comparable.

Revenues from the sale of compost are virtually negligible. If a composting facility can manufacture a good quality product, and has an effective marketing program, the compost made from MSW can be sold. Existing facilities that are able to sell their compost often get $5.00 per ton of compost. On a per ton of waste, less than $2.00 per ton of the tipping fee is recovered for these facilities. Most facilities give away their compost. While others will transport the compost and spread the compost on the farmers field at no cost to the farmer (expense to the compost facility). Some cannot even give away their compost.

Therefore, for communities considering MSW composting as an alternative, the best economic comparison that can be made is the tipping fee. The tipping fee is also listed on Table 2. Tipping fees range from $33.00 per ton to as high as $89.00 per ton.

Those on the low end of the tipping fee scale are being subsidized in some fashion. Comments from one operator at the low end of the tipping fee were that "we are keeping our facility open so we can pay off our debt". Many facilities have closed in the last few years mostly because of loss of flow (revenues) and competitive landfill prices.

For Kane County, whose current landfill tipping fee is $37.00 per ton, composting is not cost-competetive with landfills at this time. The tipping fee at landfills in the area surrounding Kane County may be artificially low because of market conditions. As the tipping fee at landfills increase in the future, perhaps composting may become cost effective.

In addition to the cost disadvantages of composting operations when compared to landfills, composting operations are dependent on landfills for the disposal of non-compostable products, and without the ability to get rid of the compost manufactured, composting may not be a worthwhile endeavor.

While economics is a major factor to consider in the short run, the future value of saved landfill space should be taken into consideration. The recycling of organic resources, the impact on the environment from the landfill (relatively more safe than past landfills) compared to the impact from compost should be a serious part of a decision formula. Siting a new compost facility may be equally difficult when compared to siting a new landfill.

WET/DRY SEPARATION AND COLLECTION

Introduction:

Wet/Dry collection technology is normally used when there is some benefit to be derived from the separation of the wet fraction of the waste from the dry fraction of the waste. Normally this technology is used in conjunction with composting, since a majority of the 'wet' waste materials in the MSW are considered biodegradable. The 'dry' portion of the waste is material that is normally landfilled. Most recyclable materials have been removed from the 'dry' fraction.

In most instances separation of wet waste is for the purpose of composting of the waste, while in some instances separated wet wastes may be directly applied on land, or fed to hogs and other animals. Hog feeding programs require a more meticulous sorting procedure. Hog feeding is a popular option with large generators of food waste. Hog feeding may be a more economical alternative than composting the waste. Hog feeding, however, may not be allowed in Illinois.

The following discussion will assume that wet/dry separation and collection is intended with the goal of composting the separated material. The separation of wet materials from dry materials often implies separation of compostable materials from non-compostable materials (except for recyclable paper). Wet/dry separation may be accomplished at the source by the waste generator, or may be carried out by manual sorting or mechanical separation at a central waste processing/ composting facility. When the separation is performed at the source, the facility has a lower capital investment and reduced labor costs, because there is less material to be handled at the facility. Separation at the source could mean higher collection costs for each additional item collected separately. No matter where the separation is done, when the

compostable fraction of the waste is separated from the noncompostable fraction, there are many advantages to the composting facility.

Advantages of wet/dry separation over mixed waste:

1. Collection of wet waste can be combined with recyclables at a curb side recycling program. This can be achieved by using multicompartment collection vehicles or a blue bag for recyclables and a green bag for wet waste.
2. When wet waste is collected separately, less volume of waste is processed at the composting facility as compared to mixed waste, needing smaller capacity equipment and space, reducing capital costs, and labor costs.
3. C:N ratios of the wet/dry separated waste are more favorable to promoting rapid composting compared to C:N ratios of mixed waste.
4. Better control of the composting environment with wet waste.
5. More rapid composting than mixed waste composting.
6. Fewer rejects generated that must be landfilled.
7. Better quality compost with wet waste compared to mixed waste composting (relative to physical contaminants, heavy metal, nutrient, and organic content)
8. Ease in marketing of a quality compost generated from wet waste.

Composition of Wet Waste

Source separation of wet waste at homes, restaurants, schools, grocery stores, implies the separation of compostables from non-compostables before the waste is collected. Some of the waste fractions that are classified as wet waste, although largely biodegradable, may not be 100% biodegradable. Wet waste may contain non-

biodegradable material such as ash, dirt, etc. Source separated wet wastes, after reaching the composting facility, are subject to a separation step to remove any incidental noncompostable material.

Wet waste includes the following:

- Food waste - table scraps, meat and bones, fruit and vegetable peelings (no packaging or liquids)
- Wet and Soiled Paper - paper towels, tissues, napkins, paper plates, pizza boxes, coffee filters, paper cartons (milk or juices)
- Diapers and sanitary products
- Pet waste and kitty litter (no liquids)
- Dry paper that is not recycled because of a lack of markets
- Other - floor sweepings, vacuum cleaner bags and contents, dryer lint, ashes (after cooling)
- Yard waste - leaves, grass clippings, tree trimmings, house plants (most programs do not include yard waste)

While the above list is a broad category of materials sorted in a wet/dry collection program, each community is likely to make up its own list of materials to be sorted. It is likely, depending on the relative care in sorting materials at the source, that a portion of the wet waste may include physical contaminants such as plastic bags, and other non biodegradable items not listed above. The composting facility will have to deal with, and separate out these physical contaminants.

Quantities of Wet Waste:

Depending on the items sorted and classified as wet waste, between 30% to 50% of the total residential waste generated could be classified as wet waste. In a short duration pilot study conducted in two Connecticut towns of Greenwich and Fairfield involving 440 volunteer households, the program was able to divert 30% of the total waste stream (not including landscape waste) to a composting facility. A residential waste separation program involving the entire city of Guelph, Ontario, has been underway for a year. This program has consistently achieved a diversion rate of 30% of its waste (not including yard waste) to a composting operation. In De Kalb, IL, only 14-17% of the waste was collected as wet organics. It is difficult to project the exact amount of waste that can be diverted using this technology in Kane County.

Approximately 47% of the commercial/residential waste stream is comprised of food wastes, (9%) and waste paper (38%) which could be treated using this technology. With a participation rate of 60% and a participant efficiency of 60%, approximately 17% of the waste stream would be treated using this technology, a value which is consistent with the amount composted in DeKalb (14-17%). Actual rates will vary depending on waste composition and participation rate, with participation rates generally higher when a good educational program is implemented.

Commercial waste generators such as restaurants were able to divert a larger proportion of their waste stream by deploying wet/dry separation. A pilot project in the Twin Cities of Minnesota involving 51 commercial food service type waste generators could divert 61% of their waste stream away from landfills and into composting facilities. Kane County business should expect a similiar diversion amount.

In order to increase the amount of wet waste collected, a weight based fee for the dry fraction could serve as an incentive to better sort the wet waste thereby

increasing the amount of wet waste collected. At the present there are no weight based programs that have a wet/dry source separation.

Participation Level:

There is always reluctance on the part of consumers to change their habits. Several years ago, when there was virtually no institutionalized recycling, residents were reluctant to change their habits resulting in a slow start for recycling. Now, recycling is the norm for virtually every community, participation is high, resulting in high diversion rates for recycling. Similarly diversion rates for wet/dry separation are likely to depend on public education campaigns, relative convenience to the consumer, and the type of collection services offered.

Guelph, Ontario, started out with a pilot program in one section of the city. After several years of implementing the pilot program they have gone to a city-wide wet/dry separation. Six months after initiating the program in excess of 95% of the households were participating.

The Greenwich/Fairfield study involved only 440 volunteer households. Because of the volunteer nature of this pilot study, participants all participants remained enthusiastic through out the study period (one month). A pilot study conducted over a four month period in the City of DeKalb, IL also assured a relatively high participation rate of 86% because of the educational campaign before beginning the sorting collection.

It is likely, that if a community has a well operating composting facility that can produce a compost product that is marketable, residents will support the idea of wet/dry separation. Many residents believe that composting is good for the environment and would like to contribute their efforts toward achieving that goal. Clear, concise

instructions, that are not confusing, have helped to not only increase the level of participation but also the amount of waste sorted and the relative accuracy with which the material was sorted. While enthusiasm levels for the separation program remains high at the initial stages of the program, it may be difficult to maintain a continued high level of participation. Continued education, strive to make the program less inconvenient, and positive reinforcement may be needed to sustain high levels of participation.

Waste Collection:

In order to establish a successful wet/dry waste collection program, planning and education are essential. Residents must be educated as to the reasons why the program is necessary, what materials to sort, and how to sort and prepare the materials. Most programs that ventured into a pilot or a full-scale collection system had a toll free telephone line available to answer residents' questions. For commercial generators, in-house training is essential for sorting of the waste. Necessary tools should be provided to residents and commercial separators.

Common features among different programs offering residential wet/dry waste collection include the following:

- Residents were normally offered a cellulose bag lined with a cellophane like material and a rigid container. The cellulose bag was placed in a rigid container under the kitchen sink and kitchen wastes deposited in the container. Types of materials to be sorted were printed on the bags and the container
- Waste must be bagged, not left loose in a can.
- Bags must be lined so that no leakage of liquid occurs
- Multiple wet waste bags may be allowed to be placed in a green bag (green bags are used for wet waste collection at the curb side.
- If waste is to be placed on the curb in a plastic bag, the bag should be color coded and transparent, and should not be filled more than the design weight limit of the bag

(typically 33 pounds per bag). If waste is to be placed on the curb in a rigid container, the container should be rodent proof and be provided to home owners

- Ashes, if included must be placed only after they have been cooled
- Rodents are likely to get into the waste, If rodents are a problem, place a secured bag in a rigid container with a lid, so that bag handles are upward to allow easy removal from the can.
- Blue bags, commonly used for recycling dry materials should not be used for wet waste.
- A drop off container be available for depositing wet waste at the composting facility.

Collection is normally provided once or two times a week. Collection vehicles are normally one or two compartment vehicles depending on the types of additional materials that are to be collected. Dual compartment vehicles were used by the City of Guelph, Ontario. Recyclables were collected in one compartment and wet waste in the other. In one collection trial in DeKalb, IL., dual compartment vehicles were used to collect waste and recylcables (blue bag) in one compartment and wet waste in the other. Yard waste was generally collected by a separate vehicle.

Commercial and institutional generators that produce large quantities of wet waste require trained employees to sort the wet waste. Because of the large number of employees and the variation in employee attitude toward waste sorting, it will be difficult to maintain a consistent high standard for separation of wet waste at commercial/institutional generators. In most cases the waste was placed in 3 or 4 containers scattered throughout the kitchen making it difficult for employees to know where the containers were. Layout of work area, space limitations, and the amount of waste generated determined the type of sorting system to be used by each business. Signage was essential to direct and remind the employees as to where to place the wet waste. Also, a list of acceptable materials had to be printed on and in the containers.

Despite the training provided to 51 commercial waste generators in the Twin Cities of Minnesota, employees in large restaurants only recovered 75% of the compostable fraction. In addition, the sorted wet waste contaminated 20% non-compostable contaminants. Businesses that had source separated waste collection also noticed an increase in the amount of waste recycled by up to 18%. For participating businesses, the frequency of waste collection service was reduced.

Economics:

There are several components to overall costs. The one time cost of containers, the recurring cost of containers, the cost of separate collection, the cost of sorting (in some cases) after collection. All these additional costs are likely to increase the overall costs of waste collection and disposal.

In one study, collection costs of separated items were compared to the cost of mixed waste collection. The collection costs for the separate collection of refuse, recyclables, and wet/dry sorted waste was 10-20% higher than for normal residential collection. The use of dual compartment vehicles, to combine two or more waste streams in a single collection route, kept the cost increases to a minimal.

For commercial generators, sorting wet waste requires paid sorters to get the job done, resulting in higher waste disposal costs. Further, wet/dry waste collection increased the number of collection stops resulting in increased collection costs.

Impact on composting:

The engineering principles applicable to the composting of mixed MSW can be applied to source separated wet waste as well. Composting of wet waste also requires some degree of processing prior to composting. Bags must be opened and the waste must be shred to the appropriate particle size before composting. The wet waste, as

collected, may be too wet for composting, therefore drier bulking agent must be added to soak up the excess moisture in order for composting to proceed at a rapid pace.

The composting process with wet waste generated as many VOC's as any other mixed waste composting facility according to a report from the Greenwich, Fairfield study. The nitrogen, phosphorus and potassium content may vary from compost to compost, depending on the amount and type of bulking agent added and the amount of bulking agent recovered from the finished compost.

Commonly used bulking agents are wood chips, yard waste, or paper products. The addition of bulking agent to the wet waste is likely to increase the amount of material to be handled. The quality of bulking agent used will determine the final quality of the compost. The cost of the bulking agent and the increased cost of handling is likely to have an impact on the overall cost of composting. A certain amount of the bulking agent will be decomposed and may not be able to be totally recovered during the final screening process. The recovered bulking age can be reused in a fresh batch of wet waste.

One of the advantages of source separated wet waste composting over mixed MSW composting, is the relatively small amount of non-compostable reject material that must be landfilled. The amount landfilled ranges from 4% in one pilot to as much as 11% in operating facilities. Commercial generators however, have had as much as 25% of the sorted waste as non-compostable. The amount of material that must be sent to the landfill will depend on the attitude of the sorter, and with continued education it is likely that the percentage of material landfilled from such facilities will decrease with time.

In one sense source separated wet waste composting facilities are sophisticated landscape waste facilities regulated by MSW rules. If this were true, should existing

landscape waste facilities be taking in source separated food waste? Food waste composting should be encouraged in some form because it does keep material from going into the landfill. The combined efforts of recycling, landscape waste composting and wet waste composting has resulted in a 70% diversion rate for Greenwich/Fairfield, CT., pilot study. Similar results are achievable for residential wastes for Kane county communities. To achieve such high level of diversions it will take commitment on the part of the planners, communication on the part of managers, and most of all the public's will to pay. The cost of landfilling in Kane County is much lower than the cost for achieving high diversion goals.

Quality of Compost from Sorted Wet Waste:

The quality of compost generated will depend on the input of materials to the composting process. The proportion of soiled paper and inert materials compared to food waste in the wet waste determines the initial carbon to nitrogen ratio of the mix. This in turn determines the reaction rate of the composting process, as well as the the carbon to nitrogen ratio of the final compost.

Composts generated from the sorting of wet wastes generally contain, reduced amounts of physical contaminants such as glass or plastics. Unless landscape wastes are used as a bulking agent, composts made from wet waste are less likely ot have weed seeds or plant pathogens. The salt concentration the heavy metal concentration of the finished compost are likely to be lower than composts generated from mixed MSW. Any bulking agent added is likely to impact the plant nutrient content of the compost.

Impressions of participants in Wet waste sorting program:

Participants in pilot or regular ongoing wet/dry sorting programs have felt positive for their "contribution to the environment" and made comments like "as easy as recycling". Although, an inconvenience to all participants, a few participants expressed reluctance. Some of the suggestions offered were the following:

- Reasons for doing the separation included: good for the environment, 62% felt composting made sense, 59% felt an obligation to the city, 76% of participants will take part in a similar program if offered again. Thirty percent of participants in one program would continue participation despite being an inconvenience because of benefits to the environment.

- Have a toll free phone number and a person to answer questions or comments.

- A few did not like the program because of the inconvenience due to too many containers, hassles, not enough room, took too much time, and a lot of work.

- Placing wet waste with recyclables in a blue bag was considered a step backward.

- Communication and education was a key to success. There was a lot of procedural confusion during one or more of the pilot programs. Enough lead time should be allowed for planning and education. At least one full-time organizer/educator/leader should be available to each program as a person who can help the community during the early startup stages. Participants must be provided with detailed instructions, including the dates of collection, what must be sorted, where should the waste be placed, frequency of collection etc.

- Two day a week pickup would be more desirable. Collection should be in the earlier part of the week especially for yard waste.

- Rigid and flexible containers for wet waste should fit under the sink, should be odor and insect proof. Cellulose bags were a source of frustration. Use degradable plastic bags if possible.

Safety and Environmental Impact:

Residents who sort wet waste must deal with the odors generated during storage and insects that are attracted to the wet waste. Although the sorting process does not change the amount of wet waste generated by the consumer, the concentrated mass of

wet waste in one place (as opposed to mixed in with the rest of the waste material) may increase the possibility of odor production and the attraction of insects and animals.

In addition, wet waste separation from dry waste may require the use of additional containers such as cellulose bags or plastic bags. In some cases, use of such containers is likely to increase the total amount of waste generated, even though less would go to the landfill.

The environmental impacts at the curb, or at the composting facility are likely to be similar to that of a mixed MSW composting facility. Because of the more controlled quality of the waste to the composting facility, processing conditions at the composting facility may be better controlled. The potential for odors, gasses, and leachate generated during composting are likely to be similar to a mixed MSW composting facility.

The quality of compost generated from source separated wet waste composting facility is likely to be better than that produced at mixed MSW composting facilities. Two compost properties that are likely to be improved are: physical contaminants, and the concentration of heavy metals in the finished compost. As a result, the risks associated with these two ingredients on the receiving land will be lower.

Adoption of Technology for Kane County:

The source separation of residential wet waste followed by composting is socially and technically feasible. Kane County residents and commercial organizations have accepted and participate in recycling programs. Citizens are likely to participate in a wet/dry separation where presented to them. However, before adopting this technology, Kane County residents should be able to accept composting as a waste reduction alternative. Considering the current cost of landfilling Vs. the projected cost of

composting it will be difficult to justify composting over landfilling, at least from an economic standpoint. Therefore, the adoption of wet/dry separation technology is not an economically feasible alternative for Kane County at this time.

WASTE-TO-ENERGY

Introduction:

There are approximately 121 waste-to-energy (WTE) facilities in the United States. The processing capacity of these WTE facilities ranges from 50 - 2300 T/day. This method of waste processing offers significant volume reduction and therefore a substantial extension of landfill life. The volume reduction of MSW delivered to WTE facilities ranges from 60% to 90%. The degree of volume reduction depends upon many factors such as waste composition, preprocessing of waste stream, and combustion process used. In addition to volume reduction, WTE facilities offer energy recovery in the form of steam or electricity. Sustained energy markets are needed in order for the long term success of a WTE facility. WTE facilities require a landfill for disposal of ash and the non-combustible fraction of the waste. Therefore the need for landfilling is not eliminated with this option.

These facilities are divided into two major categories based on the type of waste they process: mass burn; and refuse-derived fuel (RDF). Mass burn facilities generally do not have elaborate preprocessing operations, although bulky items such as bed frames, major appliances, and lead-acid batteries are removed. Detailed processing of incoming waste is generally conducted for RDF facilities. In these facilities, non-combustible and recyclable materials are separated. The preprocessing operation will reduce corrosion in the tubes of the boiler walls, improve heat recovery, reduce ash residue that needs to be landfilled, decrease mass emission rate of acid gases, etc. The additional processing requires additional capital investment and labor.

Application:

Kane County generates almost 1000 TPD of waste that is landfilled. Typical waste to energy facilities that are currently operating range in capacity from 50 to 2300 TPD. This technology, can therefore, process virtually all of Kane County 's waste.

Waste composition and the degree of processing is critical in determining the type of waste combustor to be used as well as the amount of energy recovered. Composition of MSW combusted by existing WTE facilities is similar to the composition of MSW generated by Kane County. According to case studies of different communitites utilizing WTE technology, waste composition of MSW after recycling of the non-combustible and combustible fraction will satisfy minimum requirements of heat content (3750 Btu/lb) for energy recovery. Based on the following equation,

$$\textbf{Btu/lb} = \sum_{i=1}^{m} \textbf{[Mass Fraction of Component]}_i \times \textbf{[Heat Content of Component }_i\textbf{]}$$

the heat content of Kane County's waste is about 6400 Btu/lb. The energy content of Kane County's waste should be able to sustain complete combustion of the waste and produce excess energy for recovery. The application of WTE technology is feasible in Kane County with respect to its waste composition and quantity of waste generated. All of the MSW of Kane County can be managed by WTE technology that will recover incoming waste to steam or electricity.

Facility Requirements:

The requirements for a *mass burn* facility are different than an *RDF* facility. Mass burn WTE facilities with energy recovery consist of the following components: waste storage and handling equipment, combustion system, energy converter, energy utilization process, and residue control system. Storage and handling area consists of a

large tipping floor or tipping pit which is enclosed for odor and wind control. This area should be large enough to accommodate at least three to five days of incoming waste volume. The waste moves by either a mechanical or manual feeder into the furnace for primary combustion and then moves to the discharge end by grates and rams. A variety of boilers, heat exchangers, and super heaters are used in the energy conversion process depending on the method of steam utilization. Fly ash and bottom ash capture occurs in the residue control system. Facilities with RDF burn have extensive preprocessing for preparation of the fuel. The fuel may be in a fluff or densified (pellet) form. Most of the nonburnable fraction would have been recovered during the fuel preparation process.

The composition of MSW generated in Kane County is comparable to the waste processed at the Robbins, IL., WTE facility. The Robbins, Illinois, resource recovery facility which is about 75 miles from Kane County recovers energy from 1600 TPD of MSW. The Robbins facility is constructed on a 16 acre site with two fuel preparation lines, two refuse-derived fuel fired circulating fluidized bed combustion systems, two advanced environmental control systems, and a turbine generator to produce electricity. Residual control system collects the non-hazardous ash to be later placed in a MSW landfill. Each of the waste combustion lines burn 600 TPD of RDF with a heating value of 6170 BTU/lb and produce 229,000 pph of superheated steam at 900 psig and 830°F. This system is capable of handling MSW-derived fuel in range of 4500 to 7000 BTU/lb. For Kane County, which has similar waste characteristics as the Robbins WTE facility, one facility can easily process 1000 TPD of waste or more.

While one large facility could easily process all the MSW generated in Kane County, the costs of transporting waste from distant areas of Kane County, and the available markets for recovered energy could determine the overall economics of the

facility. There are no existing WTE facilities in the County. Therefore, if this option were chosen, there will be a need to site, permit and construct a new/permanent facility in the County. Siting such a facility may not be easy. The Robbins, IL., facility is the only operating WTE facility in the area. The Robbins, IL., facility was completed in October 1996. There is no other facility proposed for construction in the area. Most of these facilities are built to last for a period of 50 years. In that sense, the facilities are likely to be a permanent part of the landscape. While most facilities are constructed new, there is potential for the modification of existing boilers that use coal or other conventional fuels (gas or oil). These boilers could be retrofitted for using RDF as a fuel which could decrease the capital cost of the facility. However, there will be additional costs in preparation of the RDF.

Technical Feasibility:

There are approximately 50 WTE facilities operating in the U.S. that process as much MSW (1000 TPD) as generated in Kane County. Many of these facilities have similar MSW composition as that of Kane County. Several of these facilities have been operating for several years. WTE facilities are compatible with recycling programs. However, because recycling and composting programs utilize a portion of the burnable waste, there are concerns relative to shortage of BTU input to the WTE combustors. At the present, many of the communities that have WTE facilities also have effective recycling and composting programs. These WTE facilities have not suffered due to a shortage of BTU input. If there was a significant increase in the recycling and composting of the MSW, WTE facility could undergo shortfalls in energy, affecting the operation and economics of the facility.

In the last two decades, negative public opinion regarding air quality and residual ash from WTE facilities has resulted in many proposed WTE projects to be placed on hold. The relative environmental impact from air pollutants and residual ash depends upon the composition of MSW, relative completeness of combustion, type and operation of the combustors, air pollution control equipment, and the design and operation of the landfills in which ash is placed. The people served by modern WTE facilities believe that these facilities are good neighbors, based on environmentally sound operations, and the energy related benefits provided to the communities.

A WTE facility is able to generate a variety of products/end-products such as steam, electricity, hot water, and refuse derived fuel depending on the market needs. Sustained end markets for these products are an important factor in developing a WTE facility. Steam can be used in industrial processes, generating electricity, driving machinery, and providing heat to institutional complexes, universities, hospitals, office complexes, apartment buildings, homes, and commercial facilities. Potential markets for steam should be within two miles of the WTE facility due to high transportation costs. Electricity can be generated from steam by installing electrical generation equipment in the WTE facility. Electricity can be produced and sold to public utilities....Under the Public Utility Regulatory Policies Act of 1978 (PURPA), public utilities must purchase electricity from WTE facilities at the avoided cost rate.

Refuse derived fuel either as a fluff or densified-RDF produced by WTE facility can be sold to coal burning electric power plants or other energy generating plants that use RDF as a replacement for a portion of conventional fuel such as coal, oil or gas.

Siting:

The permanent nature of a WTE facility makes siting no less difficult than siting a MSW landfill. Siting is dependent on:

a. General requirements

b. Potential environmental impact of the facility

c. Public opinion

d. Flow control, distance from waste source, product generation, and markets for these products

a. General Requirements:

In order to grant approval of a WTE facility the following criteria must be met

1. The facility must be designed and located to protect public health, safety, and welfare.

2. The facility capacity should be designed so as to accommodate the generated MSW by the service area.

3. The facility must be located out of the 100 year/flood plain boundary or be flood-proofed.

4. Incompatibility of the facility with the surrounding area must be minimized.

5. The surrounding area of the facility must be secured from fire, spills, and operational accidents.

6. The effects of traffic to and from the facility on the existing regional traffic must be minimized.

7. The facility should be consistent with the solid waste management plan of the area.

b. Potential Environmental Impact of the Facility:

The following criteria must be considered to ensure environmentally sound operation of the facility:

1. Environmental impact of the facility should be minimal in extent.

2. The facility utilizes state-of-the-art contaminant pollution control equipment.
3. Possibility of any operational accidents is very unlikely to occur.
4. There are enough regulations to ensure proper operation and management of the facility.

c. Public Opinion:

Siting for a WTE facility is largely dependent on approval by the community in which the facility is located. The public's concern regarding WTE facility must be addressed in an appropriate way to demonstrate that:

1. Significant benefits can be guaranteed by establishing the facility.
2. The public and local officials are seriously involved in facility development and siting.
3. The facility is not in conflict with any other regional enterprises in operation.
4. The public is aware of complete available information regarding facility operation, site design, and environmental impacts.

The siting process requires the involvement of the public. A citizen's advisory committee consisting of local representatives, property owners, civic organizations, and businesses can assist in guiding planners for siting a WTE facility. The public should be informed regarding facility development and siting by newsletters, regularly scheduled meetings with local governmental representatives, and through tours of existing facilities.

d. Flow control, Distance from Waste Source, Product Generation, and Markets:

The location of the facility and its economic competiveness can effect siting. Both of these factors are likely to impact flow control. Flow controls are legal authorities employed by local and state governments to determine where MSW must be taken for treatment and disposal. The lack of flow control has the largest effect on WTE facilities.

Where there isn't the waste, WTE facilities cannot operate normally, revenues are impacted, energy generation is reduced, and subsidies may need to be offered to keep the project afloat.

Transportation costs for transporting the waste to the WTE facility are critical in the overall economics of the facility. The location of the facility has a direct impact on transportation costs. The distance between the waste source and the WTE facility and the location of the markets should all be mutually advantageous to the siting and economics of the facility. Location of the energy users and the type of energy needed should be considered for siting a facility. Land use in service area, access to the WTE site, environmental factors, zoning, and regulatory restrictions are all critical in determining the location of a WTE facility. A site can be selected when all three criteria above are near optimal conditions.

Other siting criteria to be considered are buffer zones, matching the capacity of the facility with the energy demand, and having additional land for future expansion. Two major criteria, life cycle cost and environmental information must be employed for selecting the best site for WTE facility.

For development of a WTE facility in Kane County different scenarios must be considered:

One large facility that serves the entire county; several facilities located in such a way to serve the entire county; one facility to serve the most populated area and the rest of county continue the same disposal practice. Smaller capacity facilities are generally not as economical as larger facilities.

Environmental Impacts:

Impacts on Air

Air pollutants generated by WTE facilities fall into major categories as follows:

a. Criteria Pollutants: such as Sulfur Dioxide, Nitrogen Dioxide, Carbon Monoxide, Particulate Material, and lead that are controlled by National Ambient Air Quality Standards (NAAQS).
b. Acidic Gases: Hydrogen Chloride and Hydrogen Fluoride
c. Heavy Metals: Arsenic, Cadmium, Mercury, Chromium, Nickel, and Lead
d. Organics: Polychlorinated Dibenzo-P-Dioxins (PCDD), Polychlorinated Dibenzo Furans (PCDF), and Polynuclear Aromatic Hydrocarbons.
e. Non-criteria pollutants, such as Volatile Organic Chemicals and Metals, for which no national numerical standards are established. These pollutants are defined by Illinois State Best Available Control Technology (BACT) guidelines for MSW incinerators.

Each of these chemicals have varying degrees of impact on air quality, human and animal health, and plant growth. Matter, in the assessment of human and environmental impacts, concentrations of the criteria pollutants are compared with Natural Ambient Air Standards (NAAQS) established under the Clean Air Act. There are no standards for non-criteria pollutants in stack emissions.

Human exposure to the pollutants present in WTE stack emissions could be through inhalation, ingestion, direct ingestion of contaminated soil, indirect consumption of contaminated products such as fish, meat, and dairy products, consumption of mother's milk, indirect settlement of contaminants onto soil, plants, and water, and thermal absorption. WTE facility characteristics including facility design, operation of

combustion system, amount of excess air to the process can affect the stack emission and ash residue quality.

Impact on Land

Two types of residual ash are generated by WTE facilities, fly ash and bottom ash. Bottom ash consists of largely inert material that remains on the combustor floor. Organic compounds and heavy metals which exist in bottom ash are of concern due to their potential toxicity. Fly ash is particulate matter that is emitted with gases. Most of the fly ash is removed by air pollution control devices, some of the fly ash (less than 1%) that escapes the air pollution control device is discharged to the atmosphere. The collected portion of fly ash might be mixed with bottom ash in a water filled quench pit and disposed together. In some WTE facilities fly ash and bottom ash are managed and disposed separately. The quantity of fly ash and bottom ash depends on composition of MSW, operating conditions, and air pollution control equipment. Majority of residual ash products pass the Toxicity Characteristic Leaching Procedure (TCLP) test, and therefore can be disposed in MSW landfills. If the residual ash does not pass the TCLP test, it can be treated for conversion to a non-hazardous material at a cost of $2 to $10 per ton. Untreated residual ash must be disposed in a hazardous waste landfill at a cost of $150 per ton (SWM Newsletter, 1994). In general, the quantity of fly ash and bottom ash produced by a WTE facility is 10%-40% by weight and 5%-10% by volume of combusted waste. There are possibilities of re-using residual ashes in road construction applications, manufacture of aggregate, etc.

Impact on Water

Ash transport water, screen backwash, equipment and facility wash water, site drainage, and sanitary water are the potential sources of wastewater discharged from a

WTE facility. Ash transport water might be considered as wastewater if it is sluiced with the ash for prevention of dust generation for disposal purposes. Screen backwash may be considered as wastewater if it is used to clean the fuel separation area. Equipment and facility wash water is considered wastewater due to its usage for controlling odor problems. Site drainage and storm water discharges must be handled and controlled. Wastewater streams can be discharged to natural waterways only if WTE facility obtain a National Discharge Elimination System (NPDES) permit from IEPA.

Ash residue handling, transport, storage, and disposal will generate fugitive dust and landfill leachate that has an impact on quality of ambient air, groundwater, surface water, and soil. The human and environmental impacts associated with fly ash and bottom ash is the bioavailability of pollutants sorbed to the ash residues and leachability of trace metals in ash residues. Fly ash is the residue removed from the air pollution control equipment and bottom ash is the residue removed from boiler. Ash residues handling, transport, storage, and disposal may release contaminants to the environment by generating fugitive dust, migration of ash residues leachate into subsurface soil and eventually groundwater, transfer of contaminants to the surface water and soil by leachate treatment methods. Fugitive dust may be generated during vehicle traffic, heavy equipment operations, and ash collections. Concern regarding leachate generated by ash residues is mostly centered on the potentially toxic effects of the trace metals. Due to the above facts, a health risk assessment is needed to evaluate all variables affecting the stack emissions and ash residue characteristics.
Health risks from a WTE facility are of primary concern to the public, and depending on the level of risk that is accepted by the public, the relative ease of siting of WTE facilities can be determined.

In addition, public concerns pertain to facility aesthetics, the potential depletion of groundwater resources, and groundwater contamination. In addition, the public is concerned about workers health and safety, especially with regards to risk of respiratory problems due to ash, risk of explosion and fire hazard, preventative maintenance and housekeeping problems related to the facility, and severe air pollution exposure. These concerns might be addressed by involving the public in all aspects of the plan as discussed in siting section and utilizing environmentally sound and state-of-the-art air pollution control equipment. The WTE facility must use modern MSW handling equipment to ensure that the fuel is homogenous for a complete burn, combustion control equipment in the furnace, and the exhaust gas cleaning equipment before releasing the stack emissions.

Economics:

Economics is probably the most important factor in establishing a WTE facility. The capital and operating costs of WTE facility and the capital and operating costs of related air pollution control equipment must be considered for any WTE facility proposed for construction. These costs should be competitive with other alternatives available to t0he waste generator.

a. Capital Costs of WTE Facility

Capital costs of a WTE facility usually consist of land, engineering and design, site preparation, building and utilities, air pollution control equipment, capitalized interest, salaries and benefits during construction, steam condenser, and administrative and other miscellaneous expenses.

In order to make an initial estimate of facility capital costs, exclusive of land acquisition, infrastructure improvements, and owner administration expenses, the

following model (Rood, 1988) has been developed that takes into account the amount of waste processed per day, end products, procurement method, and type of air pollution control equipment. This equation was set up to generate capital cost in 1985 dollars. The equation is as follows:

($1,000/TPD) = 92.92 - 0.0227 (TPD) + 51.37 [1 for TPD>2000 or, 0 for TPD<2000] - 41.21 [1 for modular or, 0 for other[1]] + 8.47 [1 for SD/FF or, 0 for other[2]] - 8.17 [1 for steam or, 0 for other[3]] -5.63 [1 for A/E or, 0 for other[4]]

Where:

TPD = tons per day of MSW

SD/FF = spray dryer and fabric filter system

1_{other} = mass burn or RDF facility

2_{other} = electrostatic precipitator

3_{other} = electricity or co-generation

4_{other} = not using architecture/engineering (A/E) procurement

The Rood model was used to estimate the capital costs of existing facilities based on their design capacities. The results of the Rood model were compared to the actual capital costs of those facilities at the specified construction year. For the period of 1981 to 1989 an annual interest rate of 7% was assumed in conjunction with the model. Table 1 includes the results of such an analysis. It appears that the Rood model's estimates of capital costs were higher than the actual costs for RDF facilities.

Table 3- Capital costs of various WTE facilities versus capital costs using Rood model

Facility Name	Facility Type	Const. Year	Capacity (TPD)	Cap.Costs ($) Const. Year	Cap.Costs ($) Rood Model	Tipping Fee ($/Ton)
Polk County, MN	Modular	1987	90	8.5×10^6	3.8×10^6	45
Jackson County, MI	Mass Burn	1987	200	28×10^6	20.9×10^6	77
La Crosse, WI	RDF	1987	400	20.4×10^6	31.3×10^6	58
Kent County, MI	Mass Burn	1988	625	62.6×10^6	62.7×10^6	60
Elk River, MN	RDF	1988	1500	57.2×10^6	98.2×10^6	-
Newport, MN	RDF	1987	1100	*21.9×10^6	62.3×10^6	67
Hennepin County, MN	Mass Burn	1989	1000	142×10^6	84.6×10^6	65
Robbins, IL	RDF	1996	1600	365×10^6	130×10^6	57
Occidental Fired Facility	RDF	1981	2000	144×10^6	142×10^6	-
Indianapolis, IN R. R. F.	Mass Burn	1987	2300	109×10^6	228.7×10^6	25

* Only RDF manufacturing facility

To estimate the capital costs for a future WTE facility in Kane County, the above model was used with the following assumptions: that the WTE facility will produce steam and electricity, use A/E procurement method, use RDF, utilize SD/FF in air pollution control system. A factor of 1.60 was used to convert 1985 (year the model

above developed) dollars to 1997 dollars with 4% average inflation rate. The calculated capital cost based on the model would be,

$$(\$73{,}060/TPD)\ (1000\ TPD)\ (1.60) = \$116.9 \times 10^6$$

Comparing these figures to a more recently constructed WTE facility in Robbins, IL., the model predicts a capital cost of $130 million whereas the actual capital cost was $365 million. Site specific economics, size of the proposed facility, air pollution control equipment, and criteria not included in the model such as cost of land, infrastructure improvements, and administrative expenses can influence the overall capital cost of the facility This suggests that there is no realistic means of accurately projecting capital costs of a WTE facility.

The Illinois Retail Law which was passed in 1988 to provide state subsidies to support energy production from WTE facilities, and for Illinois counties to sell bonds to build WTE facilities. The Illinois Commerce Commission (ICC) mandates electric utilities to purchase electricity for not less than 20 years contracts from qualified solid waste energy facilities. ICC determines qualified solid waste energy facilities under the Local Solid Waste Disposal Act and the Federal Public Utility Regulatory Policies Act of 1978 (PURPA). PURPA encourages various energy production technologies by requiring the electric utilities to purchase electricity from WTE facilities at the avoided cost rate. The avoided cost rate is almost the same as the national average retail cost of electricity that is $0.07/kwh and is much higher than wholesale electricity price of $0.025/kwh. The repeal of the Retail Rate Law in Illinois (February 1996) will have a significant impact on the revenues of future WTE facilities. The repeal of the Retail Rate Law will effectively stop any future development of WTE facilities, unless landfill tipping fees increase substantially.

The capital investment in a WTE facility is critical from a borrowing stand point. When comparing alternate technologies, cost figures should be expressed on a tipping fee basis $/ton. No two WTE facilities are identical; therefore their tipping fees are different as well. The method of determining tipping fee is very complicated and includes many agreements/preconditions among owners and operators, the volume of waste received, the subsidy received, the revenue from products, disposal fee, length of contract, profit markup, etc. Several facilities contacted were not willing to discuss the breakdown of their tipping fee structure. Current tipping fees for selected WTE facilities are included in table 1. Except for the Indianapolis, IN facility (2300 TPD) and the Polk County (90 TPD) facilities, tipping fees range between 57$ and 77$/ton. These tipping fees are substantially higher than any landfill in the region.

Financing:

Project procurement is the procedure that a WTE facility is designed and constructed and consists of architect/engineer (A/E), turnkey, and full service contractor methods. In the A/E approach, the design and specifications of the facility will be conducted by an A/E firm and then the final contractor who wins the bid is chosen. The most important advantage of A/E method is low cost due to competitive bidding and the major disadvantage is that all the financial responsibilities will be on project sponsor. This method is usually utilized by public works projects. In turnkey approach, the contractor is responsible for design, construction, equipment supply, start-up, and facility performance and then the project sponsor will take over. The advantage of this approach is that the contractor assumes a majority of the risk with the disadvantage of a higher project price. Under full service approach, the contractor will perform design,

construction, equipment supply, start-up, and facility operation for long term (20 or 30 years). This approach can be employed by both public and private ownership. There are many factors that affect financing of a WTE facility.

- Technical Feasibility: the technology used must have proven its applicability for that type of facility. Innovative techniques may need additional guarantees or higher interest rates.
- Financial Feasibility: the facility should be able to demonstrate its ability to pay for itself. Lenders will consider long term economics of the facility including the potential for change in markets or users.
- Economic Strength of Participants and Basic Guarantees: the economic strength and guarantees provided by individual participants will be considered by lenders to ensure their abilities for performing specified tasks.
- Strength of Legal Documents: all components of WTE facility such as incoming waste, end-products sales, construction and operation, and other factors and responsibilities will be considered to be appropriately documented. All components will be checked by lenders to make sure all possible risks are addressed and allocated. Lenders might require flow controls for financing to ensure that delivery of incoming waste is secured.

Financing Methods

In general, three major financing approaches are general obligation (GO), project revenue, and special tax/user charge pledges.

1. General Obligation bonds: this type of financing usually used by publicly owned facilities in which government will grant all its taxing power with no limit to provide the payments of the debt. This is the surest financing method and has

less risk compared to the other options. The low risk allows bonds to be sold at lower interest rates.

2. Project Revenue Bonds: in this option, the debt will be repaid by facility revenues from tipping fees, recyclable products sales, energy sales, steam sales, and perhaps RDF sales. This method can be utilized by both private and publicly owned projects. The interest rates for this type of bond is relatively higher than GO bonds. The possibility of success will be considered very carefully by lenders for this type of financing method.

3. Special Tax/ User Charge Pledges: in this option additional revenue sources for the facility might be provided by establishing special taxes on various activities not directly related to energy recovery project such as user charge on waste generators that needs to be paid at the gate of WTE facility other than the tipping fees.

Permitting:

Environmental permits (waste stream authorization, construction, development, operation, air quality, etc.) must be obtained as an integral part of any WTE facility. These permits are very complex and variable, and public support and involvement is the major factor in obtaining the applicable permits. The environmental permits are issued for siting, air emissions, solid waste disposal, wastewater discharges, and other environmental impacts.

a. Siting Requirements

Local siting approval can be issued if the criteria discussed in siting section is achieved for any WTE facility. As previously emphasized no permit will be granted unless public acceptance is assured.

b. Air Emission Regulations

Both Federal and State Environmental Protection Agencies have set regulations to control the air pollutants. In case of any discrepancy between the two agency requirements, the more stringent regulations will be applied. The related Federal regulations are: National Primary and Secondary Ambient Air Quality Standards (NAAQS), Standards of Performance for New Stationary Sources (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and Prevention of Significant Deterioration of Air Quality (PSD). Applicable Federal Regulations are in Title 40, Chapter I, Subchapter C-Air Programs, Parts 50-81 of the CFR. The NSPS regulations determine emission concentrations, continuous emission and process monitoring, stack testing, and operator training. The best demonstrated technology (BDT) for combustors is being used to set the emission limits for WTE facilities. The supervisor and chief operators must be certified by American Society of Mechanical Engineers (ASME). In addition to regulations set by the Federal Agencies, there are other requirements set by IEPA that were applied to the Robbins WTE facility. Obtaining Federal, State, and Local permits is a difficult but not impossible task.

c. Solid Waste Disposal Regulations

The WTE facility will generate three types of solid waste including fly ash, bottom ash, and non-processable waste that is classified as special waste. Disposal of special waste requires special handling, and the waste must be placed in landfills that contain all modern components of liners and leachate collection systems. Disposal of WTE solid wastes are regulated by both Federal and State Environmental Protection Agencies. Federal regulations applicable to the handling of WTE solid waste are contained in Title 40, Chapter I, Subchapter I-Solid Wastes, Parts 240-280 of the CFR.

d. Wastewater Regulations

Control of wastewater discharges is regulated by both Federal and State Environmental Protection Agencies. Potential sources of wastewater are ash transport water, screen backwash, equipment and facility wash water, site drainage, and sanitary water. Federal requirements and guidelines pertaining to the control of WTE wastewater discharges are contained in Title 40, Chapter I, Subchapter D, Water Programs, Parts 104-147 of the CFR.

e. Other Environmental Impacts

There are other environmental impact issues such as noise and odor problems that need to be considered for obtaining applicable permits. Noise and odor will be considered as pollutants by Federal and State regulations and must be addressed properly by the facility. Federal regulations are contained in Title 40, Chapter I, Subchapter G, Noise Abatement Programs, Parts 201-211 of the CFR. Odor regulations can be found in 35 IAC 245.

Implementation:

Planning and implementation that are summarized in following steps are very critical for developing a WTE facility.

- Assess and Generate Political Support: developing of WTE facility and the justifications for such a facility must be fully understood by the public and community leaders. The role of a WTE facility relative to the overall solid waste management plan for the county should be explained and demonstrated to the community in order to win their support.

- Identify Goals: the goals and objectives of the project must be identified and procedures to achieve those goals determined. The public participation during goal setting and identification of procedures should be encouraged.
- Evaluate Waste Sources: all possible sources of waste, their quality and burning potential, hauling distance, seasonal and regional variation in quantity of waste, flow control, highway and transportation services, and economic consideration of different disposal alternatives must be carefully considered to ensure continuous supply of waste to the facility.
- Find Energy Markets: potential markets for all end products (steam, electricity, etc.), the seasonal nature of demand for these products, and alternative markets should be identified.
- Assess Alternative Technologies: all possible technologies that can be utilized with advantages and disadvantages, associated capital and operational costs, health risks and public concerns, environmental impacts, and life cycle maintenance and operation costs should be compared and evaluated.
- Negotiation of Contracts: the negotiating contracts are necessary for developinga WTE facility and could be between the developing authority and solid waste haulers, energy buyer, financing institution, construction contractor, and the facility operator if is privately operated.
- Procuring Financing: financing of WTE facility cannot be successful unless all previous steps are completed. Several different financing approaches must be evaluated to meet the local needs of the facility. Proper financing can be successfully employed by the demonstration of the technical, legal, economic, and political viability of the project.

- Obtain Regulatory Approval: various activities of WTE facility such as stack emission pollutants, handling of solid waste generated, siting requirements, wastewater discharges must be approved and permitted by State Environmental Protection Agency.
- Construction and Start-up: due to limited experience related to the construction of WTE facilities, proper supervision must be employed for such construction. Continuous monitoring of all steps of construction by certified and experienced crew is needed.
- Ongoing Supervision and Operation: due to sophisticated operation of WTE facility, operating these facilities require knowledgeable and experienced persons who are also familiar with Federal and State regulations and are certified operators.

ADVANCED RECYCLING

Introduction

Kane County communities have been recycling portions of their waste stream for the past several years. Kane County has an excellent recycling program. Curb side recycling is available to residents in virtually all communities throughout the county. The materials currently collected from homes include, landscape waste, paper, newsprint, cardboard, glass, steel cans, aluminum, plastic, etc. The level of participation and the types and amounts of material collected vary for each community and service provider. In 1996, an estimated 33% of Kane County's waste was being recycled, and therefore diverted from landfills. In addition to traditional recycling, 100% of the landscape waste generated in Kane County was diverted from landfills.

Recycling in Kane County also occurs at commercial and industrial sites. Private waste haulers that service these generators have provided excellent service to recycle cardboard, pallets, glass, paper, metal, and plastic from these generators. In addition to the above materials, these generators also recycle specific waste materials generated by their businesses.

Based on the exceptional recycling record of Kane County, further improvements in traditional recycling are unlikely. Additional increases in the recovery of recyclable materials and subsequent diversion from landfills is dependent on: future market development for recycled materials; education and encouragement of the citizenry for their continued recycling efforts; the economics of recycling; and the revenues received from the sale of recovered materials. However, additional recycling efforts are likely to have only a minor impact on landfill space savings in the future.

Construction and Demolition Waste Recycling:

Kane County, over the next two decades will be subject to urban sprawl. With this urban growth there will be new construction projects, for infrastructure development as well as residential, commercial and industrial construction. An estimated 100 million tons of Construction and Demolition (C&D) wastes are generated annually in U.S. This may equate to 35-40% of the amount of municipal solid waste stream; not all of the C&D waste generated goes to a municipal landfill. C&D wastes make up an estimated 20-30% of all MSW landfilled. According to a 1997 report prepared by University of Wisconsin-Extension, 90 percent of C & D wastes have the potential to be recycled.

In 1996, only 3% of the C&D waste was recycled in Kane County (personal communication-Kane County Environmental Management Department). It is difficult to estimate the exact amount of C&D waste generated, because in the past, there was no reporting mechanism for C&D wastes. C&D waste materials such as asphalt and concrete have been traditionally recycled by reprocessing at asphalt or concrete plants, or have been used as inert fill, and therefore have not been routed to MSW landfills. In some states where regulations allow separate C&D waste landfills (rubblefills), the burden to MSW landfill from these materials has been minimized.

The amount of C&D waste entering Kane County landfills is estimated to be 62,000 tons per year (15% of landfilled waste). However, in the great lakes region, estimates suggest that 20-30% of the waste placed in MSW landfills can be classified as C&D waste. The enhancement of C&D waste recycling offers the largest potential for future landfill space savings in Kane County. Therefore, this section of the report will focus primarily on C&D wastes.

Composition of C&D Wastes:

C&D wastes originate from roadwork, excavation, building demolition, renovation and new construction. Materials present in C&D waste include, asphalt, concrete, excavated earth, land clearing debris, steel, dimensional lumber, engineered lumber, cardboard, insulation, dry wall, metal, plastic, appliances, fixtures, paints, brick, carpet/padding, shingles, wire, pipes, etc.

The amount of C&D waste generated will depend on several factors: season and climate; strength of the economy in the region; decision on repairs of municipal infrastructure; development of urban renewal projects; and level of catastrophic events including, floods, earthquakes, tornadoes, fires, hurricanes. It is therefore, very difficult to predict the amount of C&D waste that will be generated or for that matter recycled or landfilled.

According to the National Association of Home Builders, a 2000 square foot home generates approximately 3 tons of waste. The waste consists of 0.75 tons of dimensional lumber, 0.75 tons of engineered wood, one ton of dry wall, one ton of masonry waste, 0.3 tons of cardboard, and 1.2 tons of other materials. Although some materials will be wasted during the construction process, careful design and planning could reduce the amount of waste substantially. Multifamily units are likely to generate less waste on a per square foot of constructed area basis. The composition of waste generated from a commercial building construction site is likely to be different from that of a residential building. Commercial buildings tend to have a larger proportion of concrete or brick and less of wood. Demolition wastes from whole residential buildings tend to have more than 50% of the waste made up of wood and shingles. Drywall makes up 15% of the demolition waste.

Facility Requirements and Technical Feasibility:

There were an estimated 1200 facilities in the US in 1996. Facilities processing concrete/asphalt or wood, makeup 72% of all C&D processing facilities in the US. Another 19% of the facilities process mixed C&D. Many concrete and asphalt processing facilities exist in Kane County as well as surrounding counties. There are no mixed C&D processing facilities in Kane County. The trend has been to source separate the waste and have it taken to a specialized processing facility as opposed to have a mixed C&D facility. According to one Kane county recycler and waste hauler, a mixed C&D facility would require the same level of permitting as a transfer station. At least one Kane county facility, processing wood waste (Wood Fiber Products, E. Dundee, IL), has the capacity to process larger quantities of waste, and are capable of expansion, provided the markets for these materials and the economics continue to be strong and in favor of the processor.

The type of C&D processing facilities may be classified depending on the primary material they process, into the following groups:

- Concrete/Asphalt
- C&D wood waste
- Mixed C&D waste
- Asphalt roofing shingles
- Gypsum drywall
- Salvage stores

The type of processing at the facility may vary depending on the products manufactured. The ERRCO C&D MRF located in Epping, N.H. was designed to handle 575 tons/day. This is a full scale MRF designed to handle only C&D wastes. The

ERRCO facility processes the following materials: treated and untreated wood, asphalt shingles, concrete, brick, metal, insulation, wire, glass, rock, dry wall, railroad ties, and yard wastes. At the ERRCO facility three major products are generated (wood chips for landscaping purposes, aggregate for road construction, loam for erosion control). Mixed C&D is received and after the material is sorted for non recyclables, it is picked up with a grapple arm, fed to a conveyor, and then to a disc separator. Six inch or smaller particles fall through, larger particles remain on the disc. Followed by a series of shredders, trommels, floatation separators, magnetic separators, hog mills etc.

The facility cost $ 7 million and has a 22,500 square feet processing building. The facility is located on a 80 acre parcel of land. In this area the MRF can process 175,000 tons per year, with 80 to 90% of the material recovered. Materials that cannot be processed at this facility (wire, glass, metal) are sent out to be processed at another facility. All non recyclable material is sent to a double lined landfill. Tipping fee charged is dependent on the hauler, volume provided, and the type of waste classification. The fee is expected to be $50.00 per ton.

A wood waste processing plant was built in conjunction with a wood-to-energy facility in Tacoma, WA. The waste wood was to be recycled into pulp for the manufacture of paper products. The facility was constructed at a cost of 3.5 million on 5.6 acres of land. Waste is received as five separate categories (new construction, demolition, lead-based painted wood, land clearing debris/stumpage, and pallets). One material is processed at a time. Material is fed to a screen where 6" opening screen. The particles passing through the screen are ground and screened through a ¼ inch screen. The fines are rejects, and make up 3% by weight of the incoming material. A 3" or less size is used for the hog fuel market as well as the pulp market. The facility processed 130,000 tons in 1995, and received revenues of $ 3.9 million for sale of

products and tipping fee. The plant produced 44% pulp chips and 43% wood fuel. 10% fines/top soil. Rejects are sent to the landfill at $57/ton. The wood fuel is shipped 90 miles away and sold at $ 10-15 per ton.

Tipping fees account for 50% of revenues at the Tacoma, WA., facility. Tipping fee charged varied by material. Tipping fee in 1996 were: $15 for wood from new construction projects, $44.50 for wood from demolition projects, $ 8.50 per cubic yard for land clearing debris and stumpage. Pallets were negotiable, while wood that contaminated with lead based paint were being charged a tipping fee of $150 per ton. By comparison, one wood waste processor in Kane county charges $2.50 per cubic yard.

Recycling of road construction material is generally done for reuse of aggregates. These materials are not normally disposed at a landfill, they are either reused as a base for roads at nearby projects (to avoid transportation costs) or transported to be remanufactured into new aggregate or asphalt or concrete. Since only a small proportion of these materials are sent to landfills, and most of the material is already being recycled, the recycling and reuse of the demolition of concrete or asphalt materials will not be discussed in this report. Significant cost and material savings are achieved by recycling of these materials. In Kane County, some recyclers charge from $ 0-25 per delivered load of clean asphalt for recycling.

Regulatory/Siting/permitting

Regulations governing C&D wastes are found in over 40 states. In states that have regulated demolition landfills, the regulatory approach has generally reflected the inert qualities of the waste and therefore, far less complex landfill requirements than MSW or industrial waste landfills. Some states have relied on the disclosure of the

location, and notification of operations, as well as maintenance of simple records of the quantity and origin of waste materials. For states with a more formal set of regulations, groundwater monitoring is required on a routine basis. In Illinois, the technical and siting requirements are similar for C&D waste landfills as well as mixed MSW landfills.

Constraints to establishing a MRF for C&D waste include overcoming public opposition to siting. C&D waste processing centers will be viewed as a solid waste processing center similar to that of a transfer station. These facilities are subject to SB 172 siting requirements. Potential noise from truck traffic and operation of machinery are likely to increase, resulting in some degree of opposition from the neighbors. A more simplistic approach is to offer the processing of only one type of material. For example, clean wood waste may be processed into wood fuel, or the recycling of asphalt, or the recycling of concrete from demolition sites.

Environmental Impacts:

The environmental impacts from C&D waste recycling should be minimum. Leachate from lined C&D facilities, with leachate collection systems, have been tested in a major midwestern city on a quarterly basis. Based on this data the National Association of Demolition Contractors has developed a "Potential.Surrogate Range" for leachate concentrations at C&D landfills. These calculated values do not exceed primary national drinking water standards. Based on these findings the potential impact on surface or ground water from processing C & D waste is likely to be minimal. Almost all C&D recycling facilities require some form of size reduction of the incoming waste material. The size reduction process could generate noise and fugitive dusts. Noise abatement is critical for good neighbor relations, as well as employee work

atmosphere. The dusts, although not hazardous, may pose a concern to nearby citizens and staff working at the facility.

Other environmental concerns include the presence of asbestos fibers in demolition wastes. If it is known that a batch of waste contains asbestos, perhaps rejection of the load to a landfill should be considered.

The presence of hazardous wastes is a major concern. Routine inspection and sorting may be needed if this is a problem. A toxicity test such as Toxicity Characteristic Leaching Procedure (TCLP) is one method of identifying hazardous wastes. One study reported that treated wood samples, such as utility poles could have excessive levels of arsenic and therefore may qualify as a hazardous waste. Untreated wood, or processed wood such as particle board, plywood, or painted wood does not qualify as a hazardous waste based on a TCLP test. Good record keeping and inspection are necessary steps for the successful recycling of C&D wastes.

Economics

The economics of recycling C&D waste are dependent on several factors, the cost of sorting at the source or at the processing facility, the cost of hauling the waste to the facility, the overall cost of processing, the cost of marketing, the tipping fee charged, and the revenues received from the sale of the product, and finally, the cost of landfilling the material that was not recycled.

A study conducted in DuPage county, IL, suggests a 25-50% diversion rate and a 25% savings in hauling costs can be achieved while still enjoying the benefits of resource conservation and recycling. This does not include extra labor required to sort out the materials that will be recycled at the site.

Collection of C&D materials at new construction sites could be done with the use of roll-off containers or individual containers for each item. Collection with roll-off containers is expensive compared to fenced off areas in which individually sorted materials are deposited. This method works especially well for bulky items or large volume items such as wood, cardboard, drywall, etc. Haulers are available in the county that can do this type of collection. Generally 50% of waste materials are recyclable.

The disposal costs for construction wastes generated from the construction of a typical single family home are estimated to be $ 750 per unit. If only 50% of the material is recycled, there is likely to be a proportionate savings in disposal costs. The combined cost of labor to sort the recyclables, the transportation costs, and the tipping fee paid to the C&D recycling center, are likely to offset any cost savings in disposal costs.

Capital and operating costs for three different hypothetical C&D processing facilities were estimated in 1994.

Option A: Concrete/Asphalt crushing and screening facility

Option B: Mixed C&D waste dump-and-pick operation

Option C: Mixed C&D waste mechanical sorting system

The following cost estimates were derived for the three options:

	Option A	**Option B**	**Option C**
Capital Cost	2,880,000	3,480,000	9,600,000
Annual Debt cost	370,000	450,000	1,235,000
Annual O&M cost	870,000	2,970,000	4,180,000
Annual total cost	1,240,000	3,420.000	5,415,000
Assumed tonnage	200,000	100,000	300,000
Cost ($/ton processed)	**6.20**	**34.20**	**18.05**

Assumptions made included 10% issuance expense for capital cost, capital financed at 8% for 15 years.

Tipping fee charged at a C&D recycling facility is dependent on the hauler, volume provided, and the type of waste classification. The tipping fee at the Epping, N.H. facility was expected to be $50.00 per ton.

A Phoenix, AZ. recycling facility takes mixed C&D waste (wood including land clearing materials, and inert debris such as concrete and asphalt). Tipping fees in 1994, at this facility, were $ 31.50 for C&D waste, $13..50 for wood waste, and $15.50 for inert waste. A gypsum processing facility at Bellevue, Washington, closed recently because it was priced out of the market by a local landfill. The gypsum facility charged $50 per ton for clean drywall material.

While 90% of waste material from a new construction site is recyclable, the economics of recycling and the availability of markets, may make it practical to recycle at least 40% of the waste. Cardboard, wood, and metal can be recycled in a cost effective manner in Kane county.

Economics should be competitive, the cost of delivering materials, processing of materials should be less than the cost of conventional raw materials. Supply and demand will determine price structures. The recycling mill should be able to weather annual seasonal price fluctuations.

Markets

In order for a material to be considered successfully recycled the material must be marketed. Local markets must be developed for recycled materials. Although markets that are a distance away can be used, the economics of distant markets may not be as favorable as local markets (due to increased transportation costs).

In general markets for wood, cardboard, and metals exist in the vicinity of Kane county. However, there is a need to create markets for hard to recycle C&D materials

such as dry wall, shingles, plastics, etc. Unless markets for these materials are developed it would be difficult to recycle these materials on a routine basis.

Uses for commonly recycled C & D materials:

Asphalt	New pavement, cold patch, or aggregate
Asphalt shingles	Asphalt paving or cold mix additives
Concrete	Road base
Cardboard	Cardboard, paperboard, drywall paper, fiberboard, or floor underlayment
Drywall	Soil amendment, wall board, animal bedding.
Masonry	Aggregate, daily cover at landfill, grading material
Metal	Recycled metal
Plastic	Plastic containers, plastic lumber, carpet, clothing
Wood	Fuel, landscaping material (mulch), animal bedding, pulp, composite building board, hydromulch, particle board, medium density board.

Implementation/social issues

Processing of material is a lot easier than finding the markets for the recyclables and selling the products. Implementing a successful program requires clean, well sorted, contaminant free material that will meet the processors needs.

- Builders should be encouraged to make contractors responsible for the amount of material used and managing of the waste generated. Only large builders and demolition contractors may cooperate initially.

- Needs a lot of cooperation between builder and hauler to make C & D waste recycling programs successful. Job site foreman at new construction site specialize in efficient use of materials and construction crews. They are less likely to ask their crew to source separate materials or even to inspect separated

materials. Builders and their crew members, haulers and their staff need to be educated relative to waste storage and recycling rules, the benefits of recycling, and the existence of markets. Many players must fully participate in order to make construction waste recycling successful.

- Recycling probably makes sense with large projects as part of a building permit. Permitting departments for buildings could set up a tracking system by revising permit applications to include a section on recycling, providing educational materials to builders along with approved permits, outlining litter abatement procedures for a clean and safe job site, and providing opportunities for training for recycling, and purchasing.
- Small processors of gravel and related material should be encouraged to participate in processing of recyclables. They have the equipment and can easily adapt their equipment for processing materials such as wall board and wood.

One means Kane County can utilize to encourage participation is through mandates. Targeted mandate programs for other waste streams have resulted in substantial participation in these programs. Any mandates implemented should hold all contractors to similar standards. The County could also develop a strategy that will help private enterprise reduce the amount of C&D waste landfilled by offering incentives. One such incentive which could be implemented in the future is a reduced tipping fee for C&D loads that are free of materials for which there are local markets. This in not a feasible option at present because tipping fees are fixed by the landfill operations contract.

Another strategy would be to divert all C&D waste that arrives at a landfill (after tipping fees are paid) to be ground into smaller particles and stockpiled to be later used as an alternate daily cover. A detailed study to evaluate the economic and technical feasibility of utilizing shredded, non-recyclable C&D waste as daily cover should be performed as a first step toward implementing this strategy. Ideally, the additional processing, storage and regulatory compliance costs associated with this strategy would be to offset by savings in the cost of using conventional daily cover.

Additionally, the IEPA would need to grant a significant modification to the facility's permit authorizing the use of C&D waste as daily cover. Such a permit application would require a demonstration that the C&D waste would prevent blowing litter, minimize access by vectors, minimize the threat of fire, and minimize odors.

APPENDIX B

Evaluation of Waste Markets Report
August, 1996

EVALUATION OF WASTE MARKETS REPORT

August 1996

Prepared for:

Kane County Environmental Management Department

Prepared by:

HDR Engineering, Inc.

EVALUATION OF WASTE MARKETS REPORT

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EVALUATION OF WASTE MARKETS REPORT

1. INTRODUCTION

The Kane County Environmental Management Department (County) will be updating the Kane County Solid Waste Management Plan (Plan) prepared pursuant to the Illinois Solid Waste Planning and Recycling Act (415 ILSC 15/1, et. seg.). The Plan was adopted and approved on November 10, 1992 by the Kane County Board. The Act requires that the Plan be updated at five-year intervals.

HDR Engineering, Inc. (HDR) was retained to conduct an evaluation of existing and projected markets for municipal solid waste management in the Northern Illinois, Northwestern Indiana, and Southern Wisconsin service area. This report evaluates the following waste markets for market capacity and costs:

- landfills
- waste-to-energy facilities
- transfer stations

This analysis focuses on a study period from 1996 to 2016. This report will be attached to the County's Plan Update and provide the basis for an evaluation of available solid waste management options. The following are the principal findings of the report:

1) Local landfill capacity will continue to decrease over the study period. Within Kane County, the Woodland Landfill is projected to close in the year 2000 and Settler's Hill Landfill in the year 2007 (year 2012 with an expansion).

2) The closure of Woodland Landfill will require Kane County users to redirect that portion of the waste stream to the Settler's Hill Landfill or to an out-of-county disposal facility. The closure of Settler's Hill Landfill will require the transfer of all Kane County waste to an out-of-county disposal facility because the County has decided not to site a new landfill in Kane County.

3) Only one transfer station is located within Kane County. Transferring all of Kane County's wastes to distant disposal facilities will require additional transfer stations within Kane County.

4) Few waste-to-energy facilities are projected to be operating in the region when these landfills close, and available capacity may be quickly committed. Kane County should monitor the permitting, construction and operating status, and tipping fees, of the proposed waste-to-energy facilities located in Cook County, Illinois and the proposed neutralysis facility in Lake County, Indiana. The tipping fees are projected to be higher than landfilling for the first several years.

5) Numerous landfills with sufficient capacity beyond the year 2000 are located within the State of Illinois. Landfills in Wisconsin and Indiana may also have capacity for Kane County users.

6) Local tipping fees range from $37 to $41 per ton in 1996 dollars. Local tipping fees are expected to increase at a rate greater than inflation over the next 10 years. Overall system fees are estimated at $50 per ton for transfer, transportation and disposal of solid waste at landfills within a 100 mile radius of Kane County, and $55 per ton beyond the 100 mile radius. Tipping fees at distant landfills are expected to increase at a rate equal to inflation.

2. LANDFILL FACILITIES

2.1 General Overview

2.1.1 Permit and Siting Restrictions

Landfill siting must comply with all applicable local, state and federal regulations. The three states within a 200-mile distance from Kane County (Illinois, Wisconsin and Indiana) all have state regulations governing the siting of landfills. The Illinois Environmental Protection Act (Illinois Revised Statutes, Ch. 111-1/2: "The Environmental Protection Act", Sec. 39.2), establishes nine criteria which must be met before a county board or governing board of a municipality may approve a request for local siting of a new regional pollution control facility. The criteria include:

1. Demonstration of need for the facility;
2. Protection of public health, safety and welfare;
3. Compatibility with surrounding land uses;
4. Location outside the boundary of the 100 year flood plain or demonstration of adequate flood-proofing;
5. Minimization of danger to surrounding area from fire, spills or other operational accidents;
6. Minimization of traffic impact;
7. Demonstration of an emergency response plan if the facility will be treating, storing or disposing of hazardous waste;
8. Demonstration of consistency with adopted solid waste management plan;
9. Meeting requirements specified by the Board for regulated recharge areas, if facility will be located in such an area.

Illinois landfill regulations are identified under Title 35, Subtitle G. Section 811, Subsection A sets forth general standards for new landfills. Landfills cannot be located within 1,200 feet of a designated sole-source aquifer, within 500 feet of an occupied dwelling, school, or hospital, within 10,000 feet of turbojet runways, or within 5,000 feet of any runway used by piston type aircraft. Landfill must not be located in areas where

they pose a threat to irreplaceable historic or archaeological sites or to nature preserve areas; jeopardize the continued existence of any designated endangered species; or violate Sec. 404 of the Clean Air Act. Wisconsin and Indiana have somewhat different, but similar restrictions on landfill siting.

In recent years, local bodies have been able to restrict sitings if the welfare, safety and health of the citizens were deemed to the threatened. As a result, siting a new facility has become increasingly difficult. Landfill expansion approvals have also become more difficult. A typical siting effort requires three to five years, depending on the technical, legal and political circumstances.

Kane County implemented a landfill site selection process in 1995. The selection process included a public siting advisory committee, screening for unsuitable sites, screening for potential sites, and detailed technical analysis of potential sites for selection. After completing this process, the County Board passed Resolution 95-247 on September 12, 1995 which states that the County will not pursue the development of a new landfill in Kane County.

2.1.2 Waste Export Issues

In Illinois, Wisconsin and Indiana, municipal solid waste (MSW) is routinely exported across county boundaries and across state borders for disposal. Reasons for exporting include economic decisions made by waste haulers based upon disposal capacity availability, pricing, haul distance; and contractual agreements with landfills, transfer stations, or municipalities. Waste exportation has both advantages and disadvantages that involve environmental, economical, technical, legal, and political issues.

Advantages to Kane County of exporting waste to a remote disposal site include the following:

- No fixed investment in disposal facilities;
- No direct responsibility for non-compliance with environmental regulations by the landfill;
- Avoids controversial, time-consuming and expensive facility siting;
- Possibility of long-term stabilized disposal rates (through contracts);

Remote sites to which waste can be exported are regional facilities which in many cases are new state-of-the art landfills which employ the most modern environmental control measures. Many haulers may have affiliations or contracts with landfill owners or operators in other counties and states.

Disadvantages to Kane County of waste exportation include:

- Possibility of unexpected closure or loss of disposal options through natural disasters, labor strikes or shutdowns because of non-compliance with environmental rules;
- Less control of the site;
- Potentially less control over costs, including fuel and transportation charges;
- Vulnerability to transportation disruptions;
- Possible future liability for negligent operation by the landfill owner or operator;
- Possible reduction of public commitment to waste reduction and recycling.

Communities usually have less control of the waste management process when waste is exported outside of the county or out of state for disposal. These landfills are further away from the waste generation and thus these communities have less control over landfill operation. More long-haul of waste may have greater environmental impacts because host communities must contend with greater truck traffic. Higher costs may result from waste exportation.

A discussion of waste export issues would not be complete without a discussion on flow control. In the case of *Carbone v. Clarkstown*, the U.S. Supreme Court held that "flow control" is unconstitutional in that it violates the Commerce Clause of the U.S. Constitution. Municipalities, counties and states cannot use traditional flow control to mandate the destination of waste generated within their borders. However, tonnage restrictions applied equally to all waste do not violate the Commerce Clause. For example, the landfill or host community may impose quotas or a limitation on daily waste receipts to control volumes which prevents the acceptance of additional waste from outside the community or area. Other flow control alternatives are discussed below which may impact the future of waste exportation.

Several alternatives may exist to replace the effect of "flow control" including: Congressional action, provision of public collection services, contracts and franchises, permits and licenses and economic flow control. The methods of contracts and franchises or permits and licenses may also be interpreted as restricting competition in violation of the Commerce Clause of the United States Constitution under a broad interpretation of the Carbone ruling. One of the Supreme Court's alternatives discussed in the *Carbone* ruling was economic flow control: "the town may subsidize the facility through general taxes or municipal bonds." Judicial support of economic flow control, however, is not without question.

Congress has failed to pass the necessary legislation to grant flow control authority to state and local jurisdictions in the past and the present. Recently, a House measure allowing flow control for facilities financed by bonds was defeated. This defeat lowers the chances for any other flow control measure being enacted during this Congressional session. Representatives that introduced the measure are hopeful that a

flow control and interstate waste transportation bill will be passed in 1997. The interstate waste provisions would permit governors to limit the flow of waste into their states.

Waste exports to other states involve the flow control issues discussed above. The two contiguous states that Kane County may export waste to are Indiana and Wisconsin. The following discusses the additional waste export issues unique to these two states.

Indiana

In 1991 state legislation was enacted to restrict the flow of out-of-state waste into Indiana landfills and implement tipping fee surcharges on out-of-state waste. Even though this legislation was ruled unconstitutional, imports from the State of Illinois decreased from a high of 15% in 1992 to about 6% of all waste disposed in 1994. Waste imports from most other states have also continued to decrease from 1992 levels.

The Indiana Department of Environmental Management (IDEM), Summary of Solid Waste Facility Data: 1991-1994 (IDEM Report) states that, "Solid waste imported to Indiana from out-of-state sources can be received at landfills, incinerators, or transfer stations." The largest source of out-of-state waste continues to be the State of Illinois. Waste imported from Illinois went to contiguous Indiana counties and further towards Indiana's geographic interior. If Kane County chooses to export some of the waste to an Indiana landfill, there should be no significant barriers. At the most, Kane County would need to procure an agreement which addresses disposal capacity, environmental safeguards, closure and post-closure impact, and financial and long-term liabilities with the appropriate facility(ies).

Wisconsin

The Wisconsin Recycling Act (Act 335) stipulates requirements and fees applicable to the disposal or burning of waste generated in other states. An out-of-state community was effectively banned from using Wisconsin sites after January 1, 1995 unless the Department of Natural Resources (DNR) certified that the community had an effective recycling program and was located in a state with "an effective siting program." An effective recycling program is defined as one that conforms with all of the recycling requirements imposed by both the state in which the community resides and by the State of Wisconsin.

The Act further created a solid waste capacity fee to be imposed on all out-of-state solid waste, with a few limited exceptions, disposed of or burned in Wisconsin after January 1, 1995. This fee is to be determined by the DNR annually based on a comparison of the capacity in Wisconsin and the state in which the solid waste is generated. This fee may range from no fee to $8 per ton.

In December 1994, the "effective siting program" requirement was ruled by a federal district court to violate constitutional interstate commerce protections. The federal court also struck down the requirement that out-of-state approvals go through a formal rulemaking process, but maintained the "effective recycling program" requirement in this ruling (Environmental Policy Alert, February 15, 1995). However, in August 1995, a federal appeals court ruled that the "effective recycling program" portion of the law is also unconstitutional because it impedes interstate transportation of waste.

Kane County may be able to export MSW into Wisconsin, depending on waste hauler's affiliation with Wisconsin landfills and the ease of procuring agreements. The other measures discussed above may still be used to limit waste from Illinois sources. The court's decision is not expected to result in an unrestricted flow of waste, according to state environmental officials and representatives of waste haulers. "The state expects to negotiate with the waste industry on legislation requiring recycling in some of the out-of-state communities which use Wisconsin landfills." (U.S. Supreme Court Will Not Reinstate Wisconsin Waste Law, Solid Waste Digest, Midwest Region, April 1996). The long-term viability of exporting waste from Kane County municipalities to landfills in Wisconsin is somewhat questionable.

2.1.3 Facility Closures

Kane County is located in Illinois Environmental Protection Agency (IEPA) Region 2. Assuming current disposal volumes and no additional capacity, the region's capacity is likely to be exhausted between the years 1998 and 2000 according to IEPA's Eighth Annual Report "Available Disposal Capacity for Solid Waste in Illinois" (IEPA Eighth Annual Report). At current disposal volumes, six of Region 2's active landfills are expected to reach capacity and close by 1998, another three landfills will reach full capacity by 2000, and seven will remain open after the year 2000. Proposed landfill expansions will extend the life of some of these landfills.

Furthermore, seventy-one percent of the Illinois counties are expected to be without a landfill or incinerator within three years. The number of active solid waste landfills in Illinois declined from 146 in 1987 to 59 in 1994. At current disposal volume and capacities, Illinois has between seven and nine years of remaining landfill capacity if no further capacity is added (IEPA Eighth Annual Report). Plans to expand some of those facilities further extend that deadline. Consequently, problems in waste handling capacity are more probable on a local or regional level within the next few years as demonstrated by the data for IEPA Region 2.

This trend of decreasing number of landfills can also be seen in Indiana. According to the IDEM Report, the number of publicly available landfills in Indiana decreased by 20% from 1991 to 1994. Please reference Tables 1, 2 and 3 for estimated landfill closure dates.

The following sections identify existing landfill facilities within a 200-mile radius of Kane County in Illinois, Indiana and Wisconsin. Planned facilities and projected capacities are also identified based upon currently available information.

2.2 Illinois

The State of Illinois had 59 active solid waste landfills in 1994. Of that number, 16 active landfills are located in IEPA Region 2 which includes Kane County. Figure 1 shows the landfill locations within Kane County and Region 2. Another three landfills are planned for the future; one each in Cook, Will and McHenry Counties. One landfill in Will County was temporarily closed but reopened in June 1996 (Wheatland Prairie, WMI). Kane County has two active landfills: Woodland Landfill near South Elgin and Settler's Hill Landfill in unincorporated Geneva Township. Approximately half of the waste accepted at these two landfills is from Kane County (Kane County Plan). Both landfills have available capacity to the year 2000 (Settler's Hill Landfill has current capacity until 2007).

Table 1 identifies the landfills within Kane County; outside Kane County, but within IEPA Region 2; and outside Region 2 within a 200 to 250 mile radius. Capacity and annual receipt information was obtained from IEPA's Eighth Annual Report. All projected closure years were calculated utilizing the remaining capacities and annual waste receipts from 1994. Approximately 17 landfills are projected to close by the year 2000; another 17 are projected to close between 2000 and 2005; and 22 are projected to remain active after the year 2005, assuming the planned expansions under review for the following landfills are approved; River Bend Prairie Landfill, Environtech, Inc. Landfill, BFI Zion Landfill, D&L Landfill, and Livingston Landfill. Figures 2A, 2B and 2C show the landfills within a 200 to 250 mile radius of Kane County including Illinois, Indiana and Wisconsin.

Those landfills with restricted service areas, or remaining capacities less than 150,000 tons (500,000 cubic yards), or annual receipts less than 150,000 tons (equivalent to about 1,700 cubic yards per day or 500 tons per day), or projected closure prior to the year 2000 are eliminated from further consideration in the Market Trends section of this document (Section 5).

2.3 Indiana

Within a 200 to 250 mile radius of Kane County, 22 landfills exist, or are planned in Indiana (See Table 2). Of these, twelve landfill facilities accepted out-of-state waste in 1994. Only seven had accepted MSW from Illinois. In 1994, only 7 percent of the waste disposed in Indiana facilities was out-of-state waste, and the majority of that came from Illinois (IDEM Report). Generally there has been a decrease of imports to Indiana. Refer to the discussion on Indiana under Section 2.1.2 Waste Export Issues.

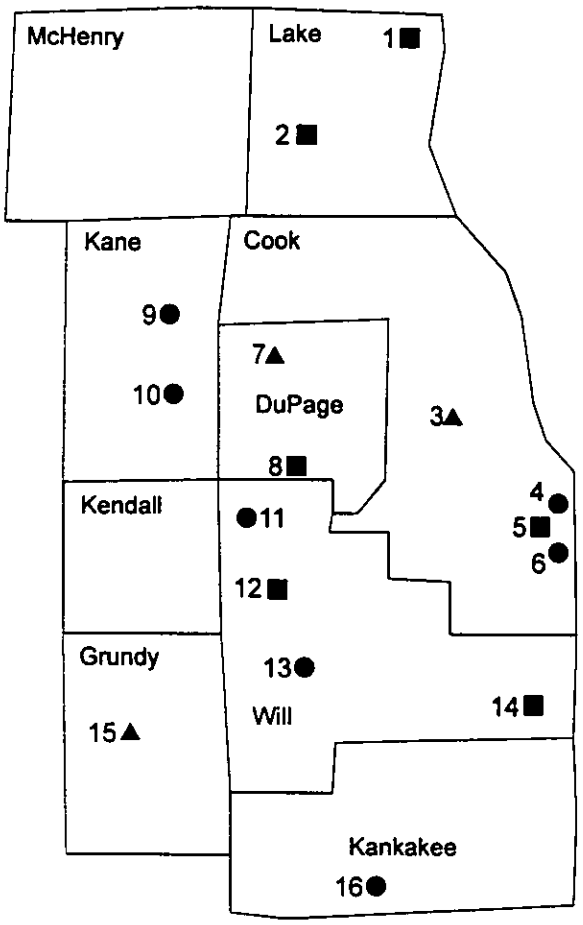
N

Not to Scale

Landfills

1. BFI #1
2. Countryside Landfill
3. Sexton #2
4. Land & Lakes #3
5. Land & Lakes / Dolton *
6. CID #1 and CID RDF #2
7. Mallard Lake
8. Greene Valley Landfill
9. Woodland Landfill
10. Settler's Hill
11. Wheatland Prairie Landfill
12. CDT Landfill
13. Laraway RDF (ESL, Inc.)
14. Beecher Development Co.
15. Envirotech, Inc.
16. Kankakee County RDF

* Renamed to River Bend Prairie Landfill



Reported Year to Reach Capacity

- ■ 1996 - 1997
- ▲ 1998 - 2000
- ● > 2000

Source: IEPA Eighth Annual Report

HDR Engineering, Inc.

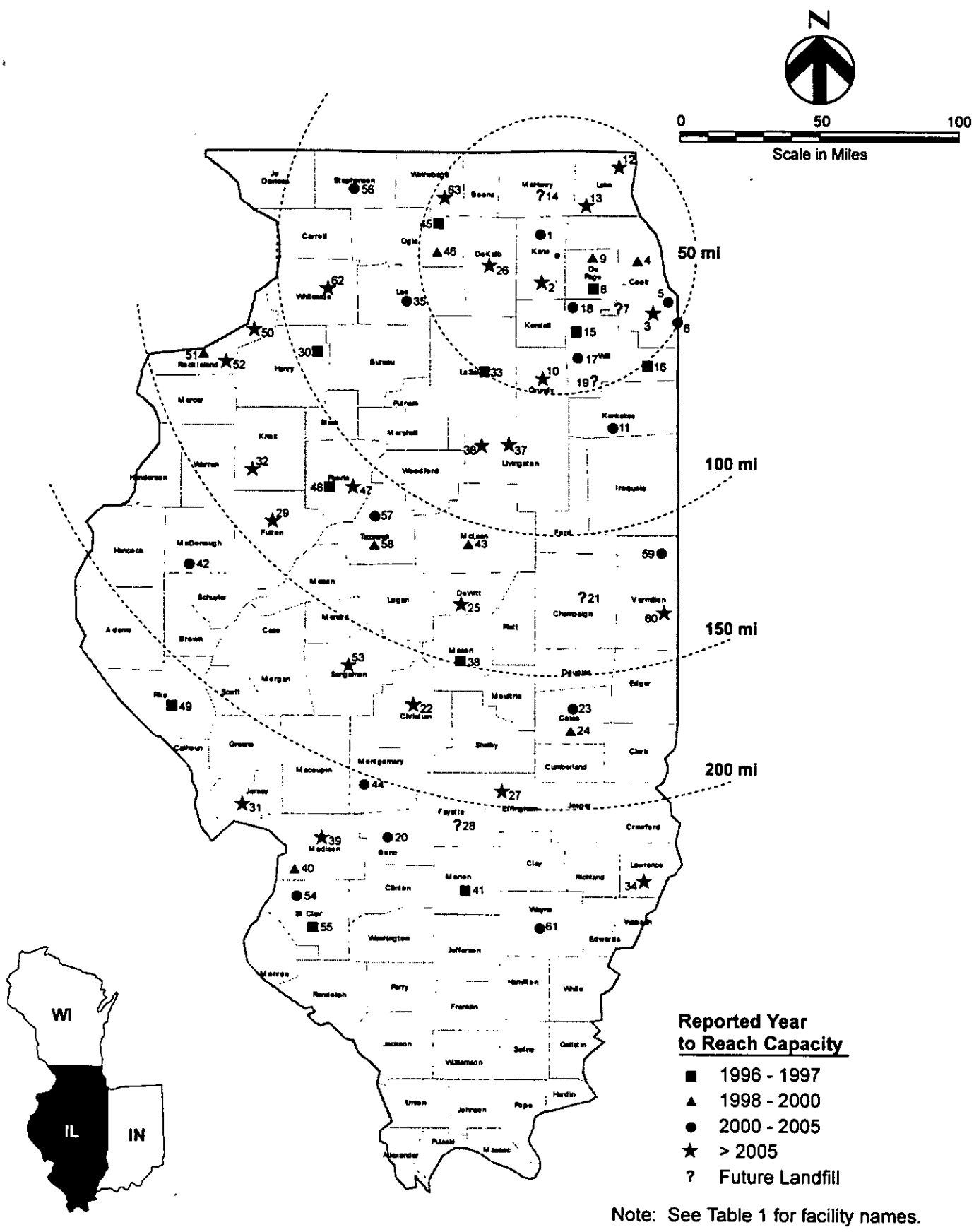
Region 2 - 1994 Active Non-Hazardous Solid Waste Landfills Subect to State Fee

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date: August 1996

Figure: 1

FIGURE1.cdr
X:\GB\FIGURES\KANECOUN; 08083-001-040-01
6-19-96



Note: See Table 1 for facility names.

HDR Engineering, Inc.

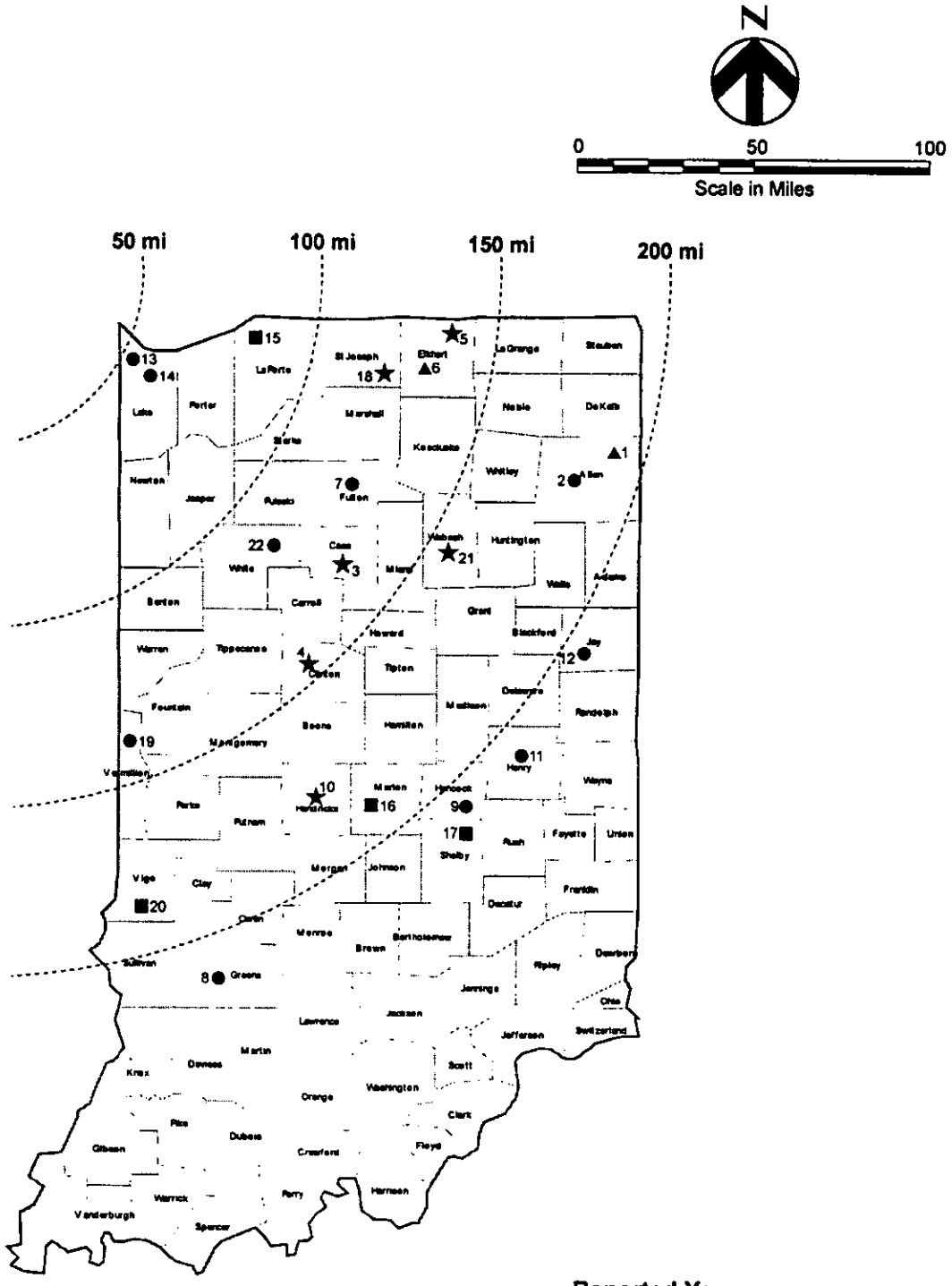
Solid Waste Landfill Facilities Within 200 Mile Radius - Illinois

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date: August 1996

Figure: 2A

FIGURE2A.cdr
X:\GIS\FIGURES\KANECOUN; 08083-001-040-01
6-19-96



Reported Year to Reach Capacity

- ■ 1996 - 1997
- ▲ 1998 - 2000
- ● 2000 - 2005
- ★ > 2005
- ? Future Landfill

Note: See Table 2 for facility names.

HDR

HDR Engineering, Inc.

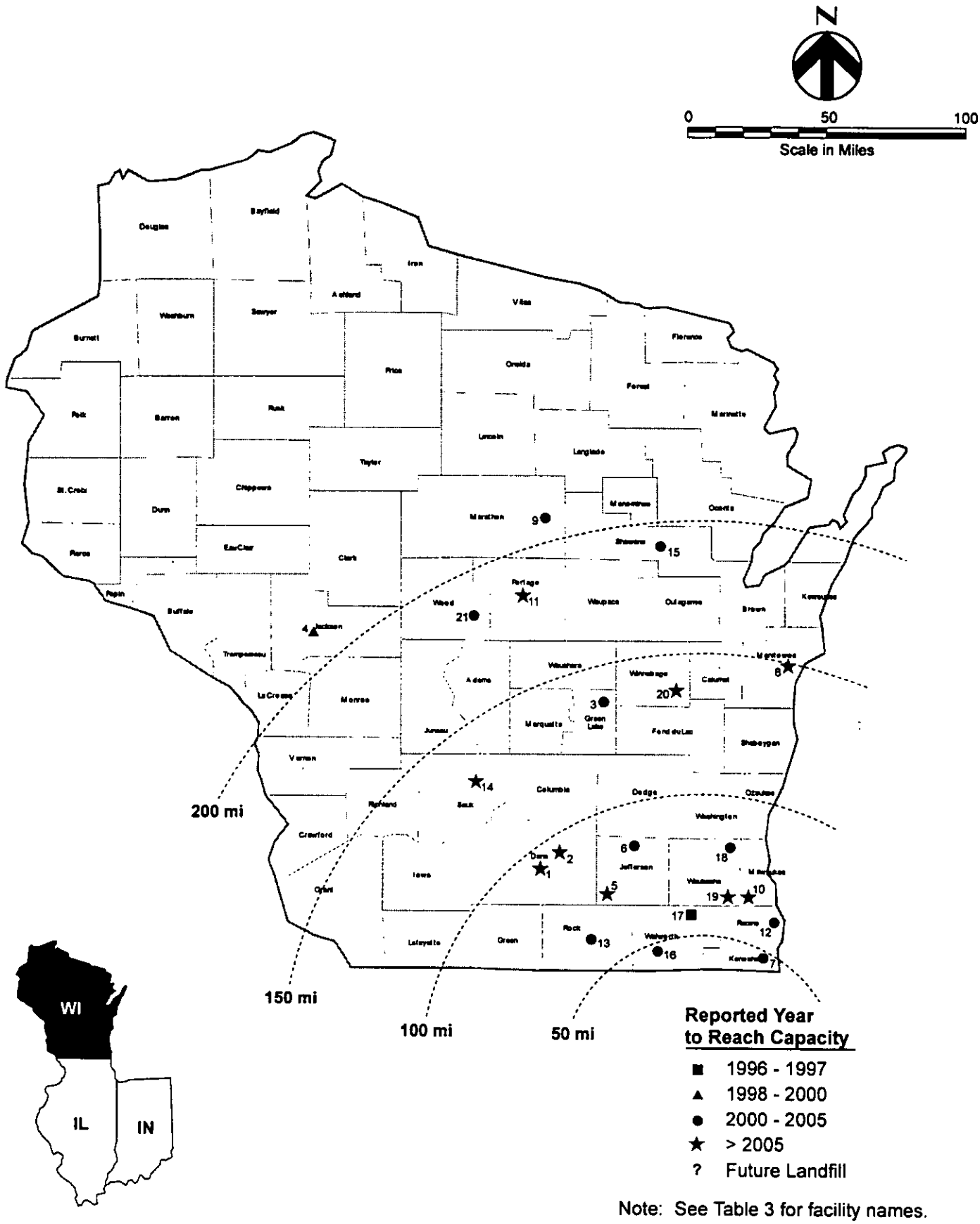
Solid Waste Landfill Facilities Within 200 Mile Radius - Indiana

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date: August 1996

Figure: 2B

FIGURE2B.cdr
X:\GB\FIGURES\KANECOUN; 08083-001-040-01
8-19-96



Note: See Table 3 for facility names.

HDR Engineering, Inc.

Solid Waste Landfill Facilities Within 200 Mile Radius - Wisconsin

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date: August 1996

Figure: 2C

FIGURE2C.cdr
X:\GIS\FIGURES\KANECOUN; 08083-001-040-01
6-19-96

Planned landfill expansions or new landfills are only known for landfills which have submitted an application to IDEM. Since 1994, three landfills listed on Table 2 have received an approved landfill expansion and applications for United Refuse Landfill and Victory Environmental-Yaw Hill Landfill are pending. Through other sources, HDR is also aware that LaPorte County plans to implement a new, 600-acre regional landfill. Also, a new landfill facility is planned in Lake County. However, no applications have been submitted to the IDEM for either facility. If any of the listed landfills plan a future expansion or counties plan a new landfill, then additional capacity may be available to Kane County.

Those landfills with restricted service areas, or remaining capacities less than 150,000 tons (500,000 cubic yards), or annual receipts less than 150,000 tons (equivalent to about 500 tpd or 1,700 cy/d), or projected closure prior to the year 2000 are eliminated from further consideration in the Market Trends section. The landfills eliminated include National Serv-All Landfill, Montgomery Landfill, Earthmovers Landfill, Hancock County Landfill, Hayes Landfill, Munster Landfill, LaPorte County Landfill, Caldwell Landfill, and West Clinton Landfill. Out of the remaining 13 landfills, only five have received Illinois waste in the past.

2.4 Wisconsin

The State of Wisconsin Department of Natural Resources (DNR) does not issue a report like the IEPA and IDEM. Very little information on facilities and status could be obtained at the state level. Only landfills with daily throughputs greater than 100 tpd were identified in Table 3. Many Wisconsin landfills are too small (i.e. accepting less than 100 tpd) to handle significant amounts of waste from Kane County.

Most of the data in Table 3 were obtained through direct telephone calls to the landfill operators. Most of the private landfills have not accepted MSW from out-of-state. Only three landfills indicated northeast Illinois in their service area which did not include Kane County. This does not exclude Kane County from potentially disposing of MSW in Wisconsin private landfill facilities. However, the available capacity may not be made available to Kane County.

Those landfills with known remaining capacities less than 150,000 tons (500,000 cubic yards), or daily receipts less than 500 tons per day, or projected closure prior to the year 2000 are eliminated from further consideration in the Market Trends section. As discussed in Section 2.1.2 Waste Exports, exporting waste to Wisconsin landfills may still be subject to restriction in the future.

TABLE 1

ILLINOIS LANDFILL FACILITIES										
County	Fig. ID#	Facility Name	Owner/Operator	Service Area[1]	Remaining Capacity (Tons)[2]	Annual Receipts (Tons)[3]	Projected Closure Year[4]	Tipping Fee ($/ton)[5]	Approximate Distance from Kane County[6]	Status
KANE COUNTY										
Kane	1	Woodland Landfill	WMI	Kane, DuPage, Cook, McHenry and other counties	1,860,000 *	402,930	2000	$41.25	0	
Kane	2	Settler's Hill Landfill	County owned/ WMI operated	Kane, DuPage, Cook, McHenry and other counties	4,140,000; * expansion 1,650,000	356,250	2007; 2012 with expansion	$37.13	0	landfill expansion proposal in litigation
REGION 2										
Cook	3	River Bend Prairie Landfill	Land & Lakes	Cook, DuPage & Will Co.	169,700;* expansion 3,240,000	113,500; project 600 tons/day	1997; 2017 with expansion	$41.25	53	landfill expansion submitted 1996 for local siting approval
Cook	4	Sexton #2 (Hillside Landfill)	Sexton Contractors, Inc.	Cook & DuPage Co.	1,435,900 *	450,000	1998	$36.63	37	
Cook	5	Land & Lakes #3 Landfill	Land & Lakes	Cook Co.	1,779,900 *	192,510	2003	$41.25	53	
Cook	6	CID #1	WMI	Spec. Haz. Waste from northeast Illinois	363,000	9	438 years reported remaining	$41.25	56	
Cook	6	CID RDF #2	WMI	City of Chicago & Cook Co.	833,200 *	171,780*	1999	$37.13	56	
Cook	7	*SWANCC Balefill*	public/private	Restricted to SWANCC member communities	11,385,000	NA	NA	Proposed $32.50	56	not open; pending legal action; need to get Corps of Engineer permits before submitting to IEPA
DuPage	8	Greene Valley Landfill	WMI	DuPage, Kane, Will and other counties	1,768,400 *	2,532,900	August 1996	$25.00	25	
DuPage	9	Mallard Lake Landfill	private	DuPage, Kane, Will and other counties	4,749,600	1,856,160	end of 1998	$26.40	15	
Grundy	10	Environtech, Inc. Landfill	private	Grundy, Will and other counties	360,000*; expansion 5,130,000	202,530	1998; 2023 with expansion	$31.19	51	landfill expansion under review for local siting approval
Kankakee	11	Kankakee County RDF	Public owned /private operated (WMI)	Restricted to County	1,140,000 *	124,860	2005	$34.32	61	
Lake	12	BFI #1/Zion Landfill	BFI	Lake, Cook and other counties	273,700; expansion 6,390,000	<900 tons/d	1996; 2020 with expansion	$33.66	67	landfill expansion submittal under IEPA review (approx. 6 more months)
Lake	13	Countryside Landfill	USA Waste Services, Inc.	Lake, Cook, McHenry and other counties (less than 1% from Kane)	441,900; expansion 10,800,000	343,600;1,080 to 1,200 tons/d	1996; 2028 with expansion	$38.94	32	Received landfill expansion permit September 27, 1995
McHenry	14	*Future landfill/balefill*	(per Solid Waste	Management Plan)	NA	NA	NA	NA	20-35	planned per SWMP
Will	15	CDT Landfill	private	Will Co. & northeast Illinois	420,000 *	463,020	1996	$36.76	31	potential landfill expansion
Will	16	Beecher Development Co.	private	Will Co. & northeast Illinois	630,000 *	341,610	1997	$25.15	66	
Will	17	Laraway RDF (ESL, Inc.)	private	Spec. Haz. Waste from northeast Illinois	353,500	32,640	2005	by Contract only	38	
Will	18	Wheatland Prairie Landfill	WMI	Will Co. & northeast Illinois	1,383,400	temp. closed		$32.00	19	Reopened in June 1996
Will	19	*Planned County Landfill at Joliet Arsenal*	County owned/ private operated	Will County Service Area	455 Acre Site	700,000 tpy (may be restricted to 500,000 tpy)	At least 20 years life	Region market rate	35	RFP stage: Anticipate open in 2000

TABLE 1 (Continued)

ILLINOIS LANDFILL FACILITIES										
County	Fig. ID #	Facility Name	Owner/Operator	Service Area[1]	Remaining Capacity (Tons)[2]	Annual Receipts (Tons)[3]	Projected Closure Year[4]	Tipping Fee ($/ton)[5]	Approximate Distance from Kane County[6]	Status
OUTSIDE REGION 2										
Bond	20	D&L Landfill Inc.	private	IEPA Region 6	27,000; expansion 2,700,000	30,060; Unknown after expansion	1996; >2000 with expansion	$23.10	220	landfill expansion under local review; no IEPA application yet
Champaign	21	*Future landfill*	(per Solid Waste	Management Plan)	NA	NA	NA	NA	110-140	planned per SWMP
Christian	22	Five Oaks RDF	WMI	IEPA Region 5	8,060,800	331,200	2017	$24.75	185	accessible or near rail lines
Coles	23	Environmental Reclamation Co.	private	IEPA Region 4	911,250	86,370	2005	$23.27	180	
Coles	24	Western Lion Ltd.	private	IEPA Region 4	220,800	24,090	1999	$16.50	190	
De Witt	25	Clinton Landfill #2	private	IEPA Region 4	2,897,500	206,610	2008	$22.28	130	
DeKalb	26	DeKalb County Landfill	WMI	Restricted to County	1,415,700	83,490	2011	$32.77	21	
Effingham	27	Landfill 33 Ltd.	private	IEPA Region 4	545,400	30,090	2012	$21.50	220	
Fayette	28	*Future landfill*	(per Solid Waste	Management Plan)	NA	NA	NA	NA	200	planned per SWMP
Fulton	29	Spoon Ridge Landfill	BFI	Regional-State of Illinois	5,092,200	160,930	2006-2026	$22.00	140	accessible or near rail lines
Henry	30	Henry County Landfill #2	private	Restricted to Village of Atkinson	37,600	19,840	1996	NA	100	
Jersey	31	RCS Landfill Inc. (new)	private	IEPA Region 5	1,515,700	< 126,000	2006	?	240	
Knox	32	Knox County Landfill #3	Public owned & operated	IEPA Region 3	814,100	32,730	2019	$22.50	130	
LaSalle	33	States Land Improvement #2 (Future)	private	IEPA Region 1	172,900	75,300	1996	$29.70	49	future new landfill planned per SWMP
Lawrence	34	Lawrence County Disposal Center	NA	IEPA Region 7	4,320,000	NA	NA	NA	240	IEPA Operating Permit received January 12, 1996
Lee	35	Dixon Municipal Grop #2	public owned/ private operated	IEPA Region 1	1,368,000	162,450	2002	$23.76	60	
Livingston	36	Streater Area Landfill	private	IEPA Region 4	1,263,000	2,400 to 26,700	2019	$22.00	64	
Livingston	37	Livingston Landfill	American Disposal	IEPA Region 4	1,276,500; expansion 14,400,000	425,490	1997; 2030 with expansion	$20.96	80	landfill expansion under IEPA review
Macon	38	Macon County Landfill #2 & #3	private	IEPA Region 4	469,400	225,810	1996	$22.00	155	plan landfill expansion per SWMP
Madison	39	Laidlaw Waste Systems-Roxana Landfill	Laidlaw Waste Systems	IEPA Region 6	4,637,800	148,320	2025	$21.00	240	
Madison	40	Chain of Rocks South Landfill	WMI	IEPA Region 6	1,977,350	341,010	2000	$29.33	250	
Marion	41	Salem Municipal #2 Landfill	private	IEPA Region 6	9,800	15,000	1995	$16.50	230	plan landfill expansion per SWMP
McDonough	42	Envirofil of Illinois, Inc.	private	IEPA Region 3	546,500	55,320	2004	$26.40	180	
McLean	43	Sexton M.C.L.	private	IEPA Region 4	570,100	90,330	2000	$24.75	80	plan new landfill per SWMP
Montgomery	44	Envotech Illinois, Inc.	private	IEPA Region 5	1,422,300	152,370	2003	$20.16	210	

TABLE 1 (Continued)

ILLINOIS LANDFILL FACILITIES

County	Fig. ID #	Facility Name	Owner/Operator	Service Area[1]	Remaining Capacity (Tons)[2]	Annual Receipts (Tons)[3]	Projected Closure Year[4]	Tipping Fee ($/ton)[5]	Approximate Distance from Kane County[6]	Status
Ogle	45	BFI Orchard Hills Landfill	BFI	IEPA Region 1	49,300	101,610	1995	$39.50	49	applied for new unit; under IEPA review
Ogle	46	Rochelle Municipal #2 Landfill	Public owned & operated	IEPA Region 1	504,300	79,860	2000	$45.00	37	
Peoria	47	Peoria-Disposal Co. #1	private	Special/Hazardous	500,200	25,200	2012	by Contract	115	
Peoria	48	Peoria City/County Landfill	Public owned/ private operator	IEPA Region 3	539,800	198,240	1997	$17.00	120	applied for new unit; under IEPA review
Pike	49	Pike County Landfill	private	IEPA Region 5	87,600	96,900	1995	$17.33	210	
Rock Island	50	Upper Rock Island County Landfill	private	IEPA Region 3	41,520; expansion 5,430,000	184,800	1995; 2024 with expansion	$19.00	110	received landfill expansion permit March 31, 1995
Rock Island	51	Watts Landfill	private	IEPA Region 3	684,900	172,410	1998	$21.45	135	
Rock Island	52	Quad Cities Landfill	private	IEPA Region 3	4,117,500	199,100	2015	$26.40	125	
Sangamon	53	Sangamon Valley Landfill	private	IEPA Region 5	2,967,150	56,220	2007-2025	$26.07	180	
St. Clair	54	Milam Landfill	WMI	IEPA Region 6	8,630,300	776,400	2005	$29.33	255	
St. Clair	55	BFI Modern Landfill	BFI	IEPA Region 6	510,150	198,930	1997	$30.40	260	
Stephenson	56	Freeport Municipal #4 Landfill	Public owned & operated	IEPA Region 1	342,100	41,730	2003	$35.00	80	plan new landfill & landfill expansion per SWMP
Tazewell	57	Tazewell County Landfill #2	WMI	Restricted to Tri-County Service Area	4,320,600	426,140	2004	$17.00	115	proposed landfill expansion
Tazewell	58	Pekin Metropolitan Landfill	private	IEPA Region 3	279,350	48,180	2000	$21.45	125	
Vermillion	59	Illinois Landfill, Inc.	private	IEPA Region 4	759,900	110,280	2001	$27.92	120	
Vermillion	60	Brickyard Disposal & Recycling	private	IEPA Region 4	5,929,700	144,300	2035	$23.93	140	
Wayne	61	Daubs #3 Landfill	private	IEPA Region 7	1,096,600	127,680	2003	$22.50	260	
Whiteside	62	New Prairie Hill Landfill	WMI	IEPA Region 1	14,940,000	NA	NA	NA	75-100	received IEPA Developmental Permit; has not applied for Operating Permit yet
Winnebago	63	Pagel Pit Landfill	private	IEPA Region 1	3,372,250	83,040	2022-2035	$58.00	56	plan landfill expansion per SWMP

Notes:

1 Service Areas for facilities are estimated from various reports, solid waste management plans, and IEPA Eighth Annual Report.

2 Remaining Capacity is from IEPA Eighth Annual Report, Available Disposal Capacity of Solid Waste in Illinois as of 12/31/94, unless noted otherwise by *. Gate cubic yards multiplied by 0.3 to convert to tons.

3 Assumes 1994 disposal will continue (IEPA Eighth Annual Report), unless noted otherwise by *. Gate cubic yards multiplied by 0.3 to convert to tons.

4 Calculated based on Remaining Capacity and Annual Receipts.

5 Tipping fee from the Solid Waste Price Index, Solid Waste Digest, Midwest Region, April 1996. Dollars per cubic yard multiplied by 3.3 to convert to dollars per ton.

6 Distances are approximate highway distances for landfills within 100 miles and straight line distances for all other landfills. Actual distances may vary depending on actual transportation routes.

[* Capacities as of 12/31/95 and annual receipts for 1995.]

TABLE 2

INDIANA LANDFILL FACILITIES

County	Fig ID #	Facility Name	Owner/Operator	Service Area[1]	Remaining Capacity (Tons)[2]	Annual Receipts (Tons/Year)[3]	Projected Closure Year[4]	Tipping Fee ($/ton)[5]	Approximate Distance from Kane County[6]	Status
Allen	1	National Serv-All Landfill	Private Landfill	IN, MI & OH	742,700	309,000	1998	$26.40	180	
Allen	2	United Refuse Landfill	Private Landfill	IN, MI & OH	464,500; expansion 1,625,000 tons	329,800	1998; 2003 with expansion	$30.86	180	landfill expansion application pending IDEM approval
Cass	3	Oak Ridge RDF	Private Landfill	IN	4,906,300	417,300	2010	NA	120	
Clinton	4	Montgomery Landfill	Private Landfill	IN	940,000	21,300	2010	$26.40	155	
Elkhart	5	Elkhart County Landfill	County Landfill	IN & MI	9,776,200	168,000	2015	$41.25	135	
Elkhart	6	Earthmovers Landfill	Private Landfill	IN & MI	1,055,000	206,100	1998	$21.45	135	
Fulton	7	County Line Landfill	Private Landfill	IN & IL	4,080,000	211,700	2005	$26.07	115	50% IL in 1994
Greene	8	Worthington Landfill	Private Landfill	IN & IL	2,294,500	157,600	2003	$29.70	230	12% IL in 1994
Hancock	9	Hancock Co. Landfill	Private Landfill	IN	134,000	27,400	2001	$26.40	210	
Hendricks	10	Twin Bridges RDF	Private Landfill	IN	3,165,400; expansion 14,572,560 tons	884,100	2002; 2018 with expansion	$24.40	190	landfill expansion application approved by IDEM 3/22/96
Henry	11	Hayes Landfill	Private Landfill	IN	443,100	90,000	2003	$28.05	220	
Jay	12	Jay County Landfill	Private Landfill	IN & OH	1,818,500	268,700	2002	$33.00	210	
Lake	13	Munster Landfill	Municipal Landfill	Munster	169,000	17,100	2001	$22.70	60	
Lake	14	Gary Sanitary Landfill	Municipal Landfill	IN & IL	NA	271,900	NA	NA	67	17% IL in 1994; 55% in 1993
LaPorte	15	LaPorte Co. RDF	Private Landfill (WMI)	IN & IL & MI	705,300	378,700	1996	$25.00	100	7% IL in 1994; 33% in 1993
Marion	16	South Side Landfill	Private Landfill	IN	4,548,700	438,700	2001	$30.29	200	
Shelby	17	Caldwell Landfill	Private Landfill	IN	200,600	92,800	1997	$28.38	225	
St. Joseph	18	Prairie View RDF	Private Landfill (WMI)	IN, MI & OH	1,694,800; expansion 2,950,000 tons	408,900	2000; 2007 with expansion	$28.38	122	landfill expansion application approved by IDEM 8/31/95
Vermillion	19	West Clinton Landfill	Private Landfill	IN & IL	110,000	30,200	2002	$40.00	155	34% IL in 1994
Vigo	20	Victory Environmental-Yaw Hill	Private Landfill	IN & IL	1,209,000; expansion NA	306,900	1997	$19.80	210	2% IL in 1994; landfill expansion application pending IDEM approval
Wabash	21	Wabash Valley Landfill	Private Landfill	IN, NY & PA	558,000; expansion 2,400,000 tons	197,300	1996; 2008 with expansion	$33.00	155	landfill expansion application approved by IDEM 4/4/96
White	22	Liberty Landfill	Private Landfill (USAWaste)	IN & IL	6,410,500	405,000	2005	$22.55	110	45% IL in 1994

Notes:

1 Service Area for facilities identified from IDEM Report only by state.

2 Remaining Capacity as of 1/1/95 from Summery of Indiana Solid Waste Facility Data: 1991-1994, IDEM Revised 7/95. Table 16 of IDEM Report indicate capacity as in-place cubic yards. Assumes an in-place density at 1,000 lbs/cy to convert to tons.

3 Assumes 1994 annual receipts will continue (IDEM Report).

4 Calculated based on Remaining Capacity and Annual Receipts and compared to the reported years remaining in the IDEM Report.

5 Tipping Fee from the Solid Waste Price Index, Solid Waste Digest, Midwest Region, April 1996. Dollars per cubic yard multiplied by 3.3 to convert to dollars per ton.

6 Distances are approximate highway distances for some landfills and straight line distances for all others. Actual distances may vary depending on transportation routes.

TABLE 3

WISCONSIN LANDFILL FACILITIES

County	Fig. ID #	Facility Name	Owner/Operator	Service Area[1]	Remaining Capacity (Tons)[2]	Daily Receipt Range (tons/day)[3]	Projected Closure Year[4]	Tipping Fee ($/ton)[5]	Approximate Distance from Kane County[6]	Status
Dar e	1	Dane County Landfill #2-Rodefeld	Dane County	restricted to Dane County	1,101,200 expansion	350	2011	$36.00	100	expansion approved
Dane	2	BFI Madison Prairie Landfill	BFI	Dane County-no municipal waste allowed	900,000	500-1,500	2011	$38.00	111	
Green Lake	3	Valley Trail	WMI-WI	Central Wisconsin	1,560,000 (2,310,000 tons permitted)	>1,000 (195,000 tons annually)	2003	$28.30	160	
Jackson	4	Jackson County Sanitary Landfill	Tom McNulty	Jackson County and Southeastern Wisconsin	67,500	60	1999	$43.00	220	
Jefferson	5	Valley Sanitation Co Inc. Landfill	Superior Services Inc.	Jackson, Dane, & Rock Counties	150,000; expansion 1,350,000	400	1999; 12 yrs. with expansion	$40.00	80	expansion application in feasibility study
Jefferson	6	Deer Track Park Inc. landfill	Sanill Inc.	Jefferson, Dodge, Dane, and Waukesha Co.	660,000; expansion 1,680,000	1,300	1998; 2003 with expansion	$30.00	98	expansion under review, n application submitted
Kenosha	7	Pheasant Run Recycling	WMI-WI	Kenosha, Racine & Walworth Co., WI; Lake & McHenry Co., IL	420,000 (2,100,000 tons permitted); expansion 5,000,000 Tons	>1,000 (800,000 tons annually)	1997; 2003 with expansion	$36.50	50	landfill expansion pending approval
Manitowoc	8	Ridgeview Recycling	WMI-WI	Eastern Wisconsin	420,000 (2,910,000 tons permitted); expansion 5,000,000 Tons	501-1,000 (500,000 tons annually)	1998; 2008 with expansion	$26.91	160	landfill expansion pending approval
Marathon	9	Marathon County Landfill	Marathon County	restricted to Marathon County	600,000	455	2005	$38.00	230	
Milwaukee	10	Metro Landfill	WMI-WI	Milwaukee Area; Restricted to in-state waste	720,000 (5,700,000 tons permitted); expansion 5,200,000 Tons	501-1,000 (750,000 tons annually)	1999; 2006 with expansion	$29.00	100	landfill expansion approved; pending detaile design and construction
Portage	11	Portage County Landfill	Portage County	restricted to Portage County	expansion 210,000	140	2006	$42.00	200	expansion to be completec in Aug' 96
Racine	12	Land Reclamation Landfill	Land Reclamation Company	Cook, Lake, Winnebago & McHenry Co., IL	597,300; expansion 2,369,700	>1,000; 379,000 tpy	1994; 2001 with expansion	$34.00	90	landfill expansion
Rock	13	Rock County/Janesville City	City of Janesville	restricted to Rock County	600,000	350	2000	$21.50	74	
Sauk	14	Sauk Co. Sanitary Landfill	Sauk County	restricted to Sauk County	195,000	85	2008	$40.00	130	
Shawano	15	Shawano City of Phase 2 Landfill	City of Shawano	restricted to Shawano County	45,000; expansion 214,950	72	2002	$45.00	200	expansion in feasibility study
Walworth	15	Mallard Ridge North	WMI-WI	Walworth Co., WI; Winnebago, Boone & northwestern McHenry Counties, IL	1,290,000 (1,560,000 tons permitted)	(225,000 tons annually)	2002	$25.00	60	potential for another landf expansion; nothing formalized at this time
Walworth	17	Troy Area Landfill	BFI	Walworth Co., WI; will not accept from IL	488,140; expansion 2,160,000	>1,000; (960 tons/day)	1996	$30.00	67	landfill closes July '96

TABLE 3 (Continued)

WISCONSIN LANDFILL FACILITIES

County	Fig. ID #	Facility Name	Owner/Operator	Service Area[1]	Remaining Capacity (Tons)[2]	Daily Receipt Range (tons/day)[3]	Projected Closure Year[4]	Tipping Fee ($/ton)[5]	Approximate Distance from Kane County[6]	Status
Waukesha	18	Parkview RDF/Orchard Ridge	WMI-WI	Northern Milwaukee to Green Bay	2,490,000 (2,790,000 tons permitted)	>1,000 (300,000 tons annually)	2004	$41.95	90	potential for landfill expansion; nothing formalized at this time
Waukesha	19	Emerald Park Inc.	Superior Services Inc.	Waukesha, Milwaukee, Racine, & Kenosha Co; as well as other counties	1,080,000; expansion 1,830,000	2,000	2002; 2011 with expansion	$20 - $35 (depending on material)	77	expansion in feasibility study
Winnebago	20	Winnebago County Sunnyview Landfill	Winnebago County	restricted to Winnebago County	1,500,000	800	2016	$29.00	160	county is looking for a new landfill site
Wood	21	Superior-Cranberry Creek Landfill	Superior Services Inc.	Wood County	390,000	400	2005	$37.50	200	expansion under review, no application submitted

Notes:

1 Service areas identified from various reports and the landfills.

2 Remaining capacity as of 12/31/95 as provided by the landfills. Gate cubic yards multiplied by 0.3 to convert to tons.

3 Daily Receipt Range as indicated in the Solid Waste Price Index, Solid Waste Digest, Midwest region, April 1996.

4 Projected Closure year calculated based on remaining capacity and years of life reported by the landfills.

5 Tipping fee from Solid Waste Price Index, Solid Waste Digest, Midwest Region, April 1996. Dollars per cubic yard multiplied by 3.3 to convert to dollars per ton.

6 These distances are approximate straight line distances. Actual distances may vary depending on transportation routes.

3. WASTE-TO-ENERGY FACILITIES

3.1 Illinois

3.1.1 Repeal of Retail Rate Law

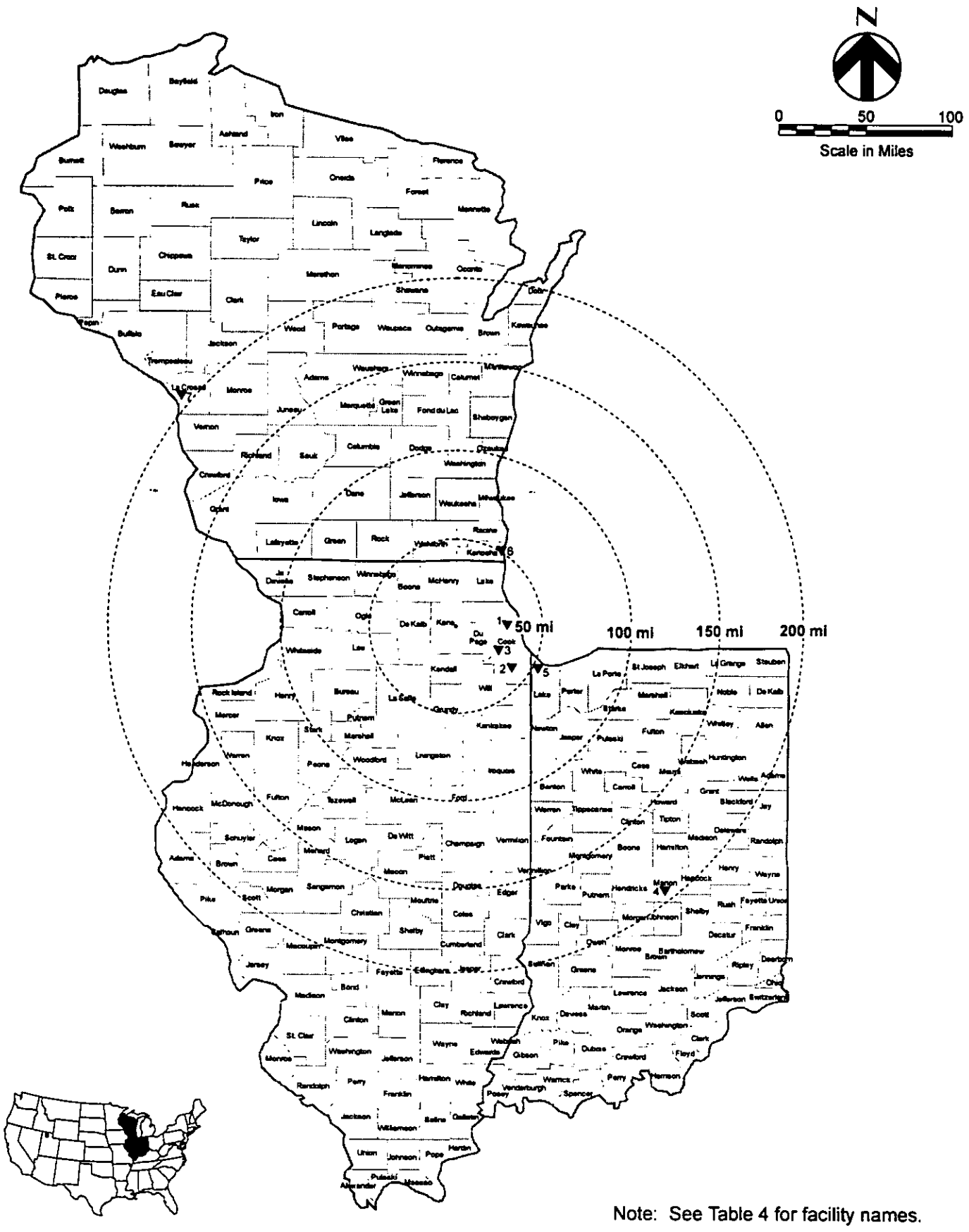
The Retail Rate Law, a provision of the Public Utilities Act passed in 1987 and enacted in 1988, provided state subsidies to encourage burning waste for energy rather than burying it in landfills. The Law required power companies to buy electricity from waste-to-energy facilities, paying the same rate as that paid by the municipalities in which the waste-to-energy facility is located. The State compensated the power companies for the higher cost of such purchases in the form of a dollar-for-dollar tax credit. The Law also allowed Illinois communities to sell bonds to build waste-to-energy facilities.

On February 1, 1996 the Illinois General Assembly passed a bill which repealed a large section of the Retail Rate Law. The bill removes the retail rate mandate on waste-to-energy facilities, but leaves protections for landfill methane burners intact. The governor signed the bill into law later in February 1996. Without the subsidy, it may be difficult for waste-to-energy facilities to compete with current landfill tipping fees in the state. The repeal of the Retail Rate Law will effectively stop any future development of waste-to-energy facilities for many years until such a time that landfill capacity becomes scarce and tipping fees increase substantially.

Some developers have threatened to file suit against the state. Foster Wheeler Corp., developer of the Robbins Resource Recovery Facility, and the Village of Robbins filed suit in the U.S. District Court for the Northern District of Illinois on March 26, 1996. The plaintiffs said repealing the law without "grandfathering" projects already financed "constitutes an unconstitutional impairment of pre-existing contracts and an improper and illegal confiscation of property without just compensation and without due process of law." The Robbins Resource Recovery Facility is discussed in the next subsection.

3.1.2 Facility Identification

Three municipal solid waste-to-energy facilities in various stages have been identified in the State of Illinois. Figure 3 shows the existing and proposed locations of these facilities. Table 4 provides detailed information for the waste-to-energy facilities. The Northwest Waste-to-Energy Facility in Chicago is currently closed. Another facility, the Robbins Resource Recovery Facility (RRRF) located in Robbins, Cook County, is under construction. The third facility, the West Suburban Recycling and Energy Center (WSREC) in McCook/Summit, had received local siting approval but was denied the IEPA permits.



Note: See Table 4 for facility names.

HDR Engineering, Inc.

Waste-to-Energy Facilities Within 200 Mile Radius

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date
August 1996

Figure
3

FIGURE3.cdr
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6-19-96

TABLE 4

WASTE-TO-ENERGY FACILITIES								
		Facility Name	Owner/Operator	Service Area	Capacity (TPD)	Tipping Fee ($/ton)[1]	Approximate Distance from Kane County	Status
ILLINOIS Cook	1	Northwest Waste-to-Energy Facility	City of Chicago	City of Chicago Department of Streets and Sanitation	640	no charge	30 miles	Closed in June 1996
Cook	2	Robbins Resource Recovery Facility	Village of Robbins/ Foster Wheeler & Reading Energy	South Suburbs of Cook Co. & Northeast Illinois	1,600	$56.74 (20 yr contract); spot market may be greater	50 miles	Under Construction; First burn in October 1996, Commercial operation in December 1996
Cook	3	West Suburban Recycling and Energy Center	West Suburban Recycling and Energy Center Lt.	West Cook Co. & Northeast Illinois	1,800	$70.00	30 miles	Received local siting approval but IEPA permits denied; under appeal. Still needs financing.
INDIANA Marion	4	Indianapolis Resource Recovery Facility	Ogden Martin Systems	City of Indianapolis	1,900	$25.00	200 miles	Operating; Retrofit by year 2000
Lake	5	Neutralysis Facility[2]	Neutralysis Industries Inc.	City of East Chicago, Lake County, NW Indiana & NE Illinois	600 (approx. 85% avail.)	Unknown	60 miles	Have not started permitting plant yet; Anticipate operations by year 2000
WISCONSIN Kenosha	6	Barron Incinerator	City of Kenosha	Kenosha	< 100[1]	$51.00	60 miles	Restricted
La Crosse	7	La Crosse Incinerator	Northern States Power	Assume La Crosse & Western Wisconsin	101-500[1]	$55.00	200 miles	Accepts RDF only; mixed burn with coal

Notes:
1 Tipping fee and Wisconsin capacity ranges from Solid Waste Price Index, Solid Waste Digest, Midwest Region, April 1996.
2 Neutralysis technology produces light weight aggregate with energy by-product.

Northwest Waste-to-Energy Facility

The City of Chicago owns and operates the Northwest Waste-to-Energy Facility (NWF). The NWF only receives waste from the City of Chicago Department of Streets and Sanitation; therefore, no tipping fee is charged. The waste delivered is residential waste from single family and multiple family buildings up to four units and a small amount of waste from other sources. The NWF has been operating since 1971. It utilizes waterwall boilers and electrostatic precipitators. The NWF was originally designed with four 400 tons per day (tpd) mass-burn boilers to process 1600 tpd of solid waste with 85% availability. In 1996, the plant accepted and processed less than 700 tpd on average.

The City of Chicago must either retrofit the NWF with modern incinerator and air pollution control equipment to comply with the new air emissions standards under the Clean Air Act, or close. The cost of retrofitting was estimated to be around $200 million. The City of Chicago has elected not to retrofit the NWF; and operations at the facility ceased in early June 1996.

Robbins Resource Recovery Facility

The Robbins Resource Recovery Facility (RRRF) will remove recyclables and non-combustible materials, produce refuse derived fuel (RDF), and burn the RDF for energy. The projected processing capacity of the RRRF is 1,600 tons per day (400 tpd recycled and 1,200 tpd incinerated). The RRRF will serve the northeastern Illinois region (Request for Siting Approval of a Regional Pollution Control Facility, Section 2 Need for the Robbins Facility, Robbins Resource Recovery Company, September 21, 1992). Currently, only 12 municipalities have committed waste through waste disposal contracts. Capacity is still available to private haulers, municipalities, and counties in the region through long-term waste disposal contracts or spot market. However, the company believes that all of the facility capacity will be committed by the time of commercial operations in December 1996. Table 4 summarizes the pertinent information for the facility.

The project developers of the RRRF are Reading Energy and Foster Wheeler. The recent repeal of the Retail Rate Law impacts the economic viability of the RRRF. The bond financing obtained to pay for the facility's construction was based on the energy revenues provided by the Retail Rate Law. Consequently, Robbins Resource Recovery Partners L.P. has reportedly reached a tentative agreement with the advisors to the Unofficial Committee of Bondholders for a restructuring of the bonds issued by the Village of Robbins. The projected tipping fee in 1997 is $56.74 per ton for those municipalities with waste disposal contracts. The repeal, in addition to area landfill closures, will likely increase the spot market tipping fee at this facility. Foster Wheeler will reportedly stand by its obligations as they are delineated in the Robbins Project Official Statement issued

November 15, 1994. Construction of the RRRF continues, with scheduled operation beginning during the fourth quarter of 1996.

West Suburban Recycling and Energy Center

The West Suburban Recycling and Energy Center (WSREC) is a proposed waste-to-energy facility with front-end recovery of recyclables to be located in McCook, Cook County. The owner/operator of the facility is a partnership, West Suburban Recycling and Energy Center Limited (WSREC-Lt). The primary sponsor in the partnership is Energy Answers Corporation. The entire project will be constructed in two phases. Phase one is a transfer station and material recovery of source separated recyclables and phase two is the waste-to-energy facility. WSREC-Lt has received an IEPA development permit for the transfer station and anticipate operations beginning early next year. The transfer station is permitted for approximately 2,100 tpd. The projected capacity of the waste-to-energy facility is 1,800 tpd. Total throughput for the combined facilities will not be greater than 21,700 tons per week.

The waste-to-energy facility received local siting approval but was denied IEPA air permits in December 1995. WSREC-Lt is appealing this decision to the Illinois Pollution Control Board and anticipate a resolution in late summer of this year. WSREC-Lt may also sue the State of Illinois regarding the repeal of the Retail Rate Law. When both of these issues are resolved, the WSREC will secure bond financing for construction of the waste-to-energy facility in mid- to late 1997. Kane County should not rely on this facility for near-term disposal capacity. Kane County should, however, continue to monitor the WSREC progress for future disposal capacity beyond the year 2000.

3.2 Indiana

The State of Indiana only has one waste-to-energy facility currently combusting municipal solid waste. The Indianapolis Resource Recovery Facility is located in Marion County and primarily serves the City of Indianapolis. Another facility, which will utilize neutralysis technology to process MSW into a light-weight aggregate and produce energy, is in the initial planning stage for a location in East Chicago, Indiana.

Indianapolis Resource Recovery Facility

The Indianapolis Resource Recovery Facility (IRRF) has been operating since 1988. The facility is owned and operated by Ogden Martin Systems. The IRRF has three mass-burn boilers, each designed to process 787 tpd of MSW. On average, the Indianapolis Resource Recovery Facility receives approximately 684,000 tons of solid waste annually (approximately 1,900 tpd). Of that amount, only about 1,600 tons were received from Illinois in 1994 (Summary of Indiana Solid Waste Facility Data: 1991-1994, Indiana Department of Environmental

Management, Office of Solid and Hazardous Waste Management, revised July 1995).

Currently, the tipping fee at the facility is $25 per ton. This is anticipated to increase by 30 to 35 percent by the year 2000 due to system modifications and retrofit of the air pollution control equipment to meet the Clean Air Act Amendments. Since the facility is approximately 200 miles from Kane County and has little available capacity for out-of-state waste, this facility is probably not a viable disposal market for Kane County.

Neutralysis Facility

The City of East Chicago has been discussing with developers (Neutralysis Industries Inc.) the possibility of constructing a neutralysis plant in Lake County since 1991. Neutralysis processes MSW to produce a light weight aggregate to be used in construction. Energy is a by-product of the process. In 1994, Neutralysis Industries Inc. acquired the old incinerator site in East Chicago on a lease basis. Currently a transfer station operates on this site to handle MSW from East Chicago and some from the City of Hammond. Neutralysis Industries Inc. is also permitted to build a material recovery facility and compost facility which will be integrated with the neutralysis plant. Permitting activities for the neutralysis plant have not yet begun. Preliminary capital construction costs for the plant range from $85 to $90 million. Neutralysis Industries Inc. hopes to have the neutralysis plant constructed and operating by the year 2000. The tipping fee is undetermined at this time. The plant will have a capacity of 600 tpd with only about 15 percent of that capacity (about 90 tpd) currently committed by the City of East Chicago. Available capacity will be offered first to Lake County and northwest Indiana, and then to northeast Illinois. A portion of this disposal capacity may be viable to Kane County, depending upon the tipping fee.

3.3 Wisconsin

The April 1996 issue of Solid Waste Digest for the Midwest Region indicates two waste-to-energy facilities in Wisconsin: the Barron Incinerator and the LaCrosse Incinerator. The Barron Incinerator is the only facility in Wisconsin combusting unprocessed MSW. Another MSW waste-to-energy facility, American Resource and Recovery in St. Croix, is closed. The Wisconsin DNR indicated that no new WTE operations have been approved in the state to date.

Barron Incinerator

The Barron Incinerator is located in Kenosha County and is operated by the City of Kenosha. This facility processes less than 100 tpd of MSW at a tipping fee of $52.00 per ton. Disposal capacity is restricted to Kenosha. This facility is not viable for Kane County.

La Crosse Incinerator

The La Crosse Incinerator is a combustion facility with mixed feed of RDF and coal located near La Crosse in La Crosse County. It is operated by Northern States Power. This facility processes less than 500 tpd at a tipping fee of $55.00 per ton. Because this facility is also located approximately 200 miles or more from Kane County it is not viable for Kane County.

4. TRANSFER STATIONS

Only the transfer stations within or near the borders of Kane County are feasible for transporting Kane County waste to remote landfill sites. The Speedway Disposal Transfer Station, located in Geneva, is the only transfer station in the County. The following contiguous counties have no IEPA permitted transfer stations: DeKalb, Kendall, Lake, and McHenry. Fourteen other transfer stations (in various stages of operation) are located within a 30 mile radius from the population centroid of the County.

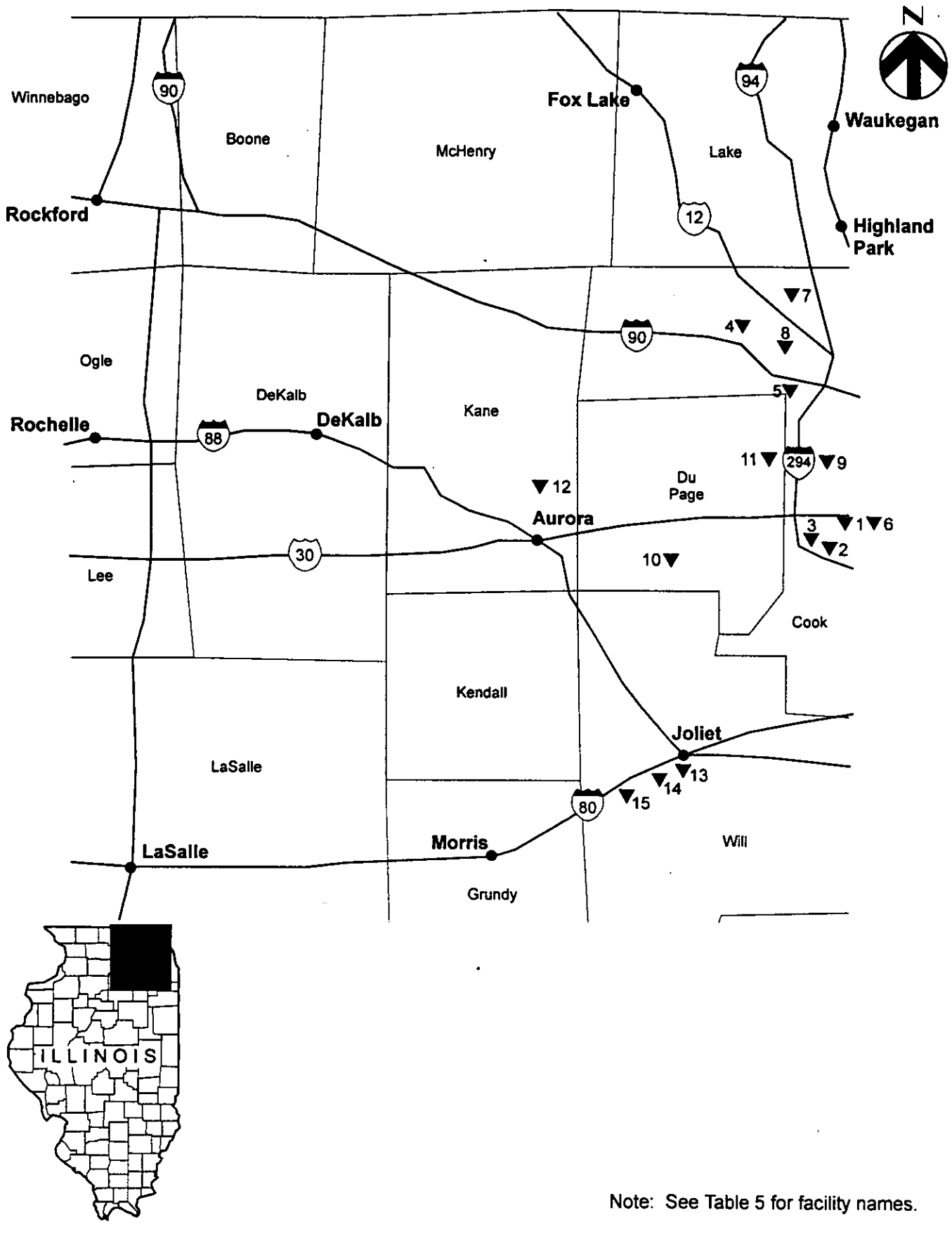
The nearest are the DuPage Yard Transfer Station, which receives only yard wastes, at 5 miles; BFI-ROT's Disposal Transfer Station, currently closed and waiting for approval to allow siting by County Board, at 18 miles; and the Rolling Meadows Transfer Station, which is restricted for village use only, at 19 miles. The remaining transfer stations all lie within a range of 20 to 30 miles.

When extensive waste exportation becomes necessary, due to the closure of Woodland and Settler's Hill Landfills, the County will require additional transfer station facilities to transport the County's waste to distant disposal facilities.

Table 5 provides information on the transfer stations within 30 miles of Kane County.

4.1 Transfer Costs

Tipping fees at Illinois transfer stations may range from $7.50 per cubic yard to $17.00 per cubic yard ($24.75/ton to $56.10/ton), according to the Solid Waste Price Index in Solid Waste Digest, Midwest Region, April 1996. Only 15 transfer stations were listed in this index which is only a small percentage of the total number of transfer stations in the state. The average tipping fee for these transfer stations was $39.00 per ton which includes transfer station operations, transportation and disposal fee. The disposal fees of facilities in the service area are identified on Tables 1 through 4. Typical transfer station operation costs may range from $7 to $12 per ton. Transportation costs are discussed below.



Note: See Table 5 for facility names.

HDR Engineering, Inc.

Transfer Stations Near Kane County

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date: August 1996

Figure: 4

FIGURE4.cdr
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6-19-96

TABLE 5

TRANSFER STATIONS

County	Fig. ID #	Facility Name	Private/Public	Service Area	Daily Permitted Capacity (tpd)	Average Daily Receipt (tpd)	Available Capacity (tpd)	Tipping Fee ($/ton)	Landfills Used	Average Landfill Tipping Fee ($/ton)	Rail Accessibility	Municipal Contracts	Status	Approximate Distance from Kane County (highway miles)
Cook	1	Niagara Recycling Manufacturers	private	Cook, Lake & DuPage Co.	NA	NA	NA	NA	NA	NA	NA	NA		25
Cook	2	Groot Industries, Inc.	Groot Disposal	No Restrictions	Unlimited	1,000	NA	$42.50	Settlers Hill/Dixon Landfill	$16-$20	Near rail line	Yes	Currently expanding	35
Cook	3	West Suburban Recycling and Energy Center	WSREC-Lt.	Cook, Lake & DuPage Co.	2,100	NA	2,100	$39-$42	Liberty Landfill	NA	NA	NA	Received IEPA Development Permit; Opens mid-1997	35
Cook	4	Rolling Meadows Transfer Station	City of Rolling Meadows	restricted to City of Rolling Meadows	NA	NA	NA	NA	NA	NA	NA	NA		26
Cook	5	Wheeling Township Transfer Station	Groot Disposal	NA	NA	NA	NA	NA	NA	NA	NA	NA		32
Cook	6	WMI Metro Transfer Station	Waste Mgmt. of Ill.	Greater metro area - No restrictions	No cap	800	NA	$49 - $54	Greene Valley/ Tazewell	$18 - $25	No	Yes		30
Cook	7	WMI - Northwest (Wheeling)	WMI	North and NW Suburbs - No Restrictions	2,200	1,200	1,000	$49 - $54	Woodland/ Greene Valley	$18 - $25	No	Yes		36
Cook	8	Arc Disposal Company	Arc Disposal Company	Cook and DuPage Co.	NA	NA	NA	NA	NA	NA	NA	NA		31
Cook	9	Melrose Park Transfer Station	BFI	Cook and DuPage Co.	3,000	NA	3,000	$36 - $46	Spoon Ridge	$25	Yes	NA	IEPA permit filed July 1996	28
DuPage	10	DuPage Yard Transfer Station	private	DuPage, Kane, South Cook, & North Will Counties	600 cubic yards per day	NA	NA	$11-15	NA	NA	NA	NA	receives yard wastes only: opens July '96	8
DuPage	11	BFI's-Rots Disposal	BFI	NA	NA	NA	NA	NA	NA	NA	NA	NA	legislation pending to allow siting by County Board	25
Kane	12	Speedway Disposal Transfer Station	Rex Disposal	Kane and DuPage Counties	NA	200	NA	NA	Settler's Hill Mallard Lake	NA	Near rail line	Yes		0
Will	13	CDT Services Transfer Station	CDT Transfer	City of Joliet & Will Co., portion of Grundy Co.	600	150	450	$15	CDT Landfill, Joliet	NA	have rail accessibility	none	opened in Jun '96	30
Will	14	Banner Western Transfer Station	private	City of Joliet & Will Co.	NA	NA	NA	NA	NA	NA	NA	NA	restricted for private use only	30
Will	15	Citiwaste Transfer Station	Citiwaste, Inc.	City of Joliet & Will Co.	NA	NA	NA	NA	NA	NA	NA	NA		30

Notes:
1. Information provided by transfer station owner/operator and supplemented by proposal information from neighboring counties.
2. NA - not available (information not provided).
3. Transfer station tipping fees may be lower in a competitive bid situation.

The costs of transporting waste can be divided into vehicle costs and labor. Vehicle costs include fuel, oil, tires, maintenance, insurance and depreciation. Labor costs are generally included as a per-hour cost. The transportation expense of transfer stations depends primarily upon trailer payloads and distances to landfills. The variable cost of fuel can impact future transfer costs. Increased transport costs would be passed on to the users. Assuming transfer trailer payloads of 20 tons, average hauling speeds, and other costs from HDR sources, transportation costs can be estimated. Based on these assumptions, the estimated transportation costs for transfer truck haul will vary for the following ranges in haul distances:

$ 0.15/ton-mile	up to 50 miles
$ 0.14/ton-mile	50 miles to 100 miles
$ 0.13/ton-mile	100 miles to 150 miles
$ 0.12/ton-mile	150 miles to 200 miles
$ 0.12/ton-mile	over 200 miles

These costs compare favorably with Envirodyne Engineers, Inc.'s estimated transfer cost of $0.15/ton-mile in 20-ton transfer trailers, developed for the Solid Waste Management Plan for South Suburban Mayors and Managers Association (SSMMA). Envirodyne also indicated that transfer haul is economically feasible when one-way hauling distances exceed 30 miles from the collection area. Transfer costs per ton-mile will differ somewhat between truck and rail haul. Rail haul becomes more economical over longer distances. Rail haul costs are difficult to determine without a defined system. Transportation issues with truck haul and rail haul are described below in Section 4.2.

4.2 Transportation Issues

As landfills become scarcer, long-distance hauling to disposal facilities will be even more common. The unavailability of local landfills; increasing land and construction costs, more stringent zoning and environmental protection codes, and public opposition to new local disposal facilities are reasons why long haul has become more prevalent. Concerns of transporting solid waste include containment of odors and control of vectors, such as birds, insects and rodents, during long hauls. Other considerations are the need to protect the MSW from rain, high temperatures, freezing temperatures, littering caused by wind during loading, transport, and unloading and drainage of moisture from the refuse. The greater the distance traveled, the greater the potential impact on the environment.

The planning, site acquisition, and contracting for services as well as the financing of a system for hauling solid waste to remote disposal sites will require time to implement. Truck and rail haul are two modes of long-distance transport to consider.

4.2.1 Truck Haul

Truck haul is the most common form of transporting solid waste. Transfer trailers provide hauling services to remote landfill locations not served by other forms of transportation. They are highly reliable and can accommodate breakdowns of operating equipment with little effect on the hauling system. Truck haul also lends itself to compacting equipment and allows changes to the transportation system or its destinations to be easily implemented.

Truck haul may impact traffic congestion on highways and through communities, the physical state of roads and bridges, and air quality with truck emissions. Exporting waste via truck creates other administrative costs. Local health departments along the transportation route must plan responses to possible accidents that result in spilling of solid waste. Also, increased truck traffic will increase the need for state safety inspections. As haul distances increase, a greater number of trucks are needed to make the trip. Other factors to consider in truck haul include:

- suitability of land use for the loading and unloading facilities;
- location of the disposal site;
- ordinances and zoning requirements for heavy use transportation facilities in the transportation corridor;
- local traffic impact, including road congestion, traffic patterns, and concerns over safety of hauling significant volumes of MSW over public roads;
- roadway deterioration; and
- compaction requirements.

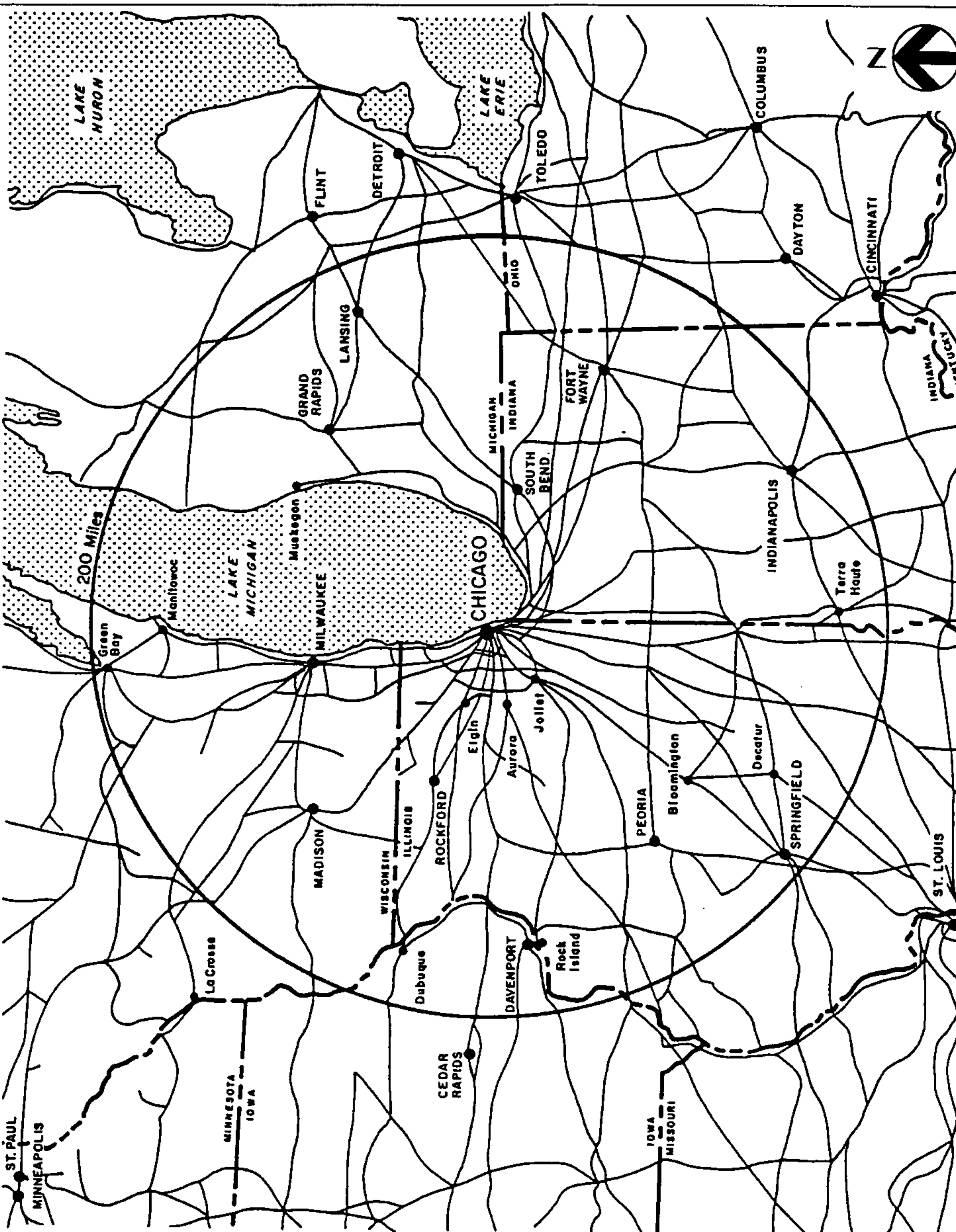
4.2.2 Rail Haul

Rail haul is one of the leading modes of transportation for the movement of bulk loads of freight, serving all major population centers. Rail lines may be considered for long-distance hauling of solid waste, because they typically pass through sparsely-populated and economically underdeveloped areas where available landfill disposal sites may be found. However, rail haul is less common for hauling solid waste because most landfills are not served by railroads. (See Figure 5 for Major Rail Lines Serving Chicago Area).

Three general options are available for hauling waste by rail:

- loose waste conveyor-loaded into hopper cars or box cars;
- baled waste forklift-loaded into box cars; and
- truck transfer trailers, piggy-backed onto flat cars.

Special cars, dedicated solely to carrying solid wastes, may be required to assure that the cars are consistently available and to meet environmental concerns. Both the hopper car and box car options require the construction of special handling facilities for loading and



HDR

HDR Engineering, Inc.

Major Rail Lines Serving Chicago

Evaluation of Waste Markets
Kane County Environmental Management Department
Kane County, Illinois

Date
August 1996

Figure
5

FIGURE5.cdr
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unloading the rail cars. In addition, the box car baling option requires a baling station and either a balefill operation or a bale breaking operation at the disposal site. These options also narrow the possible landfill disposal sites to those served by an existing railroad line, or those for which construction of a dedicated spur to serve the landfill would be feasible.

Rail haul can lessen road congestion and increase waste compaction by taking advantage of high railcar weight capacities. Factors to consider for rail haul include:

- accessibility of rail lines to landfill;
- intermodal requirements;
- difficulty to modify transportation system and its destinations;
- suitability of land use for the loading and unloading facilities (rail cars cannot be easily end loaded or unloaded);
- additional handling of MSW;
- flexibility and storage capacity in the transportation system to accommodate a systemwide shutdown or failure;
- compaction requirements;
- preparation and yarding time requirements, offset by an increase in average speed with distance of haul;
- complexity increasing with the number of different railroad companies involved in the route;
- scheduling delays associated with commuter train and priority freight traffic; and
- potential for accidental spills, while loading, unloading or en route.

Rail haul is generally not the most desirable mode of transport unless very long distances are involved or traffic considerations require it.

Some of the many variables affecting rail haul costs are the type of equipment (container, boxcar, gondola, etc.), use of dedicated equipment, ownership of the equipment (shipper or railroad company), number of railroads involved from origin to destination, volume of business on the same route, carrier's pricing philosophy and interest in transporting waste, duration of the contract and provision of a back-up truck fleet. Rail may involve significant expenditures for intermodal transportation if there is no existing accessibility to presently sited landfills. Maintenance costs for rail stock are borne by the railroad company. A detailed cost analysis cannot be conducted without a definitive system configuration of the facilities and the operational mode. Rail haul generally becomes more cost competitive with truck transport as the haul distance increases because of the very low variable costs (meaning little extra expense associated with longer distances).

THIS SECTION REVISED BY: Stuart H. Russell, P.E.

5. MARKET TRENDS

Since this Report was originally prepared in August 1996, Kane County has agreed to close the Settler's Hill Landfill by December 31, 2007. In September 1995 the County passed a resolution declaring that no new landfill would be developed in the County. These developments increase the likelihood that one or more transfer stations will be needed in Kane County.

5.1 Existing and Projected Tip Fees

Existing posted gate rates at 42 landfills within 200 miles of Kane County are shown on Table 6, updated to September 1997. It is important to note that many users of these landfills are charged less than these posted gate rates (i.e. discounting). These landfills are divided into three groups; Local Landfills (within 30 miles), landfills within 100 miles, and landfills beyond 100 miles of Kane County. Note that these tipping fees are generally lower as the distance from the Chicago metropolitan area increases.

Over the past 12 months, the published gate rates for local landfills and landfills within 100 miles of the County have generally remained unchanged, or have decreased. Only five of the nineteen landfills in this group had increases in rates. Both Kane County landfills have decreased rates over the past year by about two to five dollars per ton. The average landfill rates for facilities within 30 miles decreased slightly by $0.13/ton in the last year, while the average rate for landfills located between 30 and 100 miles distance increased slightly by $0.34/ton. Average rates for landfills beyond 100 miles distance increased by about $2.43/ton in the past year.

These rate reductions are a reversal of the trend of steadily rising rates for landfills in Illinois, Indiana and Wisconsin. Rates have risen at annual rates of between 2.5% to over 10% in these states from 1993 to 1996. The only exception was a decrease of 11.5% in landfill rates in Wisconsin in 1996 after two years of increases averaging over 10%. Moderation in the historical increases in gate rates at these landfills may be the result of competition for a shrinking waste supply. Solid waste intake at all landfills in Illinois decreased by about 2% from the second to third quarters of 1997. Although these decreases may be due to the success of waste reduction and recycling programs, some of the reduction is likely the result of the increased flow of solid waste into Indiana and Wisconsin landfills from the Chicago Metropolitan area.

Also shown in Table 6 is an approximation of a "Total System Fee" which includes the costs of transfer station operations and long distance transportation of the waste from Kane County to locations beyond the local landfill sites. These costs were calculated to approximate what municipalities in Kane County might expect to pay in 1997 to utilize these distant landfills. The transfer station and transportation costs were estimated based upon average costs for a 750 tons/day transfer station located in the County, utilizing industry standard design and operation factors, and standard long distance transfer equipment. These calculated Total System Fees range from about $37/ton to $72/ton depending upon distance and gate rate.

TABLE 6

1996 and 1997 LANDFILL COSTS BY DISTANCE							
County	Facility Name	Approximate Distance (miles)[1]	1996 Tipping Fee ($/ton)[2]	1997 Tipping Fee ($/ton)[2]	Transfer Station Fee ($/ton)[3]	Transportation Fee ($/ton)[4]	1997 Total System Fee ($/ton)[5]
LOCAL LANDFILLS							
Kane	Woodland Landfill	0	$41.25	$36.00	$0.00	$0.00	$36.00
Kane	Settler's Hill Landfill	0	$37.13	$35.00	$0.00	$0.00	$35.00
DuPage	Mallard Lake Landfill	15	$26.40	$34.00	$0.00	$0.00	$34.00
Will	Wheatland Prairie Landfill	19	$32.00	$35.00	$0.00	$0.00	$35.00
Will	CDT Landfill	31	$36.76	$31.68	$0.00	$0.00	$31.68
Lake	Countryside Landfill	32	$38.94	$40.00	$0.00	$0.00	$40.00
		AVERAGE	$35.41	$35.28	$0.00	$0.00	$35.00
LANDFILLS WITHIN 100 MILE RADIUS							
Kenosha, WI	Pheasant Run Recycling	50	$36.50	$38.58	$7.00	$7.44	$53.02
Grundy	Environtech, Inc. Landfill	51	$31.19	$30.00	$7.00	$6.98	$43.98
Cook	River Bend Prairie Landfill	53	$41.25	$41.25	$7.00	$7.25	$55.50
Cook	Land & Lakes #3 Landfill	53	$41.25	$41.25	$7.00	$7.25	$55.50
Walworth, WI	Mallard Ridge North	60	$25.00	$31.68	$7.00	$8.21	$46.89
Lee	Dixon Municipal Group #2	60	$23.76	$21.50	$7.00	$8.21	$36.71
Lake	BFI #1/Zion Landfill	67	$33.66	$33.66	$7.00	$9.17	$49.83
Waukesha, WI	Emerald Park Inc.	77	$30.00	$30.00	$7.00	$10.53	$47.53
Livingston	Pontiac Landfill	80	$20.96	$23.00	$7.00	$10.94	$40.94
Racine, WI	Land Reclamation Landfill	90	$34.00	$34.00	$7.00	$12.31	$53.31
Waukesha, WI	Parkview RDF/Orchard Ridge	90	$41.95	$41.95	$7.00	$12.31	$61.26
Jefferson, WI	Deer Track Park Inc. landfill	98	$30.00	$26.73	$7.00	$13.41	$47.14
		AVERAGE	$32.46	$32.80	$7.00	$9.58	$49.72
LANDFILLS BEYOND 100 MILE RADIUS							
White, IN	Liberty Landfill	110	$22.55	$22.55	$7.00	$14.22	$43.77
Rock Island	Upper Rock Island County Landfill	110	$19.00	$19.00	$7.00	$14.22	$40.22
Tazewell	Tazewell County Landfill #2	115	$17.00	$18.50	$7.00	$14.87	$40.37
Fulton, IN	County Line Landfill	115	$26.07	$28.38	$7.00	$14.87	$50.25
Cass, IN	Oak Ridge RDF	120	NA	$28.21	$7.00	$15.52	$50.73
St. Joseph, IN	Prairie View RDF	122	$28.38	$31.25	$7.00	$15.77	$54.02
Rock Island	Quad Cities Landfill	125	$26.40	$26.40	$7.00	$16.16	$49.56
De Witt	Clinton Landfill #2	130	$22.28	$24.75	$7.00	$16.81	$48.56
Elkhart, IN	Elkhart County Landfill	135	$41.25	$41.25	$7.00	$17.45	$65.70
Fulton	Spoon Ridge Landfill	140	$22.00	$22.50	$7.00	$18.10	$47.60
Wabash, IN	Wabash Valley Landfill	155	$33.00	$46.20	$7.00	$18.82	$72.02
Green Lake, WI	Valley Trail	160	$28.30	$29.10	$7.00	$19.43	$55.53
Manitowoc, WI	Ridgeview Recycling	160	$26.91	$27.78	$7.00	$19.43	$54.21
Allen, IN	United Refuse Landfill	180	$30.86	$30.86	$7.00	$21.86	$59.71
Christian	Five Oaks RDF	185	$24.75	$29.70	$7.00	$22.47	$59.17
Hendricks, IN	Twin Bridges RDF	190	$24.40	$25.90	$7.00	$23.07	$55.97
Marion, IN	South Side Landfill	200	$30.29	$35.90	$7.00	$24.29	$67.19
Jay, IN	Jay County Landfill	210	$33.00	$33.00	$7.00	$24.76	$64.76
Vigo, IN	Victory Environmental-Yaw Hill	210	$19.80	$34.82	$7.00	$24.76	$66.58
Greene, IN	Worthington Landfill	230	$29.70	$33.89	$7.00	$27.11	$68.00
Jersey	RCS Landfill Inc.	240	NA	$24.00	$7.00	$28.29	$59.29
Madison	Laidlaw Waste Systems-Roxana Landfill	240	$21.00	$22.50	$7.00	$28.29	$57.79
Madison	Chain of Rocks South Landfill	250	$29.33	$30.33	$7.00	$29.47	$66.80
St. Clair	Milam Landfill	255	$29.33	$30.33	$7.00	$30.06	$67.39
		AVERAGE	$26.62	$29.05	$7.00	$24.18	$60.23

Notes:

1. Approximate highway and straight line distances. Actual distances may vary depending on actual transportation route.
2. Posted Gate Rates from, Solid Waste Digest, Midwest Region, April, 1996 & September, 1997. 3.3 cubic yards per ton used for conversion.
3. Costs assume a 750 tpd transfer station of industry standard design and operation.
4. Assumes transfer trailer payload of 20 tons, average hauling speeds and other average cost factors. See Section 4.1 for cost per ton mile.
5. Sum of Tipping Fee, Transfer Station Fee, and Transportation Fee. Does not include collection costs.

It is possible that Kane County and its municipalities may be able to obtain transfer and disposal services at rates significantly lower that these calculated Total System Fees when the Settler's Hill Landfill closes. Transfer and disposal agreements negotiated within the past year demonstrate that significant discounts can be achieved when municipalities controlling large blocks of solid waste generation work together to competitively procure these services over a long-term period (10 to 20 years). The following are three examples.

West Cook County Solid Waste Agency (20 municipalities)

Agreement Date:	January, 1997
Term:	10 years
Contractor:	Waste Management of Illinois, Inc.
Landfill Location:	Pontiac Landfill (Livingston Co., IL), American Disposal
Transfer Station:	Metro Transfer Station (Stickney, IL)
1997 Contract Fees:	$32.55 per ton, escalated by CPI, capped at 5% per year

(Note: This arrangement and price will not go into effect until the WCCSWA completes an environmental audit of the Pontiac Landfill)

Solid Waste Agency of Northern Cook County

Agreement Date:	Revised June 1997	
Term:	20 years	
Contractor:	Groot Industries	
Landfill Location:	Pheasant Run Landfill (Kenosha Co., WI), WMI	
Transfer Station:	SWANCC Transfer Station (Des Plaines, IL)	
1997 Contract Fees:	$11.69/ton	Transfer Station Operation
	$7.69/ton	Transportation
	$21.57/ton	Disposal
	$40.95/ton	Total

(Note: Transfer Station and Transportation components escalate with inflation indices, Disposal component escalates with justified cost measures with a market "true-up" in the year 2000 limited to plus or minus 30%)

Will County

Agreement Date:	June 1997	
Term:	20 years	
Contractor:	Waste Management of Illinois, Inc.	
Landfill Location:	Joliet Arsenal (Interim Landfill: Tazwell Co. LF)	
Transfer Station:	Banner Western (Rockdale, IL) or TCD (Wilmington, IL)	
1997 Contract Fees:	$6.00/ton	Transfer Station Operation and Transportation
	$17.00/ton	Disposal
	$23.00/ton	Total

(Note: This Transfer and Disposal service is part of a 20-yr. contract to develop, construct and operate the Joliet Arsenal Landfill. This service is offered to Will County municipalities during the interim period until the landfill is put into operation. Disposal component is escalated by the market rate of selected area landfills.)

In addition, privately-owned transfer stations in Cook County are offering transfer and disposal services for prices in the $30/ton to $34/ton range, with some locations in Chicago offering rates as low as $22/ton to $27/ton. These low rates are indicative of the highly competitive nature of the private solid waste market in Cook County at the present time and represent short-term "spot market" rates. For these reasons, these rates may not be indicative of rates which may be available in Kane County. Based upon recently negotiated contracts, it is likely that if Kane County were to negotiate a similar contract, a 1997 rate of between $30/ton and $40/ton could be achieved.

It is difficult to predict the future costs for transfer and disposal of solid waste in out-of County landfills which may be available to Kane County and its municipalities. Table 7 makes an attempt at such a prediction based upon certain assumptions. It shows in the first column a projection of the current average published gate rates for local landfills over a 20-year period assuming that rates remain unchanged through 1998 (when Mallard Lake and Hillside are expected to close), then escalating at 5% per year through 2005, and 3% per year thereafter. For comparison, the next two columns represent the low and high end of a likely range of transfer and disposal costs available in a long-term competitively negotiated contract in 1997 escalated over 20 years at an assumed rate of 3% per year.

TABLE 7

PROJECTED LIFE CYCLE SYSTEM FEE COSTS ($/TON)			
		Out-of-Co. Transfer/Dispose Contract	
Year	Local Landfills	Low	High
1997	$35.28	$30.00	$40.00
1998	$35.28	$30.90	$41.20
1999	$37.04	$31.83	$42.44
2000	$38.90	$32.78	$43.71
2001	$40.84	$33.77	$45.02
2002	$42.88	$34.78	$46.37
2003	$45.03	$35.82	$47.76
2004	$47.28	$36.90	$49.19
2005	$49.64	$38.00	$50.67
2006	$51.13	$39.14	$52.19
2007	$52.67	$40.32	$53.76
2008	$54.25	$41.53	$55.37
2009	$55.87	$42.77	$57.03
2010	$57.55	$44.06	$58.74
2011	$59.28	$45.38	$60.50
2012	$61.05	$46.74	$62.32
2013	$62.89	$48.14	$64.19
2014	$64.77	$49.59	$66.11
2015	$66.72	$51.07	$68.10
2016	$68.72	$52.61	$70.14
2017	$70.78	$54.18	$72.24

Notes:
1. 1997 Average Cost from Table 6, unchanged through 1998, then escalated at 5% through 2005, 3% thereafter.
2. Low end of 1997 contract cost range escalated at 3% per year.
3. High end of 1997contract cost range escalated at 3% per year.

At the low end of the contract price range, the projected costs are significantly lower than the Local Landfill rates, while even at the high end of the range, the projected costs are almost the same after 2005.

5.2 Market Trend Factors

The two most important factors affecting future disposal market rates are competition; and supply and demand. In 1997, strong market competition exists, the supply of disposal capacity is plentiful, and the demand for that capacity (i.e. waste generation) is declining. This situation has led to steady, and in some cases, decreasing disposal rates. This situation may, however be temporary. Two more landfills in the region will be closing in the next year: Mallard Lake Landfill, DuPage County in mid-1998 and Hillside Landfill (Sexton/BFI), Cook County in late 1998. These closures, which reduce local capacity supply, may cause regional tipping fees for direct haul waste (excludes transferred waste) to increase at a rates slightly greater than the statewide average after 1998.

Changes in law and regulations also affect disposal rates. The promulgation of U.S. EPA Subtitle D regulations forced many small landfills across the country to close. Larger regional landfills replaced this capacity, but at a greater cost. Most of these greater costs (improved liner construction, more extensive groundwater monitoring, post-closure care, etc.) have been offset by the "economy of scale" of these larger landfills. Extra fixed costs can be divided over a much larger solid waste intake, thereby allowing steady, or even declining per ton rates. In addition, increased competition has forced many private landfill owners to accept lower profit margins by lowering per ton rates in order to attract waste flow. The promulgation last year of New Source Performance Standards for landfill gas emissions may also increase disposal rates somewhat for landfills required to implement gas collection systems. Other economic considerations such as financial assurance requirements, host community payments, surcharges, and environmental monitoring costs will also affect the final disposal rate.

Other factors that will affect future disposal rates at landfills are: i) health of the economy, ii) public acceptance for siting new landfills, iii) effectiveness of waste diversion and reduction programs, and iv) effect of exporting waste. Tipping fees may tend to increase as the national, state and local economies grow; as the siting of new facilities becomes more difficult; and as the quantity of waste exported decreases. Tipping fees will tend to decrease as the effectiveness of waste diversion and prevention programs increases. However, many of these waste diversion programs are maturing and the rate of increase in diversion will slow in future years.

As available disposal capacity is located further from the generation point, transfer costs will be incurred. Transportation costs to distant landfills may change quickly due to fluctuations in fuel costs. Other factors impacting transportation costs such as labor and vehicle capital costs have been relatively stable and typically increase at the rate of inflation.

6. CONCLUSIONS

The Woodland Landfill and Settler's Hill Landfill in Kane County are projected to be open to the year 2000 and 2007, respectively. In addition, the Mallard Lake Landfill in DuPage County, which takes a large amount of solid waste generated in Kane County, is scheduled to close in 1998. The average posted gate rates for these local landfills are approximately $35 to $36 per ton in 1997. However, anticipated closures of other landfills in the region may cause local direct haul (excludes transfer waste) tipping fees to increase at a greater rate than inflation over the next several years.

By the year 2000, Kane County will need to find disposal capacity for that portion of the waste stream that currently goes to the Woodland Landfill and the Mallard Lake landfill. This waste may either be redirected to Settler's Hill Landfill, or transferred to an out-of-county disposal facility. When Settler's Hill closes in 2007, Kane County will begin to transfer all of its waste to out-of-county disposal facilities. Disposal facilities can include waste-to-energy facilities and landfills. Few waste-to-energy facilities are projected to be in operation and the majority of the capacity may be committed by the time these facilities begin operations. Additionally, the projected tipping fees at the only waste-to-energy facility within a reasonable distance (Robbins) will be higher than landfills for several years. On the other hand, numerous landfills within the State of Illinois will have capacity beyond the year 2000, and are reasonably priced. Landfills in Indiana and Wisconsin are also available.

In order to haul wastes to distant landfills economically, Kane County will require waste transferring capability. Currently, only one transfer station, the Speedway Disposal Transfer Station, is located within Kane County. Most of the transfer stations listed in Table 5 are located too far away from Kane County to be economically useful. The new transfer station proposed by BFI and given Local Siting approval by DuPage County near West Chicago will provide a convenient location for portions of eastern Kane County, however this facility will not effectively serve the entire County. BFI has not yet received development or operating permits from the Illinois EPA for this site. Additional transfer stations may be necessary in Kane County. Two to three years should be allowed for proposals, siting, permitting and construction of the transfer station(s) prior to the landfill closures.

It is likely that the County, or a group of municipalities can negotiate a long-term contract to transfer and dispose of solid waste generated in the County for rates which can minimize any additional cost over the present local landfill system, or possibly achieve rates lower than current local landfills. Others in the Chicago metropolitan area have been successful in doing so.

APPENDIX C

Public Comment