Champaign County Solid Waste Management Plan

PART III
RECYCLING

Prepared by the
Intergovernmental Solid Waste Disposal Association
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Introduction

The enactment of the Illinois Solid Waste Management Act (P.A. 84-1319) in September of 1986 clearly established the public policy commitment to change and improve the management of solid waste. The purpose of the Act was to foster a more effective and efficient approach to solid waste management which not only protects the public health and environment, but also promotes economic development. More specifically, according to Section 2(b) of the Act:

> It is the purpose of this act to reduce reliance on land disposal of solid waste, to encourage and promote an alternative means of managing solid waste, and to assist local governments with solid waste planning and management. In furtherance of those aims, while recognizing that landfills will continue to be necessary, this act establishes the following waste management hierarchy, in descending order of preference, as State policy:
>
> 1) volume reduction at the source;
> 2) recycling and reuse;
> 3) combustion with energy recovery;
> 4) combustion for volume reduction;
> 5) disposal in landfill facilities.

This was a significant call for change since in the same year, the Illinois Environmental Protection Agency estimated that 95% of the solid waste in Illinois was landfilled with 3% being incinerated and only 2% being recycled.

The articles of incorporation for the ISWDA (July, 1986), which pre-date the Illinois Solid Waste Management Act, also indicate a preferential approach for recycling. The preamble of the "Agreement and General Plan for Development of Solid Waste Disposal Facilities and Programs and Creation of the Intergovernmental Solid Waste Disposal Association" established the following solid waste goals for the member governments of the ISWDA:

(1) That solid waste should be looked upon as a resource of the community to

use and not as a "problem."

(2) That the volume of solid waste generated be reduced to the maximum feasible extent by promotion of alternative solid waste reduction strategies.

(3) That materials and energy (in optimum proportions) be recovered from the solid waste stream to the maximum extent possible.

(4) That need for agricultural land for solid waste disposal be minimized (to accommodate only the irreducible remainder of solid waste otherwise disposed of).

(5) That the recovery of energy and materials from solid waste and the disposal of the irreducible remainder be accomplished by use of environmentally sound technologies.

(6) That the implementation of the long-range plan for the disposal of solid waste be based on obtaining as great control of the waste stream as is practically and legally possible.

In addition to these goals, the ISWDA specifically commits its members to establish recycling programs. The Association Agreement requires that these programs, at a minimum, include:

(a) the curbside collection of glass, aluminum, tin and bi-metal cans and newspapers in the Cities, and at minimum, the drop-off collection of such materials at a minimum of six (6) sites in the unincorporated areas of the County or any municipalities under 3,000 in population in the County, provided that there exists, at the time of any such collection, an economically viable market for selling any such material for recycling,

(b) regular collection, and

(c) promotional and educational programs.

This same portion of the Association Agreement also states that the City of Urbana will provide (until provided for by the Association) the use of certain land for the disposal and reclamation of landscape waste. The requirements to establish these recycling programs have all been met by the members of governments of the ISWDA.

Types of Recycling Programs

Recycling programs consist of four elements: collection, promotion, processing, and material marketing. Collection is the most visible of the four elements and therefore receives the most attention when recycling is discussed. Recycling collection has many of the same characteristics as garbage hauling. Since most collection programs require that recyclables be separated (to lower processing costs) special vehicles having segregated containers are required. Several different varieties of commercial recycling collection vehicles are available, some geared toward collection and unloading efficiency while others emphasize lower capital costs.

Materials collected in a recycling program must be processed (sorted and "packaged") locally through the equivalent of a transfer station. The collected materials are sorted, if necessary, assembled, packed into marketable volumes, and transferred to markets as secondary materials. A recycling collection program cannot exist without an intermediate processing facility since it is not feasible to transport recyclables collected directly to the materials market.

Participation in recycling programs can be either voluntary or mandatory. Most recycling programs begin with voluntary participation. Voluntary recycling is a value-driven program; it either reflects an already strong commitment to environmental values or it is based on a commitment by elected and other community leaders to increase environmental awareness and encourage residents to accept those values as community values. The incentives to participate in voluntary residential recycling collection comes from a personal value system.

Mandatory recycling programs work on a legislative basis. Mandatory programs can not guarantee a higher participation rate than voluntary programs, although compliance rates are determined by the enforcement mechanisms used. Typically, local ordinances that

require participation in the program use fines or refusal of garbage collection as the punitive measure. However, if these compliance provisions are not enforced, participation rates are not appreciably better than for voluntary programs.

Nationally, most curbside collection programs are operated on a voluntary basis. However, mandatory programs consistently provide higher participation rates than voluntary programs. In 1988, the National Solid Waste Management Association (NSWMA) surveyed 26 voluntary curbside programs and found the average participation rate to be 35%. This was compared with participation rates of 55% for 13 mandatory programs. This pattern appears to be consistent with any type of collection program frequency. In a report to the City of San Francisco in 1987, the pattern of participation was found to consistently favor mandatory programs irrespective of the frequency of service provision. As shown in Table 1, weekly voluntary programs average a 45% participation level while the weekly mandatory programs average a 74% participation level. For biweekly or monthly programs, mandatory participation levels remain higher than the voluntary levels; 49% to 31% respectively. Participation is enhanced by promotion efforts which may involve nontraditional methods that may seem unconventional for municipal public relations. Promotion activities are often integrated with and reinforced by the collection operation.

Materials marketing is a highly specialized function requiring experience and sound business judgement. Normally, materials are sold either on the open market or by way of long-term contracts with a specific dealer or manufacturer. Income from material sales can vary significantly depending on the economy and the availability of particular markets within economic hauling distance.

TABLE 1

Comparative Participation Rates For Municipal Recycling Programs

Weekly Programs

Voluntary	Participation Percent	Mandatory	Participation Percent
Beaverton, OR	10%	Islip, NY	40
Charlotte, NC	18	Montgomery County, MD	50
Madison, WI	25	Dover, NJ	70
Albany, OR	26	Longmeadow, MA	80
Ann Arbor, MI	30	Groton, CT	85
Corvallis, OR	40	Woodbury, NJ	90
Austin, TX	50	Berlin, NJ	90
El Cerrito, CA	50	Hamburg, NY	98
Marin County, CA	50		
Monroe County, PA	52	**Average**	**74%**
San Jose, CA	57		
Sunnyvale, CA	58		
Springfield, PA	65		
Davis, CA	80		
Kitchener, ON	80		
Average	**45%**		

Biweekly or Monthly Programs

Voluntary	Participation Percent	Mandatory	Participation Percent
Bend, OR	4	Monroe Township, NJ	25
El Paso, TX	5	Manitowoc County, WI	30
Grand Rapids, MI	10	Barrington, RI	35
Port Townsend, WA	13	St. Cloud, MN	44
Bellingham, WA	19	Montclair, NJ	77
Minneapolis, MN	19	Roxbury, NH	85
Naperville, IL	28		
Berkeley, CA	30	**Average**	**49%**
Richfield, MN	35		
Santa Monica, CA	35		
St. Louis Park, MN	40		
Burbank, CA	50		
Boscobel, WI	60		
Los Altos, CA	65		
Average	**31%**		

Source: Resource Conservation Consultants, 1987. "Proposal for a Residential Recycling Plan", presented to the City and County of San Francisco, September 21, 1987. Portland, Oregon, RCC.

There are several different ways in which recyclables, whether separated on a voluntary or mandatory basis can be collected. These types of programs include:

- Drop-off;
- Buy-Back;
- Source Separation;
- Post Collection/Centralized.

Drop-off Programs

A drop-off program requires residents to bring their recyclable materials to a specified drop-off or collection center. This program is the easiest to implement and generally less expensive because of reduction in labor and collection expenses. It can be as simple as a single material collection center or as complex as a fully staffed multi-material collection center. Low participation can be a problem with this program for several reasons. The primary reason is that the citizens are responsible for separating their recyclable materials and taking them to the drop-off center themselves. An additional reason is that, the drop-off centers are not always in the most convenient locations, therefore, the residents may not go often which would require them to store the materials in their homes. To encourage participation, most successful drop-off programs try to make the collection center as convenient as possible. For example, they use local transportation areas or grocery stores -- places the residents are likely to go frequently, in order to improve the convenience of use. Another approach is to use mobile collection centers which provide a greater flexibility in location.

Buy-Back Programs

A buy-back program generally increases participation by providing a financial incentive for recycling. In this type of program, the residents are paid for their recyclables. Most programs will pay cash for the recyclables the residents bring into the drop-off center. However, in some parts of the country, residents who take recyclables to local drop-off centers receive a credit deduction against the standard per month charge for disposal

service. The prices and types of material accepted vary between buy-back programs as well as fluctuating within a single program. Market forces are especially obvious in buy-back programs in terms of which materials are accepted and the prices paid for those materials.

Source Separation or Curbside Collection

Source separation, or curbside collection, is generally a more effective method of collection than the drop-off program. Due to the increased labor and equipment costs, this approach is more expensive, however, the yield of material is much higher. The convenience of a reliable collection system invites greater participation. In general, curb-side programs that require households to separate their waste into too many different categories will have lower participation. Typical categories include: newspaper, colored glass, clear glass, aluminum cans, tin cans, and corrugated cardboard. However, other materials such as plastics and used motor oil can also be collected. Participation is almost always enhanced if the residents are provided with special containers for each category. Other factors influencing participation are: frequency of collection (once a week to once a month) and scheduling of service (the same day as garbage service or a different day). The population density of the area should also be taken into account when considering this type of program.

Post Collection

A post collection or centralized separation system can act as a back-up to curbside collection programs or totally remove recycling responsibilities from the individual household. The recyclable materials can be separated at a resource recovery facility either manually or mechanically. Mechanical separation is usually associated with refuse derived fuel (RDF). It can also become very expensive due to high capital costs and the incomplete or low quality of the material recovered. Manual separation offers more complete separation and more jobs to the community, but the labor can be costly. Some combination of both manual and mechanical separation is usually the most productive.

Existing Public Recycling Programs in Champaign County

Current public recycling programs in Champaign County use three of the four collection options discussed - drop-off, buy-back, and curbside. All three programs operate on a voluntary basis. The first modern recycling efforts in Champaign were begun by citizens groups in 1970. In 1978, the Community Recycling Center (CRC) was founded. The next year, the Cities of Urbana and Champaign began to provide direct financial support to CRC from revenue sharing funds. The City of Champaign also leased its old public works garage to the CRC. This represented the first direct local government involvement in recycling. The 1983 Champaign-Urbana Solid Waste Disposal System (CUSWDS) contracted with the CRC to provide recycling in the two Cities. This effort was supported through a $.24 per cubic yard surcharge on the Urbana landfill gate fee. This surcharge continued until the closure of the landfill operated by the CUSWDS, in November of 1988.

The Association Agreement mandates financial support of the CRC by the members. This was implemented through contracts between the member governments and the CRC, which provide for processing and marketing recycled materials collected through the member government programs. Public investment has included a one-time financing of capital improvements to the CRC's processing facilities in the amount of $179,220 which was paid over a three year period. There is also a five year operations and recycling program support contract in the amount of $174,000 annually. Currently, each member government contributes one-third of the $174,000 contract for CRC. This commitment is due to end in November of 1991.

Municipal Programs

The City of Champaign operates Reeecycle, which provides weekly, voluntary curbside service to 14,500 single-family through fourplex households. This program is a four material program: newspaper, cans, (aluminum and food), glass (clear and colored) and

high density polyethylene plastic (HDPE). The service is provided by a local waste hauler under contract to the City. During the first full year of operation (1987), 700 tons of recyclable materials were collected. In 1988 the tonnage was 951, a 35% increase. Initially, the City did not provide containers to all eligible households as part of a study. However, the results of the study showed a dramatic rise in participation when containers were provided, so the City intends to complete distribution of two containers to all eligible households by early 1990. Figure 1 shows the recycling zones in Champaign.

Urbana operates U-Cycle, a weekly, voluntary service which provides two 5-gallon plastic pails, one for glass containers and one for cans, free to all eligible Urbana residents. Their There are approximately 7,900 eligible households in the city. Newspapers are bundled or placed in grocery bags. The recyclable materials are collected by a public works crew. Urbana's curbside pickup program was the first municipally operated program in Illinois. In 1987, 575 tons of recyclables were collected through the U-Cycle program. The 1988 tonnage was 645, an increase of 12%. Urbana collected HDPE plastic on a trial basis and discontinued the collection due to its low market value and consumption of collection space on the U-Cycle vehicles. Figure 2 shows the U-Cycle zones.

The County has developed a rural drop-off program, called Hometown Recycling. By the end of 1989, there were nine drop-off sites: Tolono, Mahomet, Thomasboro, Sidney, Gifford, Homer, Fisher, St. Joseph and Ogden (see Figure 3). At each site there is one 15 cubic yard container subdivided into three compartments screened by fencing made of recycled plastic. The materials accepted include glass, HDPE, newspapers and cans. Materials are then collected from the sites by the Community Recycling Center under a 5-year contract with the County.

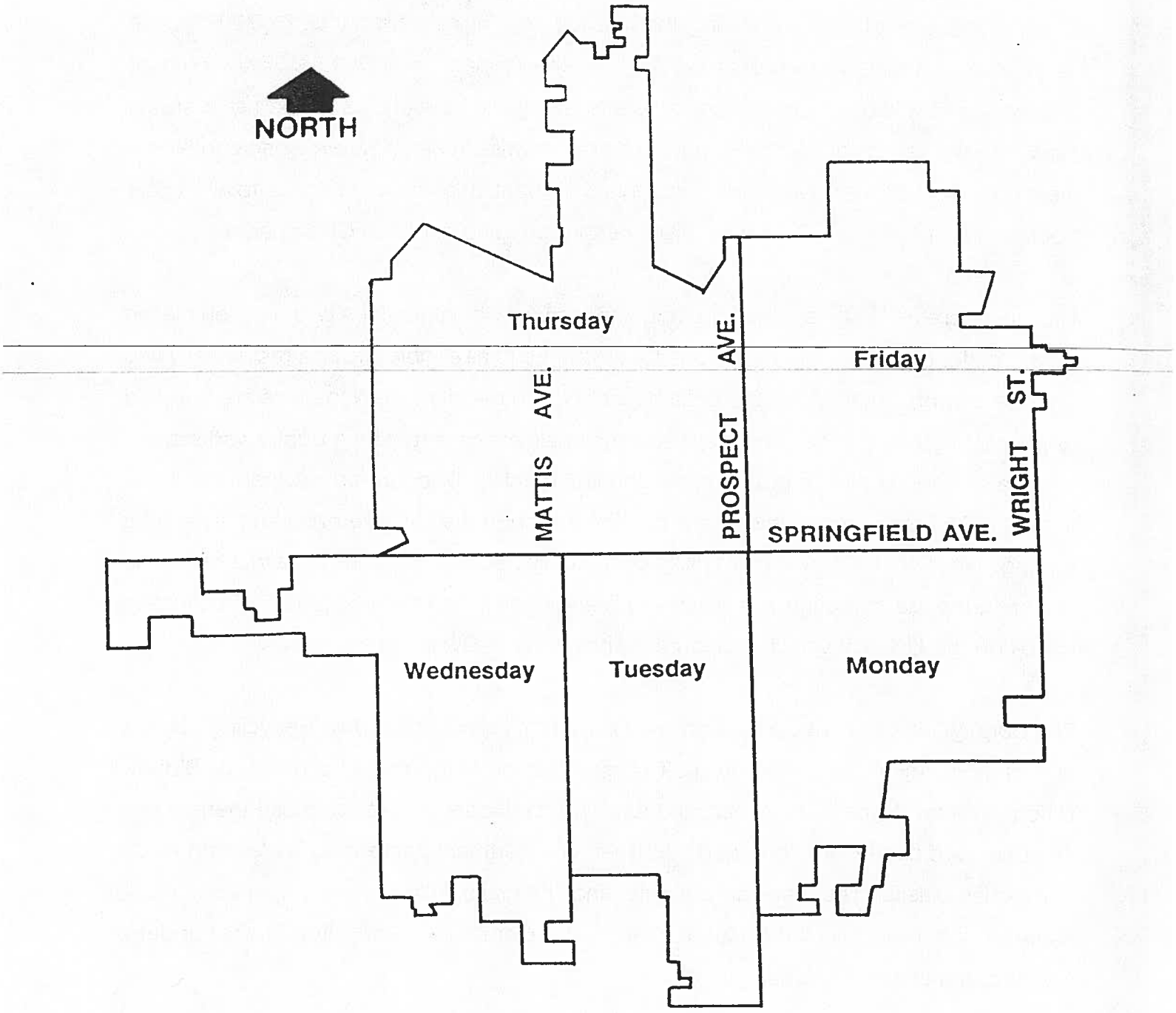


FIGURE 1

Reeecycle Routes
City of Champaign

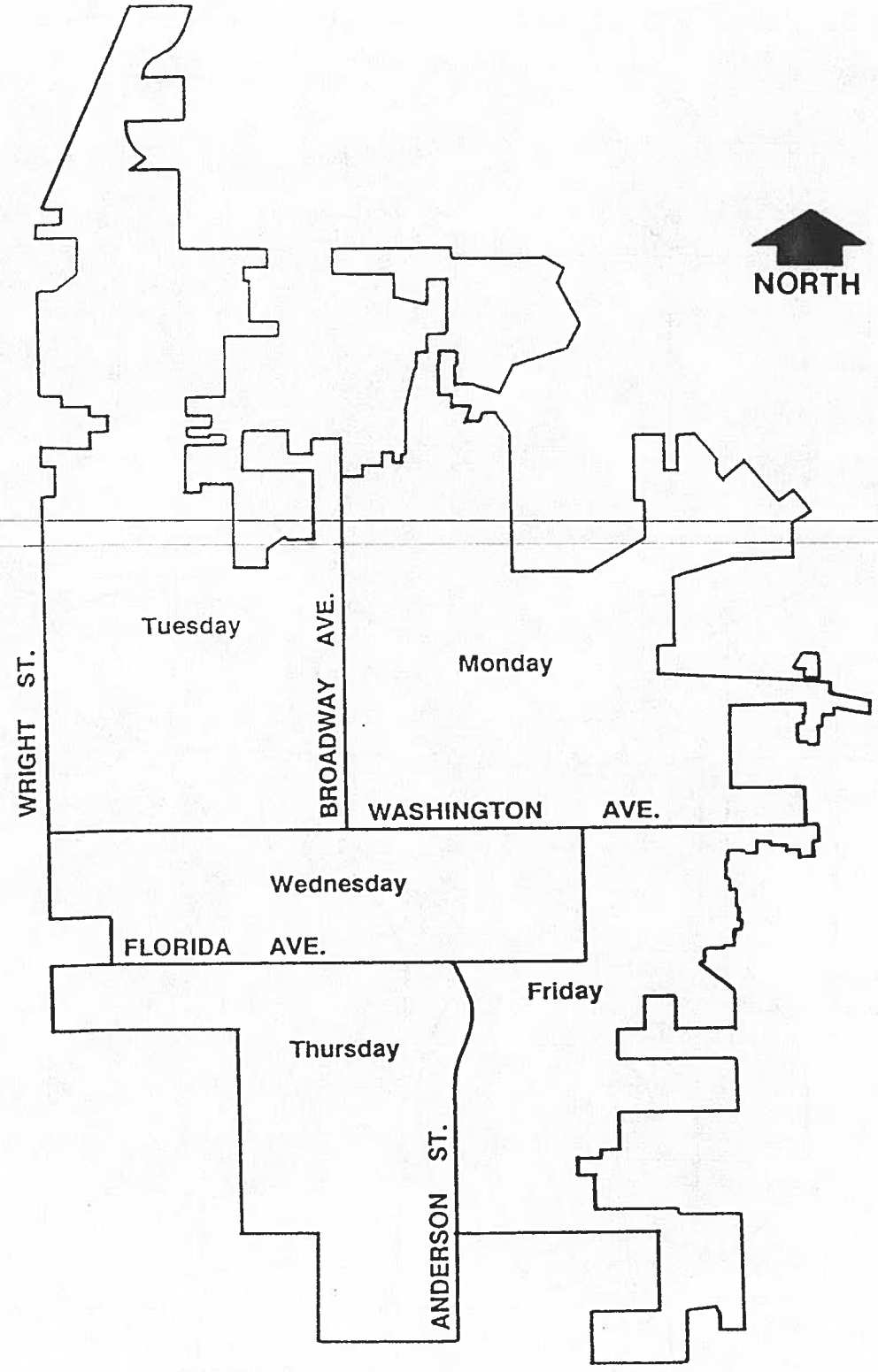


FIGURE 2

U-Cycle Routes
City of Urbana

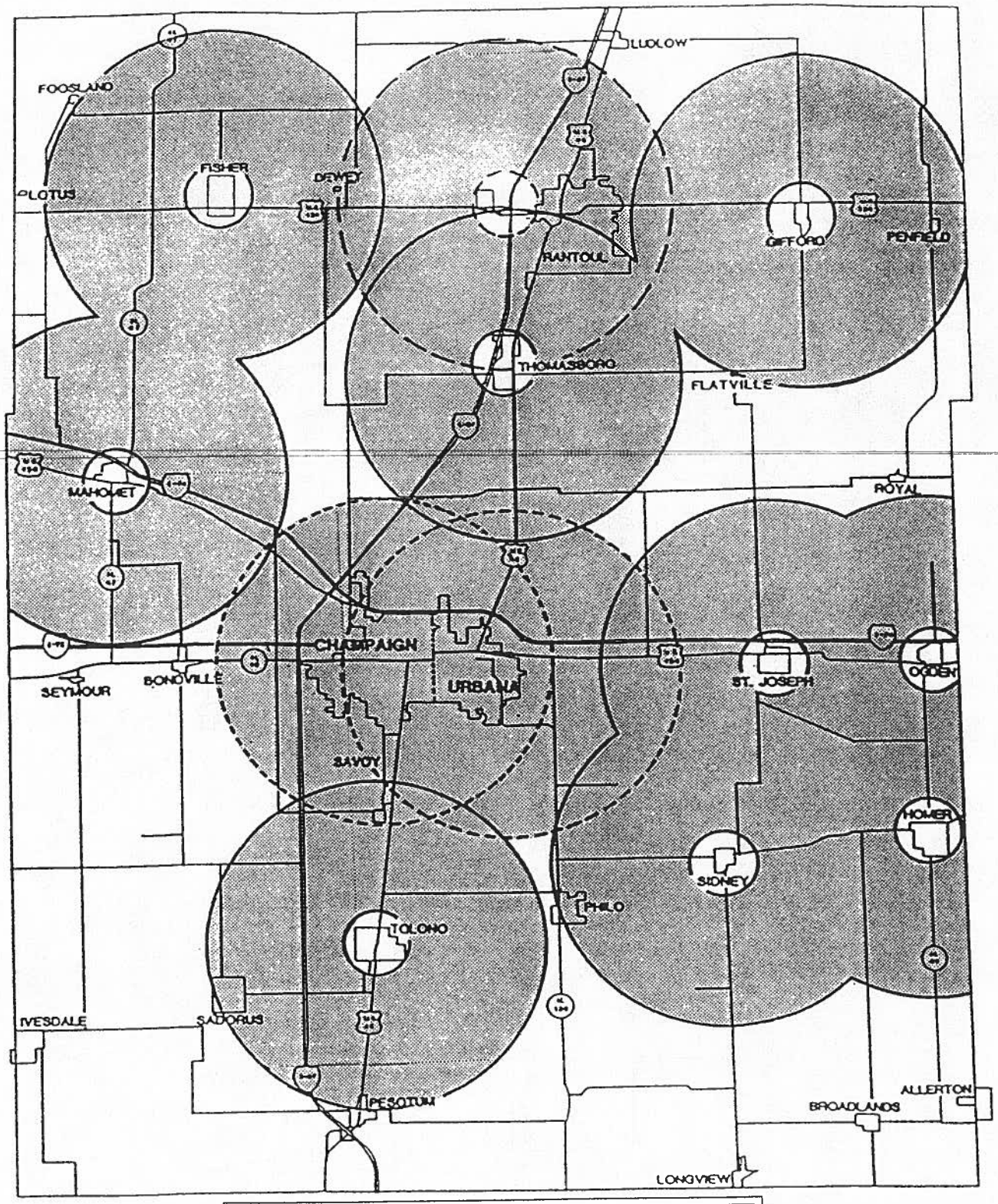


FIGURE 3

Hometown Locations

Champaign County

The Hometown program currently has drop-off sites in 9 of the 11 largest villages in the County. The two that do not have a drop-off, Savoy and Philo, were initially considered. Savoy did not have an appropriate and willing site for the drop-off. Residents of Philo were concerned that placing a drop-off in their village would detract from local organizations' fund raising activities. The villages and towns that currently have drop-off sites service about 13,900 people living within one mile of a drop-off (the white circles in Figure 3). This represents 67% of all people living in a rural village or town and 26% of all rural residents of the County.

Around the Hometown and Rantoul drop-off sites there is an estimated 47,548 people within five miles of a drop-off site (the dark circles in Figure 3). This represents 88% of the County population outside of Champaign and Urbana. When the sites in Champaign and Urbana are included, 160,970 people, or 94% of the County's population are within five miles of a drop-off site. Moreover, 77% of the total County population is within one mile of a drop-off site.

Rantoul

The Village of Rantoul, while not a member of the ISWDA, does have its own recycling programs. These are focused primarily on educational and yardwaste diversion. Additional recycling activities in Rantoul include a drop-off site and a buy-back center. Both of these are operated by a private hauler. The drop-off site is located at the IGA store and the buy-back site is located just west of downtown. However, the operator will not release tonnage figures for materials collected at either site. The Village also has an in-house office paper recycling program. The same operator accepts the material generated from Village Offices but cannot provide quantities.

An education coordinator is employed by the Village on a part-time basis. In 1988, the coordinator visited all kindergarten and first grade classes in the six schools throughout the Village. The coordinator has also placed signs in the local IGA grocery store to

designate recyclable or reusable products. With grant funds from Illinois Department of Energy and Natural Resources (IDENR), the Village purchased a booklet containing recycling information. The booklet will be distributed to school teachers and other interested parties. Grant funds have also been used to mail a recycling newsletter to the Village residents. The newsletter is mailed about twice a year to approximately 3,500 households. The funding for the coordinator expires in 1990. Future plans for a recycling coordinator or an education coordinator are not finalized.

Chanute Air Force Base (CAFB), located in Rantoul, has some limited recycling activities on base. The Morale, Welfare, and Recreation Department (MWR) collects aluminum cans to raise money for equipment. The cans are collected through drop-off sites in common areas such as recreation areas and gyms. An aluminum company places a trailer on the base and collects it when it is full. Some office paper recycling occurs throughout base offices, primarily computer print-out paper (CPO). Yardwaste collected by the Base grounds maintenance contractor is taken to a site on the base for decomposition or burning. A program to separate residential yardwaste from garbage began in Fall of 1989.

University of Illinois

For the past twenty years, the University of Illinois at Urbana-Champaign (UIUC) has been recycling metal, fats and grease, yardwaste, saw dust, oil and other items. During 1988, UIUC estimated that it recycled approximately 500 tons of metal, 190 tons of fats and grease, 644 tons of yardwaste (2,800 cubic yards), 9,000 gallons of oil and 400 tons of high grade paper. In addition, starting in July 1988, the University began to divert cardboard at the Campus Transfer Station. The University's total wastestream is predominately paper and generation is split between administrative/academic areas (60%) and housing (40%) by weight.

Overall, UIUC estimates that it currently recycles about 10% of its total wastestream from academic and residential areas, of which virtually all the paper is marketed through the Community Recycling Center. In February of 1989 the University announced a five year, $680,000 program to expand recycling of paper, glass, aluminum cans and plastics to all of the administrative, academic and housing areas. The University target is to increase the recycling rate to 30% of the total wastestream by 1993.

Community Recycling Center

There is also a linkage between recycling programs and markets for recyclables. The Community Recycling Center (CRC) is now in its eleventh year of operation and employs 23 full-time staff. As mentioned previously, the CRC is under contract with the three member governments to provide multi-material recycling to individuals and businesses in Champaign County. Drop-off sites, High Volume, or commercial collection, and Buy-Back facilities are also operated by the Center. The Center is the processing and marketing facility for materials collected from the Urbana and Champaign curbside program as well as the County drop-off sites. Volumes collected and processed by CRC between 1978 and 1988 are shown in Figure 4. Approximately 15% of all material recycled in Champaign County during 1988 was processed by CRC.

The Community Recycling Center's Buy Back program is located at the Center and is opened on a limited schedule. In 1988, 1,977 tons of material were collected through the Buy-Back program. CRC purchased glass, newspaper, high grade paper, cardboard, aluminum, bimetal, tin and plastic in 1988 and paid out approximately $425,000 for materials. CRC discontinued payment for newspaper at the Buy Back in June, 1989.

CRC offers a High Volume program that is directed toward businesses or offices that generate a large quantity of recyclables such as computer print-outs, office paper, cans or glass. The collected materials are consolidated for pick-up by CRC at scheduled times or on an on-call basis. CRC's High Volume, or commercial collection, produced 862 tons

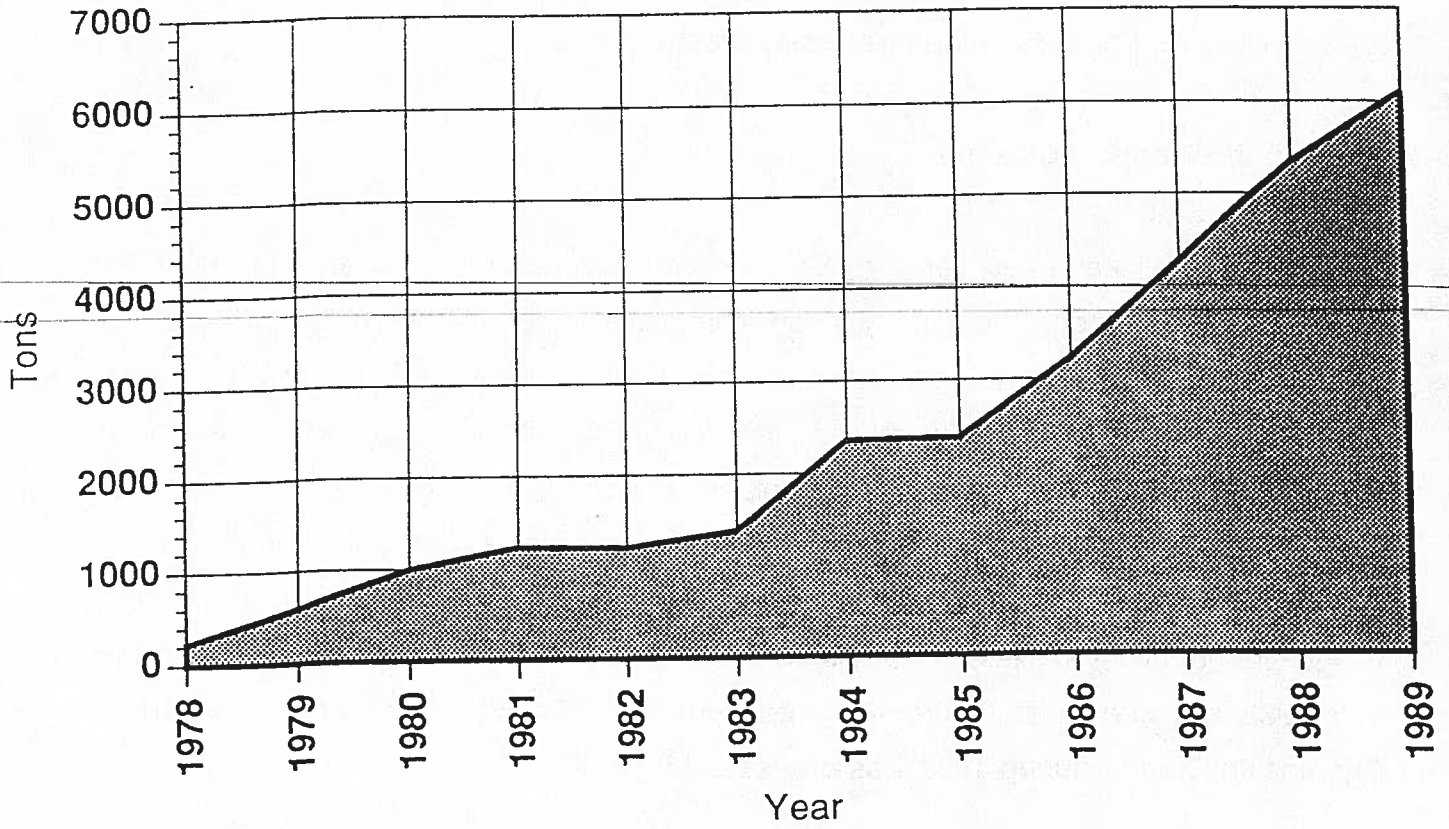


FIGURE 4

Marketed Volumes at the
Community Recycling Center
1978-1989

of material in 1988. This program services about 300 businesses in town, including bars and restaurants.In the Cities of Champaign and Urbana, CRC operates nine Drop-off sites. Figure 5 shows the location of the sites. In 1988, 946 tons of material were collected through the nine sites. Materials collected at the sites include: glass (all colors), newspaper, aluminum, bimetal, tin, mixed paper, HDPE, and used motor oil. Approximately 90-95% of the residents in Champaign and Urbana are within one mile of a drop-off site. According to the survey conducted by ISWDA in November, 1988, The Public on Solid Waste Disposal Issues: Champaign County Household Survey of November, 1988 (Household Survey, see Appendix 1 for Executive Summary) 70% of the respondents from Champaign or Urbana knew where a drop-off site was located. Awareness of the drop-off location was even higher among those respondents living in the Urban Fringe. The Urban Fringe is comprised of the densely populated areas which are contiguous to either Champaign or Urbana, yet are unincorporated. Examples of neighborhoods included in this description would be Edgebrook and Scottswood, east of Urbana and Maynard Lake and Lincolnshire, west of Champaign. Of respondents living in this area, 80% were aware of the drop-off locations.

Awareness of drop-off site locations was the lowest among apartment dwellers. In the Cities, only 51% of respondents living in structures with 5 or more units, knew where a drop-off site was located. Among residents of duplex to fourplex, 69% knew the location of a site and 83% of those living in single-family homes knew the location of a site. When respondents were asked if they had used a drop-off site within the last six months, use corresponded to knowledge of site location. Single-family residents were most likely to use drop-offs, with residents of duplexes to fourplexes second and apartment dwellers the least likely to use a drop-off site.

The CRC also maintains a high profile public education program. There is a full time education coordinator on the staff. Education programs are focused on increasing participation in CRC sponsored, as well as government funded, recycling programs. The education programs at CRC are a combination of media (TV, radio, newspapers),

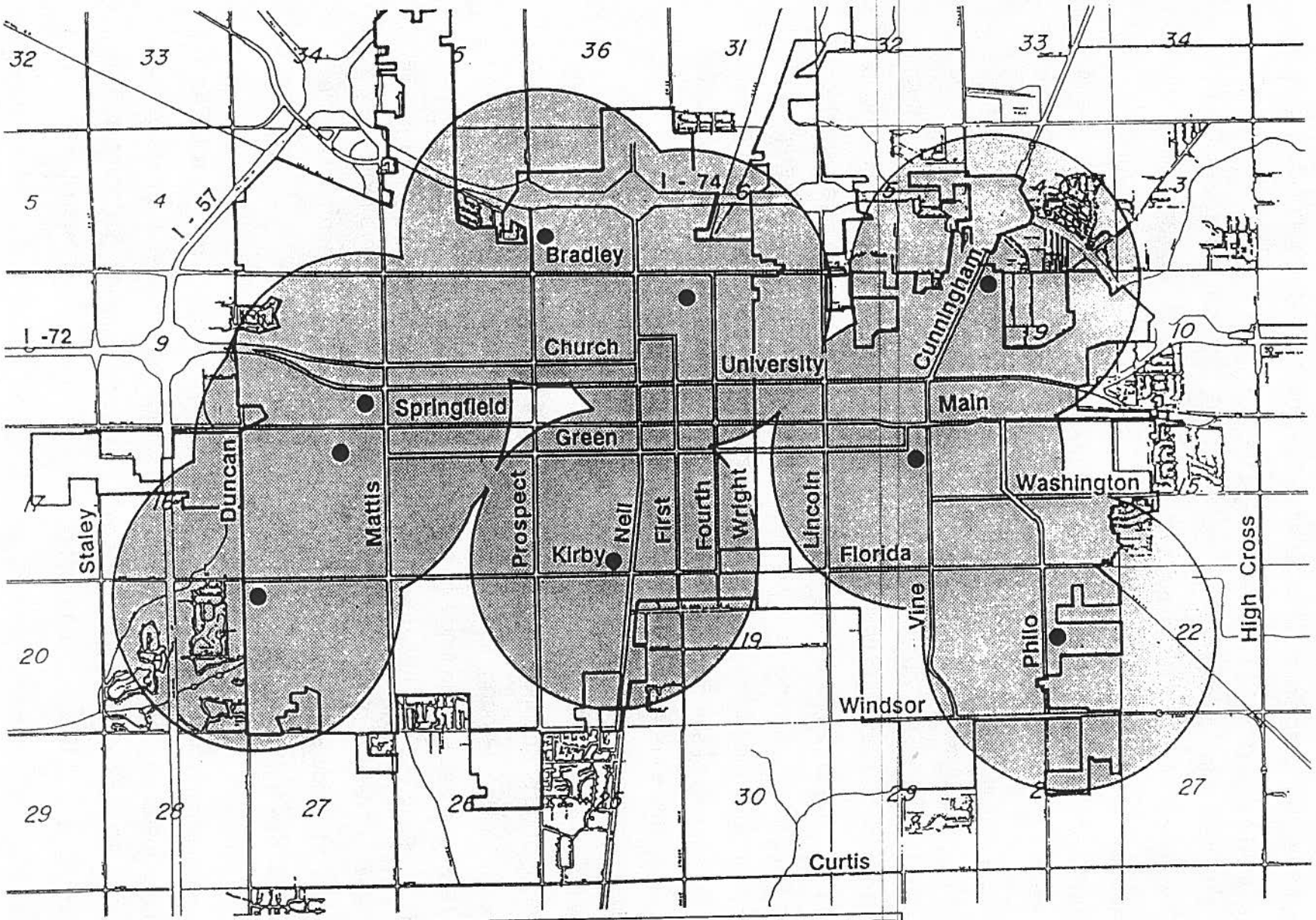


FIGURE 5

In-Town Drop-off Locations

Champaign and Urbana

in-school programs, public speaking and other out-reach efforts. These efforts,combined with local government promotion programs, have assisted in providing a high degree of visibility to all recycling programs in Champaign County.

Yardwaste Diversion

The Association Agreement requires the three members to jointly develop a yardwaste reclamation site to divert leaves, grass clippings, brush, and wood from landfills and process it for use. This site, located on a closed portion of the Urbana landfill, is operated by the City of Urbana for the ISWDA and is funded by the three member governments.

The yardwaste site receives landscape waste and processes it in a variety of ways. The 1988 gate fee was $2.00 a cubic yard at the site (It was raised to $3.00 cy on July 1, 1989 and will rise to $4.50 cy on July 1, 1990). Leaves and grass clippings are composted and brush is ground in a tub grinder producing a chip-like product suitable for mulch or landscape use. Wood is cut and split for fuel. The compost and chips were sold for $2.50/cy and $3.50/cy, respectively in 1988. Cut firewood is sold at a discount from the market price while bulk firewood is free.

Urbana operates a nine-month yardwaste collection program called the U-Bag program. Residents purchase degradable bags at local stores for leaves and grass. In 1988-1989, the bags were sold for $.50 each and were sold in packets of 6 for $2.99. A U-Tie was also sold and it cost $2.49. The U-Tie is a 6-foot cord wrapped around a card and is used to hold bundles of brush together for collection. Purchase costs of the bags or ties included collection and disposal. Bags and brush bundles are placed on the curb on the same day as a residents' recycling pick-up. A private hauler under contract to Urbana collects the material and takes it to the Yardwaste Reclamation Site.

The City of Champaign offers the Leafcycle and Treecycle programs. Leafcycle, a three month program, consists of residents bagging leaves and putting them on the curb for collection. Treecycle is aimed at collecting Christmas trees after the holidays and chipping them. In 1989, both programs were operated by a private hauler under contract to the City of Champaign. The City is currently investigating its options in the face of the July 1, 1990 landfill ban on yardwaste disposal.

The County does not offer any type of yardwaste collection program. All residents in the County, as well as any resident in Champaign or Urbana, can bring materials to the yardwaste site. In 1987 the yardwaste site diverted about 27,031 cubic yards or 6,200 tons. In 1988, 5,041 tons of material was diverted through the yardwaste site. The decrease in yardwaste delivered to the site was attributed to the drought conditions prevalent that summer.

The Village of Rantoul has been collecting yardwaste for many years. It recently began taking the yardwaste to a compost site. The current program features municipal crews collecting yardwaste year round. Grass must be bagged and placed at the curb. Leaves can either be bagged or raked to the edge of the lawn. In the fall of 1989, the Village distributed free of charge, approximately 21,000 biodegradable bags. Any resident could pick up a roll of fifteen (15) at the Village Hall. It is hoped that the same bags will be available for purchase next year in local stores although it doesn't appear use of these bags will be mandatory. A vacuum is used to collect loose leaves. Wood and brush are also collected. A portable chipper, purchased with grant funds, chips the brush into a 10 cubic yard truck. The load of chips is taken to one of three places; 1) to the compost site by the landfill, 2) to a central location in the Village (for resident pick-up) or 3) to a residents' home or business. Village residents may take the chips for free or if they do need a large quantity, the Village will tip the entire load at a designated location.

There are no scheduled pick up days for brush, grass, or leaves. Municipal crews attempt to cover the entire Village once a week. The composting operation began in

September, 1988. The Village of Rantoul collected approximately 408 tons of grass and leaves and 74 tons of brush during 1988.

Existing Private Recycling Programs in Champaign County

Although there has been a long history of recycling activity in Champaign County, the mid-1980's marked a dramatic increase in public sector involvement with recycling programs. Prior to 1983, recycling services in Champaign County were either provided by the CRC or private sector recyclers. Public involvement was limited to assistance in material collection drives and minor levels of financial assistance.

After the CRC was established in 1978, the Cities of Champaign and Urbana provided financial assistance from their federal revenue sharing fund allocations. This support did not exceed $7,000 annually. In addition, CRC also utilized federal job training funds (CETA grants) to support its operations. As shown on Table 2, in 1983 CRC began to receive funds derived from a $.24 cents per yard surcharge collected on material disposed of in the Urbana landfill. This funding source ceased when the landfill closed.

In 1986, the Cities of Champaign, Urbana and Champaign County committed themselves to establishing the municipal curbside, rural drop-off and yardwaste programs. With funding derived from the landfill tipping fees and state and private grants, the level of public sector expenditures on recycling increased from $100,000 in 1983 to $746,347 in 1988. This represents a 700% increase in expenditures which resulted in an 840% increase in the amount of material recycled by the public and non-profit sector. This expenditure level created the collection, transport and processing systems that currently operate in Champaign County. The pattern of expenditures and material collection increases can be seen in Tables 2 and 3 and Figures 6 and 7.

In review of the material received and processed by the Community Recycling Center during 1988, it would appear that the majority of this material was derived from the

residential, institutional, and small retail/commercial sectors. The private sector recyclers in Champaign County were recycling material generated by large scale commercial and industrial operations such as supermarkets, regional shopping centers and uncontaminated industrial packaging wastes and production scrap. In addition, the private sector recyclers in Champaign County also handle other materials such as white goods (appliances), automobiles, high volume corrugated cardboard and scrap metals. The disclosure of tonnages and materials handled by individual private recyclers would reveal proprietary information. However, it would appear the private recyclers, working largely in commercially and industrially recycled materials, processed as much material as the public and non-profit operations during 1988. With treatment sludge removed from the totals, there appears to be an equivalence between public/non-profit and private recycling efforts; for every ton of material recycled by public/non-profit efforts, a ton of material is recycled by the private sector.

Public Expenditures For Recycling

Net Operating Costs, 1983-1988[1]

	1983[2]	1984	1985	1986[3]	1987[4]	1988[4]
Champaign						
CRC	50,000	50,000	50,000	68,333	78,840	78,840
Reeecycle				47,060	172,000[5]	172,000[5]
Leaf Collection		7,000	9,000	11,000	12,000	16,500
Yardwaste Site				9,969	16,532	23,247
ENR Grant					(25,000)	
Urbana						
CRC	50,000	50,000	50,000	68,333	78,840	78,840
U-Cycle				34,297	68,222[5]	70,951[5]
U-Bag/U-Tie				10,384	32,279	33,570
Yardwaste Site				9,969	16,532	23,247
ENR Grant					(25,000)	
Champaign County						
CRC				32,333	78,840	78,840
Hometown						43,601[5]
Yardwaste Site					16,532	23,247
ENR Grant					(2,500)	(7,500)
ISWDA						
Household Hazardous Waste Event					80,000	65,153
Foundation Grant					(30,000)	
Rantoul						
Village						25,810
ENR Grant						(12,500)
Local Expenditure Subtotal	100,000	107,000	109,000	291,678	650,617	726,347
Grant Subtotal					82,500	20,000
Total Expenditures[6]	**100,000**	**107,000**	**109,000**	**291,678**	**733,117**	**746,347**

(1) Costs do not include cost avoidance calculations. Net operating costs are program expenses less material revenues.

(2) In 1983, CUSWDS began $0.24 per ton tipping fee to subsidize CRC.

(3) In November, 1986, Champaign, Urbana and Champaign County signed a five year contract with CRC. CRC figures include $13,000 to capitalization fund.

(4) CRC figures for Champaign, Urbana and Champaign County include $20,000 to capitalization fund.

(5) Net cost for collection program after material sales revenue. This does not include cost avoidance calculation.

(6) Local public expenditures less federal, state or private grants. Excludes the University of Illinois.

TABLE 3

Growth In Public And Non-Profit Recycling Program Tonnage, 1983-1988[1]

	1983	1984	1985	1986	1987	1988
Community Recycling Center						
Drop-Off	UNK	827	916	1,319	832	946
Buy-Back	UNK	1,159	1,176	936	1,202	1,797
High Volume	UNK	---	228	608	763	862
Waste Oil	84	102	34	41	114	20
Subtotal	1,292	2,088	2,354	2,904	2,911	3,625
Urbana						
U-Cycle	---	---	---	133	561	645
Yardwaste	---	---	---	---	2,700	2,041
Subtotal	---	---	---	133	3,261	2,686
Champaign						
Reeecycle	---	---	---	50	747	951
Yardwaste	---	141	145	177	3,500	3,000
Subtotal	---	141	145	225	4,247	3,951
Champaign County						
Hometown	---	---	---	---	---	128
Yardwaste	---	---	---	---	---	---
Subtotal	---	---	---	---	---	128
Rantoul						
Area Recycling	---	---	---	---	---	UNK
Yardwaste	---	---	---	---	250	482
Subtotal	---	---	---	---	250	482
ISWDA						
Household Hazardous Waste Collection	---	---	---	---	16	9
Subtotal	---	---	---	---	16	9
TOTAL	**1,292**	**2,229**	**2,499**	**3,262**	**10,685**	**10,872**

(1) Does not include material the University of Illinois recycles through other vendors.

UNK - Unknown or not reported.

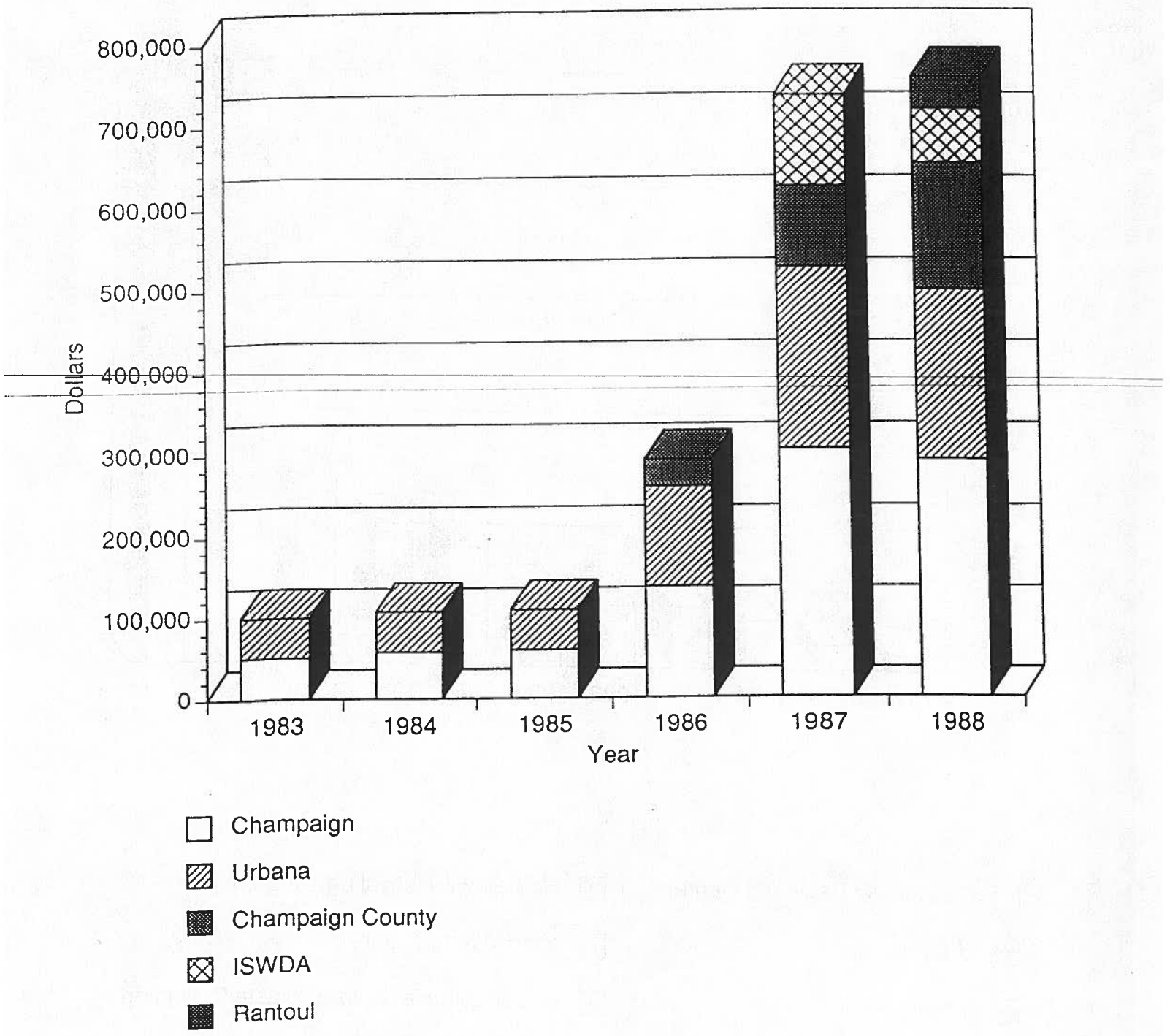


FIGURE 6

Growth in Public Expenditures
for Recycling
Champaign County, 1983-1988

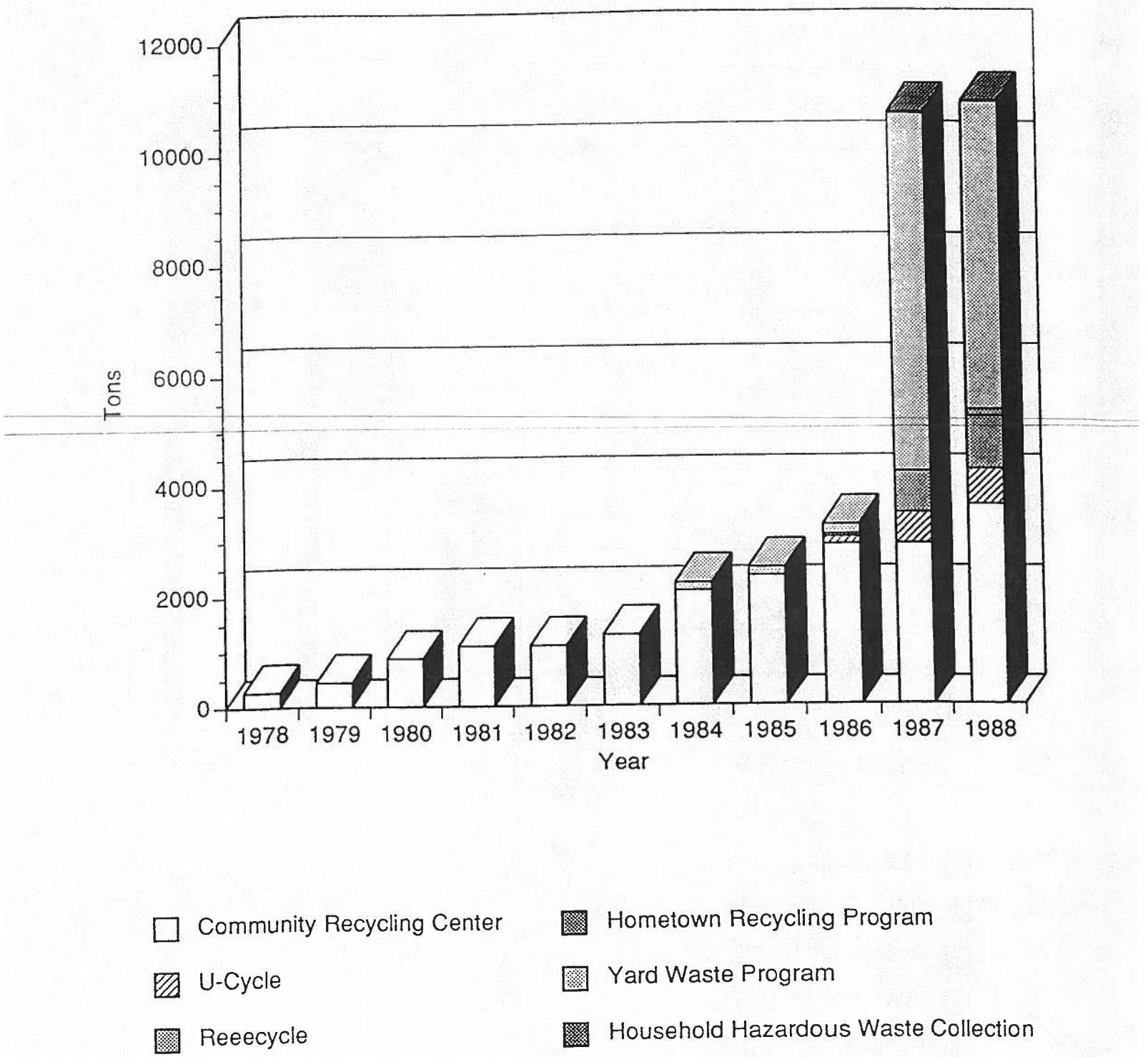


FIGURE 7

Growth in Public & Non-Profit Recycling
Champaign County, 1978-1988

State Mandated Planning and Recycling Goals

Subsequent to passage of the Illinois Solid Waste Management Act in 1986, the Solid Waste Planning and Recycling Act (PA 85-1198) became law in January of 1989. This Act required counties in excess of 100,000 in population to prepare plans for solid waste management. Included in this Act are target dates for completing the solid waste plan as well as implementing recycling programs with 15% and 25% rates recovery. Specifically, the Act requires that these plans must be submitted to the Illinois EPA (IEPA) by March 1, 1991. Counties with populations under 100,000 are also required to complete plans, however they have until March 1, 1995 to submit them to IEPA.

The Solid Waste Planning and Recycling Act establishes very specific recycling program performance standards to be incorporated in the plan. These recycling programs:

(1) " . . . shall be implemented throughout the county and include a time schedule for implementation of the program."

(2) " . . . shall provide for the designation of a recycling coordinator to administer the program."

(3) " . . . shall be designed to recycle, by the end of the third and fifth years of the program respectively, 15% and 25% of the municipal waste generated in the county, subject to the existence of a viable market for the recycled material."

(4) " . . . may provide for the construction and operation of one or more recycling centers by a unit of local government, or for contracting with other public or private entities for the operation of recycling centers."

(5) " . . . may require residents of the county to separate recyclable materials at the time of disposal or trash pick-up."

(6) " . . . may make special provision for commercial and institutional establishments that implement their own specialized recycling programs, provided that such establishments annually provide written documentation to the county of the total number of tons of material recycled."

(7) " . . . shall provide for separate collection and composting of leaves."

(8) " . . . shall include public education and notification programs to foster understanding of and encourage compliance with the recycling program."

(9) " . . . shall include provisions for compliance, including incentives and penalties."

(10) " . . . shall include provisions for (i) recycling the collected materials, (ii) identifying potential markets for at least 3 recyclable materials and (iii) promoting the use of products made from recovered or recycled materials among businesses, newspapers and local governments in the county."

(11) " . . . may provide for the payment of recycling diversion credits to public and private parties engaged in recycling activities."

Clearly, based on the requirements of Solid Waste Planning and Recycling Act, Champaign County has many of the components required to meet this objective of the law. However, until recently the methods and basis for determining the percentages and that portion of the waste stream subject to these recycling targets had been unclear. The Act defines municipal waste as:

> . . . any garbage, refuse, industrial lunchroom or office waste, and other material resulting form operation of residential, municipal, commercial or institutional establishments and from community activities.

This definition does not correspond to other definitions of municipal waste, particularly those definitions found in either the Environmental Protection Act or in the Local Solid Waste Disposal Act (PA 84-963).

In a similar fashion, the Solid Waste Planning and Recycling Act defines recycling as:

> . . . any process by which materials that would otherwise become municipal waste, including but not limited to metals, glass, paper, leaves and plastics are collected, separated or processed and returned to the economic mainstream in the form of raw materials or products.

The use of the term "any process" is a broad statement which makes the accounting of recycling activities difficult. In addition, the basis of measurement for the percent of material recycled from municipal waste is not specified. These values can be expressed in either weight (tons) or volume (cubic yards). Thus, in order to establish where Champaign County is in terms of recycling, all these terms must be defined.

The Illinois Environmental Protection Agency has the primary review and comment function in the solid waste planning process. In order to assist in the preparation of solid waste plans, the IEPA issued, in October of 1989, its interpretation of the terms "municipal waste" and "recycling" found in the Solid Waste Planning and Recycling Act. Based on the Agency's interpretation, municipal waste for the purpose of calculating the recycling rate **includes**:

a) abandoned or discarded household or commercial appliances such as stoves, refrigerators, washing machines and the like;
b) special wastes generated from municipal, commercial or institutional establishments such as POTW (publicly owned treatment works) sludge, waste oil from service stations and the like;
c) abandoned or waste parts from motor vehicles normally removed as a part of regular maintenance such as tires and batteries;
d) construction and demolition debris from buildings and roads;
e) wastes collected in a household hazardous waste collection;
f) landscape waste.

Conversely, waste that is **excluded** from recycling rate calculations is:

a) abandoned or "junk" motor vehicles;
b) special waste generated through an industrial operation or process;
c) hazardous waste;
d) earth materials moved or removed during demolition or construction;

e) scrap metal from industrial operations such as machining, lathe work, tool and die operations and the like;

f) municipal waste used as clean fill, road base material or other uses constituting disposal.

The October 1989 interpretation also stated that the municipal waste recycling rate should be calculated by weight, not volume. The percentage is therefore derived by dividing the weight of the municipal waste being recycled (or planned for recycling) within the county in one year by the weight of the municipal waste generated (or expected to be generated) within the county during the same year. The weight of municipal waste being recycled is the weighed amount of municipal waste received (or planned for receipt) for recycling minus the weighed amount of material remaining after processing that is not recyclable. Recycling activities which can be used in these calculation values include:

a) composting operations where the waste, once composted, is returned to the economic mainstream or replaces other raw materials for fertilizer, soil conditioner or mulch;

b) shredding operations where the waste is returned to the economic mainstream or replaces other raw materials as soil conditioner, mulch or erosion control;

c) reusing construction or demolition debris for building construction purposes or re-use as road surface materials;

d) using waste for commercial feed such as mink farms, swine operations or fish production;

e) processing waste at a rendering facility for return to the economic mainstream;

f) processing municipal waste, particularly metal appliances, for metal recovery;

g) applying landscape or other municipal waste directly to agricultural land at agronomic rates.

Current Recycling Rate in Champaign County

In order to establish the current recycling rate for Champaign County, the amount of non-hazardous solid waste generated in the County was prepared and projected. This was developed in Part One, Solid Waste Characteristics, of the Champaign County Solid Waste Management Plan. As discussed in that portion of the plan, population is a major determinant of residential and commercial waste generation. To determine the population change in Champaign County, information from the Census Bureau and the Illinois Bureau of the Budget was used. The Census Bureau reported a 1.3 percent total growth from 1980 to 1985 or an annual growth rate of about 0.26 percent. The Illinois Bureau of the Budget uses an estimate of 3 percent total population growth from 1985 to 2000. This equals an annual average growth rate of 0.2 percent. Consequently, a growth rate of 0.2 percent was used to project population increases during 1988-2010.

The industrial waste category does not include hazardous or special waste resulting from manufacturing. This is the fraction of Champaign County's wastestream which contains manufacturing rejects or off-specification products which are not considered a special waste according to Illinois EPA. The initial value of 0.41 pounds per person per day was derived from observation of loads arriving at area landfills during the weigh programs conducted in 1985, 1987 and 1988. It was also compared to industrial employment data. Industrial (durable and non-durable goods) manufacturing employment was approximately 7,200 in 1988. This per capita figure was held constant and projected to grow directly proportional to population.

Construction/demolition debris was calculated based on weigh program data collected in 1985, 1987 and 1988. Based on the weigh data, the estimated per capita generation rate of construction/demolition waste was 1.84 pounds per person per day. However, just as special wastes in the industrial wastestream are not to be included in recycling calculations, there are fractions of the construction/demolition wastestream that should not to be considered as well.

The Illinois EPA specifically lists several types of construction/demolition wastes which ***should not*** be included when determining recycling rates. Illinois EPA has indicated that construction/demolition waste excluded from the recycling rate calculation includes: (1) earth materials moved or removed during demolition or construction and (2) waste used as clean fill, road base material or other uses constituting disposal. Based on this interpretation and known Champaign County weigh data, it was possible to discount that portion of the construction/demolition wastestream that would be considered dirt, rock or earth materials. These materials were considered the non-processible fraction of construction/demolition wastes in terms of recycling activities.

The final projected wastestream category was treatment plant sludge. Sludge can be from industrial or publicly owned treatment works (POTW), water supply treatment plants and septic tanks. There are no industrial wastewater treatment plants operating in Champaign County. Since the majority of the Champaign County population is served by sanitary sewers, for projection purposes, septage (septic tank cleaning sludge) was assumed to be land applied or processed at a wastewater treatment plant. No area landfills indicated that they accepted septage for disposal. The figure of 0.61 percent was derived from 1988 data supplied by Illinois EPA. This was projected to grow in direct proportion to population growth.

Based on these assumptions and observations, the total per capita solid waste generation rate for Champaign County in 1988 was estimated at 6.25 pounds per day. This includes sludge and construction/demolition waste contributions. This compares favorably with reported values from other counties in Illinois as shown in Table 4. It should be noted that none of the other counties included treatment sludges. This is because their data was prepared prior to Illinois EPA's interpretation in October, 1988.

TABLE 4

Selected Per Capita Generation Rates

Reported In Illinois During 1988 In Pounds Per Person Per Day

	Residential/ Commercial	Industrial	Construction/ Demolition	Sludge	Total Pounds[1]
Champaign County	3.39	0.41	1.84	0.61	6.25
Will County[2]	3.14	0.98	0.82	----	4.94
DuPage County[3]	3.90	1.10	0.80	----	5.70
Lake County[4]	3.20[5]	3.60[6]	1.70	----	8.50
IEPA[7]	----	----	----	----	5.50[8]

(1) Pounds per person per day.

(2) Will County Interim Solid Waste Plan, December 1988.

(3) DuPage County Solid Waste Recycling Study, September 1987.

(4) Lake County Solid Waste Management Plan, April 1989.

(5) Does not include commercial waste.

(6) Includes commercial waste.

(7) Available Disposal Capacity for Solid Waste in Illinois: Second Annual Report, October 1988.

(8) Values include per capita contributions from residential, commercial and industrial sources. Excludes treatment sludges. 5.5 pounds per capita day is the value used for urban counties and 4.7 is the value for rural counties. Champaign County is considered an urban county by IEPA.

Based on these projection assumptions and per capita generation rates, the estimated 1988 base year total solid waste tonnage for Champaign County was 197,809. Once the non-processible fraction of construction/demolition waste was subtracted, 169,452 was the tonnage figure used to calculate the 1988 recycling rate. The total municipal solid waste tonnage is projected to increase to 222,258 tons in the year 2010, of which 192,627 tons will be used to determine in the recycling rate. The results of these estimates and projections can be found in Table 5.

From the projected 1988 solid waste tonnage, it was possible to apportion the total among the various wastestream components to establish Champaign County's base recycling rate. Fortunately, documentation of recycled tonnage was well supported in the case of public and non-profit efforts. Moreover, since recycling efforts among the public, non-profit and private sector were distinct, with little overlap, it was also possible to show recycling performance by material. For example, the public and non-profit sector handles most of the yardwaste and glass. Conversely, the private sector handles the majority of all bulky white goods, corrugated cardboard, scrap metal and construction/demolition waste processing. As a result, there was little duplication of processing capability between the two sectors. These distinctions can be seen in Table 6 and Figure 8.

TABLE 5

Estimated Solid Waste Tonnage Generated in Champaign County, 1988-2010[1]

Waste Type	1988	1990	1995	2000	2005	2010
Residential/Commercial[2]	107,008	108,838	113,136	117,840	122,613	127,807
Pounds Per Capita Day	3.39	3.43	3.53	3.64	3.75	3.87
Industrial	13,026	13,076	13,209	13,342	13,476	13,611
Pounds Per Capita Day	0.41	0.41	0.41	0.41	0.41	0.41
Processible Construction/Demolition	29,859	29,979	30,280	30,584	30,891	31,201
Pounds Per Capita Day	0.94	0.94	0.94	0.94	0.94	0.94
Non-Processible Construction/Demolition	28,357	28,470	28,756	29,045	29,336	29,631
Pounds Per Capita Day	0.90	0.90	0.90	0.90	0.90	0.90
Treatment Sludge[3]	19,559	19,637	19,835	20,034	20,235	20,438
Pounds Per Capita Day	0.61	0.61	0.61	0.61	0.61	0.61
Total Tons	197,809	199,590	204,799	210,428	216,125	222,258
Tons Per Day	542	547	561	577	592	609
Total Population	173,177	173,870	175,616	177,389	179,160	180,959
Total Pounds Per Capita Day	6.25	6.29	6.39	6.50	6.61	6.73
Base Tonnage For Recycling Calculations[4]	169,452	171,120	176,043	181,383	186,789	192,627
Recycling Rate at 15%	25,418	25,668	26,406	27,207	28,018	28,894
Recycling Rate at 25%	42,363	42,780	44,011	45,346	46,697	48,575

(1) Adapted from "Solid Waste Management Feasibility Analysis for Champaign County, City of Champaign and City of Urbana," Brown, Vence and Associates, May, 1988.

(2) Includes University of Illinois.

(3) Projected from data supplied by the Illinois Environmental Protection Agency, Division of Water Pollution Control.

(4) Calculated by subtracting the non-processible (dirt/rock) portion of the construction/demolition waste stream.

Estimated Recycling Rate By Sector In Champaign County, 1988[1]

Wastestream Type	Calculated Generation Tons Per Year	Reported Recycled Tons Per Year Public[2]	Private[3]	Calculated Disposal Tons Per Year
Residential/Commercial				
Large Bulky Items	7,313	—	900	6,413
Newspapers	7,121	2,588	—	4,533
Office Papers	3,157	593	UNK	2,564
Corrugated Boxes	14,128	271	4,400	9,457
Other Papers	19,394	113	UNK	19,281
Glass	9,856	1,056	—	8,800
Ferrous Metals	5,087	495	3,609	983
Aluminum	1,590	354	11	1,225
Other Products[4]	5,405	—	120	5,285
Plastics	6,677	19	UNK	6,658
Yardwaste	17,487	5,523	—	11,964
Food/Misc. Organics	9,793	415[5]	UNK	9,378
Subtotal	107,008	11,427	9,040	86,541
Processible Construction/Demolition[6]	29,859	—	14,373	15,486
Non-Processible Construction/Demolition[7]	28,357	—	—	28,357
Industrial	13,026	—	5,933	7,093
Treatment Sludge[8]				
Wastewater	3,277	2,524	—	753
Water Supply	16,282	316	15,911	55
Subtotal	19,559	2,840	15,911	808
TOTAL	**197,809**	**14,267**	**45,257**	**138,285**

(1) Adapted from: "Solid Waste Management Feasibility Analysis for Champaign County, City of Champaign and City of Urbana." Brown, Vence and Associates, May 1988.

(2) Public Sector reported recycling tonnages from: "The Status of Recycling in Champaign-Urbana During 1988." Community Recycling Center, September 1989; "Campus-Wide Recycling Program Report and Recommendations to the Vice-Chancellor for Administrative Affairs." University of Illinois Recycling Task Force, October 1988; personal correspondence with Village of Rantoul Recycling Coordinator; and personal correspondence with Illinois EPA, Division of Water Pollution Control.

(3) Represents 1988 base information reported from interviews with private recyclers, commercial and industrial representatives.

(4) Includes non-ferrous metals, rubber, leather and textiles.

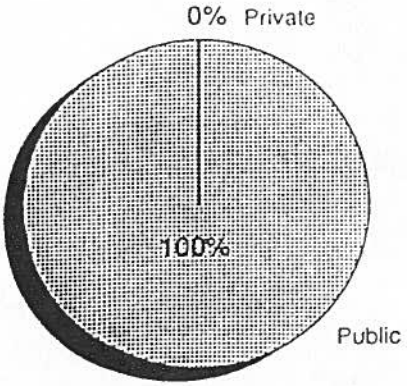
(5) Includes waste oil recycled by the University of Illinois and Community Recycling Center and Young Farmers.

(6) Processible construction/demolition waste includes wood, paper, metal, cardboard and concrete.

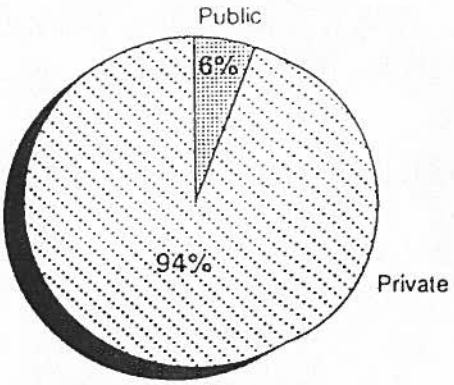
(7) Non-Processible construction/demolition waste includes dirt, rock, masonry and cement.

(8) Dry weight.

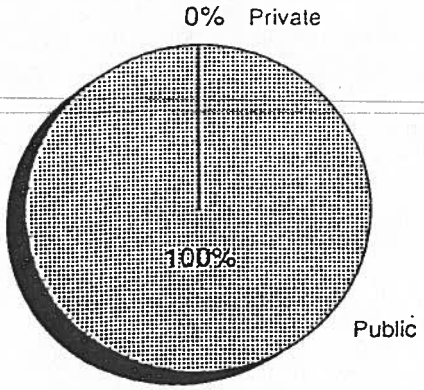
UNK - Unknown or not reported.



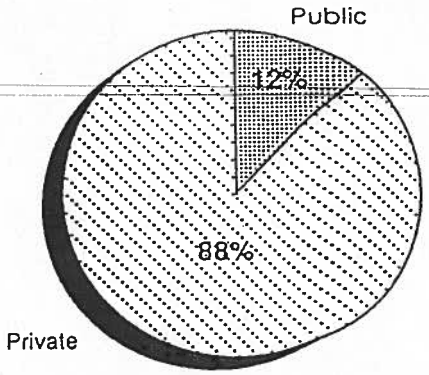
Newspapers



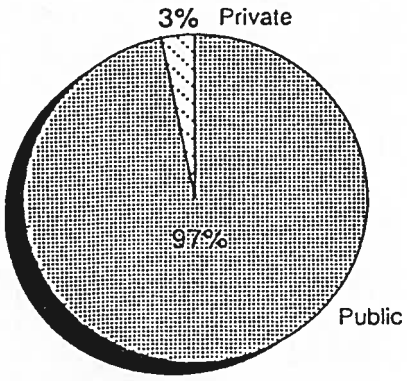
Corrugated Boxes



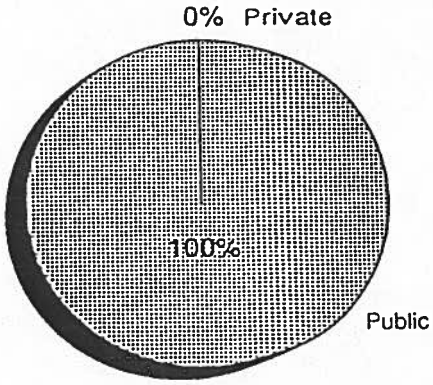
Glass



Ferrous Metals



Aluminum



Yardwaste

FIGURE 8

Distribution of Recycling
Activity by Sector and Material
Champaign County, 1988

SECTION TWO: Cost Avoidance

Introduction

The implicit assumption concerning recycling is that it has an economic as well as an environmental value. This economic value or benefit can be expressed in a number of ways. These benefits include:

(1) Extended Disposal Facility Life: Materials diverted by recycling programs conserve disposal capacity. Such programs allow solid waste managers to manage disposal capacity as a resource in and of itself. This capacity management applies to any type of disposal or processing facility in which capacity is fixed. Extended facility life also can reduce the capital cost of new facility development as well as reducing the number of times the community must deal with the facility siting process.

(2) Reduced Waste Disposal Costs: Materials recovered by recycling programs avoid or reduce the costs associated with solid waste management programs. Recyclers can reduce the cost of disposal by eliminating additional transport and disposal (or tipping fee) charges.

(3) Direct Economic Return: Materials recovered through recycling programs can generate revenue by the sale of the materials. Material sales typically do not cover the full cost of recovery but do help offset the costs.

(4) Long Term Economic and Environmental Benefits: Recycling programs can provide long term economic and environmental returns by reduced energy consumption and/or lessened environmental impact. Products manufactured from recycled materials typically require less energy and do not consume virgin materials. An additional environmental benefit is the avoidance of long term care costs for per ton of material not landfilled. This includes groundwater monitoring, landfill post-closure maintenance and any potential remedial action costs.

Among these four general areas of benefit from recycling programs, there is a sliding scale of determination for economic value. Typically, recycling program costs are discounted against their economic return from material sales and avoided costs of landfill disposal. Less frequently included are costs for reduced disposal facility size and

regional/national economic or environmental cost savings. The latter are harder to quantify in a local setting. The sum of all these economic, environmental and material savings are collectively called avoided cost benefits.

Calculating avoided cost benefits is necessary in order to approximate actual recycling program costs in Champaign County. The basis of this analysis hinges on the acceptance of a conceptual model of material movement. The movement of solid waste can be divided into three steps: collection, transport and disposal or processing. Residential solid waste is collected at the curb and transported to a landfill for disposal. In a similar fashion, residentially separated recycled materials are placed at the curb and transported to a processing center for shipment to markets. In Champaign County, all the collection, transport and disposal functions, including landfilling, for residential solid waste collection are handled by the private sector. In contrast, all collection, transport and processing functions, including marketing, for residential recyclables collection are provided by the public or non-profit sector. This creates a disjointed system and makes it difficult to approximate the system cost. In the context of this discussion, system cost was viewed as the *overall* cost for either landfilling or recycling a ton of solid waste.

Although the disjointed system made it difficult to estimate the system costs, this had to be determined in order to review recycling programs and other alternative management methods. The collection, transport and disposal costs were the first to be examined. For the purposes of this evaluation, the quantifiable values of material sales and avoided cost of disposal were be used. However, there was also an effort to account for environmental costs avoided due to material not being landfilled and thus not subject to long-term care requirements. The regional/national economic and environmental costs that can be attributed to these programs are subject to a greater speculative range and were not used in a quantitative fashion in this discussion.

Cost of Residential Solid Waste Collection

The collection, transport and disposal of garbage is not unlike a utility service similar to the provision of water and sewer. In many municipalities, garbage collection is provided as part of municipal services such as fire and police protection and is paid for by property taxes. If a municipality does not actually provide the pick-up, they often oversee the service by contracting or franchising. In the survey conducted by the City of Champaign during the summer of 1988, half of the 93 cities contacted had municipal garbage collection of at least single-family homes. An additional 35% used a contract system and 2% franchised for collection services. Of the 12% of cities reporting a free market system of collection, none appear to offer curbside recycling service. Champaign-Urbana appears to be somewhat unique because garbage collection is an individual subscription service provided entirely by the private sector while the Cities and County offer recycling services paid for by general revenue funds.

Except for the University of Illinois, Champaign County depends entirely on private refuse collection. The Cities of Champaign and Urbana have nearly identical systems with licensed private haulers collecting nearly all the residential and commercial refuse in the two Cities. In 1989, Champaign issued 15 licenses to 15 different companies and Urbana issued 36 stickers to trucks representing 19 haulers. The fee for these licenses was $100.00 per year in Champaign and $150.00 per year in Urbana. The remaining communities in the County including Rantoul, Mahomet, St. Joseph, Tolono and the others have similar arrangements. However, most do not license garbage haulers nor are they serviced by more than one or two haulers for the entire community. In addition, residential and commercial waste collected in the townships surrounding the Village of Rantoul can be disposed of in Rantoul's landfill. All other communities must use out of county facilities.

The nearest landfills currently being used by haulers in the Champaign-Urbana area are either 20 miles (Multi-County Landfill in Villa Grove) or 35 miles (H & L Landfill in Danville)

away. These landfills are both privately owned and operated. Each ton of residentially generated material collected for recycling does not have to be collected, transported, or disposed of by a local hauler. Thus, each ton recycled also "frees-up" space in a private landfill, extending the life of that landfill. By allowing that space to be used in the future, the operator may be able to charge more for that space. Another option would be for the operators not use the space, reducing the amount of material in their landfill and thereby reducing their liability and risk.

In the 1988 Community Recycling Center Annual Report, the estimated cost of collection, transport and disposal of Champaign County solid waste in a landfill was $100.14 per ton. However, there appears to be no locally derived documentation for this estimate. Therefore, this figure needed to be recalculated since all costs for collection, transport and disposal are now provided by the private sector, with much of the necessary information being considered proprietary. Estimated costs were developed based on current collection, hauling and disposal patterns. There are standard formulas that can be used for estimating the cost of collection, transportation and disposal of solid waste. Typically, these formulas require the following information:

Truck volume	Number of households picked up per stop
Density capacity, lbs/cy	Tipping fee
Cost of vehicle	Trips per day
Salvage value	Labor cost
Weight per household stop	Crew size
Distance between stops	Miles to disposal
Containers per stop (total)	Overhead
Throwaways per stop	Maintenance/Operation
	Depreciation

However, to be used, these formulas rely on a certain predictability; number of stops, distance between stops, and productive time per stop. Cost approximations were difficult

to use in a free market system such as the one existing in Champaign County. Therefore modifications had to be made to incorporate the nature of the collection system in Champaign-Urbana in order to use these formulas to approximate costs. Some information, such as miles to disposal, tipping fee and cost of vehicle were readily available. The remaining variables were assigned a value based on studies and field observation. A range of values have been assigned to the different variables to provide a range of total costs. These different scenarios are discussed below (for more detailed outputs, see Appendix 2).

As mentioned, modifications were made to the standard formulas after discussions with local haulers and field observations. For example, it was determined that the local haulers were more productive per stop than the formula would predict. This increase in productivity per stop helps to compensate for the less consistent routing. The set of assumptions created from the discussions with haulers and observations which are common to all of the scenarios are:

(1) all trucks operate with a 1-person crew;
(2) labor costs included fringe benefits;
(3) each laborer was guaranteed 40 hours of work a week;
(4) overtime was paid at 1.5 times regular wage;
(5) only one household was picked up each time the truck stops;
(6) each truck collects one load a day;
(7) each truck was emptied at a disposal site at the end of each day;
(8) average household set-out weighed 45 pounds;
(9) average household occupancy rate was 2.3 persons, as determined by the U.S. Census Bureau.

The main cost components in the overall collection system are: equipment and crew size; productivity (a function of crew size and container placement) and collection routing pattern.

In Champaign County, all of the cost components are completely driven by market forces creating a randomness that has made cost approximation difficult. In Champaign or Urbana, a homeowner can get any one of a number of individuals or firms to collect their residential garbage. Collection routes are bought and sold with the price varying up to ten times the monthly collection rate generated by a route. However, each individual or firm is free to choose his own hauler or to haul his own refuse. When a family moves within the Cities, they often retain their hauler. Therefore, routes in Champaign and Urbana are not routes in the usual sense, but sporadic stops all over the Cities. Moreover, type of service can vary as well. A homeowner has a choice of once or twice a week collection service. In Urbana, garbage cans may not be placed on the curb while in Champaign there are no restrictions on placement. Thus, haulers working in both Cities are faced with a number of operational challenges in providing service.

As previously discussed, residential collection is an extremely competitive business. Therefore, in order to calculate avoided cost savings from residential recycling, two types of collection scenarios were created. The one common element in both scenarios was that residential refuse was collected and hauled to either Danville or Villa Grove. The four major variables used were overhead (including labor rates), equipment size, container placement and collection route characteristics.

Overhead

The first variable, overhead which includes labor rates, reflects the operating nature of the hauling business. Some haulers in the County operate only one truck, provide only residential service and have little overhead in the way of administrative staff, building or equipment payments. These individuals are basically working for wages. Although haulers with this type of business operation are numerous, they, in fact, haul only a small portion of the total solid waste volume in the County. The majority of the solid waste is collected by a handful of larger firms which are: multi-truck operations, provide residential, commercial and specialized industrial hauling services and have higher operating overhead expenses typical for firms providing diversity in collection services.

Thus, based on discussions with both large and small haulers, two levels of labor and overhead rates were utilized.

Equipment

The second variable used was collection truck size. Through the interviews with local haulers and field observations, three commonly used collection trucks were selected for cost approximation. The first was an 18-cubic yard packer truck with a density of 760 pounds per cubic yard. It was estimated that this truck made approximately 304 residential stops before it was loaded to the legal limit. The second size truck was a 20 cubic yard packer which has a density of 760 pounds per cubic yard. It would take approximately 338 residential stops to load. The third vehicle was a 25-cubic yard packer with 650 pounds per cubic yard density. To load this truck, approximately 361 stops would be required. In all cases, per cubic yard densities assumed that the trucks would travel at the legal weight limit to the landfill.

Container Placement

The third variable used was the placement, or location, of the garbage can. There are three variations of placement: curb, back door, and alley. (The frequency of pick-up also affects costs. Residential customers can have either once or twice a week pick-up.) For collection purposes, curbside and alley placement were viewed the same in terms of collection practice. Based on the Household Survey, the typical split of container placement in Champaign County was 55% back door and 45% curbside. Back door container placement was the most expensive type of service, regardless of frequency of pick-up, compared to curb service.

Collection Route Characteristics

The final variable was distance between stops. Currently in Champaign and Urbana, there are few, if any, areas which are served exclusively by one hauler. This means that haulers *do not* begin a route and stops at every home along every block until the truck is full. There are about fifteen to twenty licensed haulers in the two Cities. Some haulers

have placed self-imposed restrictions on their routes; they only serve Urbana or Champaign and then perhaps only portions of those Cities. This may reduce the actual number of haulers available to collect along any given block to ten to fifteen. Using this number, a figure of 1,000 feet between stops was developed. This represents the average distance between stops a truck must make to collect at one out of ten homes on a block. In reality, it could be possible that a hauler could pick-up every home on a block and then travel five or six blocks for the next pick-up, using any combination of stops and travel distances between pick-ups. Consequently, 1,000 feet was used to approximate this random travel and collection pattern.

Based on these variables and the two types of collection variables, two types of collection service were calculated. The first was once a week, back door pick-up with disposal at either Danville or Villa Grove. The other collection service was once a week, curb service with disposal at Danville or Villa Grove. Cost alternatives were established by collection vehicle type (18, 20 or 25 cubic yard truck). Also, the high and low values per ton resulted from approximating labor and overhead rates for both single vehicle and multiple vehicle operators. The range of these costs per ton are found in Table 7.

In addition, an effort was made to weight the cost per ton figures by the distribution of collection vehicle and disposal location. Based on the assumption that 20% of the trucks collecting garbage have 18 cubic yard capacity, 50% have 20 cubic yard capacity and 30% have 25 cubic yard capacity, a "blended" cost per ton, irrespective of service variation, was estimated. The final assumption was landfill location. Using a disposal distribution assumption that 40% of the garbage collected goes to Villa Grove and 60% goes to Danville, the calculated avoided cost for the collection, transport and disposal of a ton of residential solid waste is $74 per ton. Conversely, the calculated avoided cost for collection, transport, and disposal to the Urbana landfill, which closed in November 1988, was estimated to be approximately $64 per ton. The calculation for this weighing can be found in Appendix 1.

TABLE 7

Estimated Cost Per Ton To Collect, Transport And Dispose
Of Residential Solid Waste From Champaign-Urbana, 1988

Vehicle Capacity and Service Type	Disposal at Villa Grove	Disposal at Danville
18 Cubic Yard Capacity		
All Curbside	$62.00	$66.00
All Back door	$81.00	$89.00
Average[1]	$72.00	$78.00
20 Cubic Yard Capacity		
All Curbside	$60.00	$64.00
All Back door	$80.00	$87.00
Average[1]	$70.00	$76.00
25 Cubic Yard Capacity		
All Curbside	$62.00	$65.00
All Back door	$81.00	$88.00
Average[1]	$72.00	$77.00

(1) Unweighed Average.

In 1988, the approximate cost to collect, transport and dispose of one ton of residential waste in Champaign-Urbana on average ranged from $70.00 per ton to $78.00 per ton. The estimated overall range was between $60 to $89 per ton. These figures were intended to represent the range of costs to haulers in the area; *they did not represent any one residential hauler's operation*. There are a number of factors that could alter the figure for any particular hauler. As previously discussed, a single owner operation with one truck, no garage and an answering machine instead of a dispatcher or secretary will have very low overhead. Their costs will be in the lower range. However, a larger

company with a fleet of trucks, a garage and office, additional support personnel and higher depreciation will have costs in the higher end of the range.

The total tonnage cost was found to be apportioned between collection, transportation and disposal in similar ratios for the high and low figures. For the high figures, the costs were allocated 61% to collection, 26% to transportation and 12% to disposal. For the low figures, the approximate cost allocations were 61% to collection, 22% to transportation, and 16% to disposal.

Since the majority of the information required in the total cost formulas would be is proprietary and therefore, a unfavorable check of the figures was necessary. One method to check the figures is to review what a hauler charged for service. It was assumed that a hauler's charge for collection would include fixed costs and a profit margin. The 1988 ISWDA County Solid Waste Survey included the question, "What is your monthly bill for hauling?" Of the 546 respondents who answered the question, the most frequent response was $12.00 a month. This was true for all respondents that answered including respondents living in Champaign or Urbana.

Since the Urbana landfill closed in November of 1988, it had been estimated that monthly hauling bills had risen about 20% by November of 1989. This rise has been attributed, in part, to an increase in tipping fees at area landfills. This increase would make the average monthly hauling bill about $14.40. Using the figure of $14.40 per month, a household would be paying $172.80 per year, for garbage collection. Using the figure of 90 pounds a week, a household of four would generate 2.34 tons of residential waste a year. At $14.40 a month, a household is paying $73.85 per ton for collection, transportation and disposal of their residential waste. The $73.85 per ton figure falls within the calculated range. This indicates that the total cost figures calculated were relatively accurate. It also shows that smaller generators of solid waste subsidize larger generators in a residential setting due to the fact that a two person residence would pay

as much as a four person residence. This is because collection costs are based on the cost of service frequency (once or twice a week) rather than a per unit cost (price per pound).

Cost of Residential Recycling Collection

The costs associated with a municipal recycling program can be broken into steps that parallel the three steps of garbage collection. The first two steps, collection and transportation, are the same as with regular garbage collection. Whether it is a curbside or drop-off program, there is a cost to collect the recyclables and a cost to transport them. However, instead of transporting them to a final disposal site, recyclables are taken to a processing facility. Here the material is sorted and prepared for shipment to markets. A fourth step may be added as a separate item: marketing. While the revenues, or costs, associated with marketing the recyclables can be viewed as a separate step in this review, those revenues or costs are incorporated into the processing costs in this analysis.

As discussed earlier, both Cities operate curbside programs. However, there are differences between them. Champaign collects an extra material: plastic milk jugs (HDPE). Champaign also uses two trucks, with one-person crews while Urbana uses one truck with a two-person crew. Champaign contracts for their curbside collection to a private hauler, while Urbana uses municipal crews. Table 8 shows the costs associated with the two programs.

As previously discussed, there are several adjustments that can be made from the actual costs. The first adjustment in Table 8 that was made was material revenue. Each city receives revenue from the sale of the materials collected through their curbside programs. The second item discounted was the avoided landfill cost. This figure was calculated using the 1988 figure of $74.00 per ton as the cost to collect, transport and landfill one ton of garbage in Champaign and Urbana. The tonnage picked up by the curbside

programs was multiplied by $74.00 to arrive at the appropriate figure. Excessive processing payments was the third item discounted from the total cost figures. CRC stated in 1988 that it costs an average $38.00 per ton to process recyclables. However, the Cities and the County paid much more for processing than $38.00 per ton in 1988. If Champaign were to pay just for materials brought in by Reeecycle, it would have paid $36,138.00 instead of $58,000.00; this would represent a savings of $21,862.00. Urbana would have paid $24,510.00 instead of $58,000.00; a savings of $33,490.00. The final item discounted is avoided post-closure care costs. CRC estimated that it costs $1.15 per ton per year to "care" for a ton of garbage in a landfill. If the post-closure monitoring period is 20 years, that equals $23.00 per ton in 1988 dollars.

These discounts bring the total program costs to $167.00 per ton for Champaign and $82.00 per ton for Urbana. These costs would be lowered if additional discounts for energy savings and material savings were factored in. However, these costs are very difficult to determine and quantify on a local level.

One last item should be noted when reviewing the costs in Table 8. There is a certain economy of scale associated with curbside collection. As the equipment reaches maximum utility, the costs per unit will decrease. Champaign, although recovering more tons than Urbana, has a lower participation level; 34% vs 39% in Urbana. If Champaign's participation level rose to 39% to match Urbana's, the cost per ton would drop to $126.00. This makes the two programs somewhat more equitable. Champaign is also paying a higher price to assure a fixed cost over the long term. As Champaign's participation levels rise, their costs will remain steady. This is because the contract between the City and the hauler does not base costs on amount of material or number of homes served; all material placed at the curb by a single-family through fourplex dwellings must be picked up. Urbana, however, will have to make capital equipment purchases to accommodate any increase in participation levels, which will raise Urbana's total program costs. Another item of note is the variation in funding for promotional activities. In 1988, Champaign spent $21,000 on promotion; Urbana spent $5,500.00.

TABLE 8*

Costs For Residential Recyclable Collection In Champaign-Urbana, 1988

	Champaign	Urbana
Total Tons Collected (1988)	**951**	**645**
Expenditures		
Curbside	$208,000.00	$85,485.00
CRC (Processing)(1)	$79,840.00	$79,840.00
Promotion	$21,000.00	$5,500.00
Subtotal	**$308,840.00**	**$170,825.00**
Cost Per Ton	**$325.00**	**$265.00**
Deductions		
Material Revenues	($36,000.00)	($22,000.00)
Avoided Cost ($74 Per Ton)(2)	($70,374.00)	($47,730.00)
Excess Processing Payment(3)	($21,862.00)	($33,490.00)
Avoided Post-Closure Care(4)	($21,873.00)	($14,835.00)
Total Program Costs	**$158,731.00**	**$52,770.00**
Cost Per Ton	**$167.00(5)**	**$82.00**

* See Appendix 5 for updated table.

(1) Includes $21,840 capitalization fund, payments ended in 1988. Remaining CRC payments through 1991 are $58,000 per year.

(2) Includes collection, transportation and disposal at landfill only; does not include post-closure care cost.

(3) Represents the savings each city would gain if they only paid processing costs for the actual tonnage generated through curbside programs. CRC annual report states $38.00 as average processing cost. ($58,000 subtract 1988 tonnage for each municipal program multiplied by $38,000).

(4) Represents the post-closure care cost for tonnage in a landfill. CRC's 1988 Annual Report used $1.15 per year as the cost of post-closure care. Figure is cost of monitoring the material in a landfill for 20 years. (Total tonnage diverted multiplied by $1.15 per ton per year multiplied by 20 years).

(5) If Champaign's participation level rose to 39% (Urbana's 1988 level), the cost would be $126.00 per ton.

The cost per ton for recycling was found to be distributed differently over collection, transportation and processing for recyclables than for regular garbage service. The percent allocated to collection was 58%, 10% to transportation, and 31% to processing. This can be compared to the 61% allocated to collection for garbage service, 22-26% for transportation and 12-16% for disposal at a landfill.

The collection costs were similar for the two services, is because collection, whether garbage or recyclable, is labor-intensive. Collection costs would be dependent upon the labor wage and productivity. While the garbage haulers have less cohesive routes than the recyclers, their labor rates are probably lower. The transportation allocations primarily reflect the distance. Haulers are currently travelling 20 to 35 miles to disposal. Recyclers must only travel approximately 5 miles to the processing center. The difference in processing/disposal allocations was due to the costs associated with these differences. The tipping fees at area landfills were about $12.00 per ton during 1988. It costs an average of $38.00 per ton to process recyclables during 1988. Since the Cities all pay a processing fee which exceeds their actual processing costs, they in fact paid $61.00 to $90.00 per ton for processing in 1988.

It is difficult to establish a per unit price for solid waste collection and recycling services for the purposes of comparison. Garbage collection and/or recycling services are not "metered" in the traditional sense like water, gas or electricity. A residential account pays for the appearance of the collection vehicle and crew, not for the weight of the individual collection. This is unlike service to commercial or industrial accounts, which typically charge by volume (through container size) for service. Consequently, if a household of four were to pay for the curbside recycling programs at actual costs, it would cost $0.08 per pound in Champaign or $33.00 per year. In Urbana, the annual cost would be $17.00 or $0.04 per pound. This would assume an annual total set-out weight of 416 pounds. This compares to a cost of approximately $0.04 per pound for traditional garbage

collection.

The per unit cost of garbage collection and recycling was calculated to determine how recycling would affect a homeowner's collection bill. Would recycling lower a homeowner's cost of garbage collection? Reviewing the total cost figures, the answer would be no. Recycling does cost more than simply throwing garbage away. However, the system costs should be viewed when determining the true cost of recycling. The system, in this case, would include less tangible costs such as post-closure care. As previously discussed, post-closure care, excess processing payments and material sales revenues were all costs that were discounted against the total cost of the Cities' recycling programs. Once this discounting takes place, the cost to recycle became comparable to the cost of traditional garbage collection.

There are currently other system parameters that would prevent any recycling or waste reduction activity from being reflected in a homeowner's collection bill. A major parameter is the current distribution of collection responsibilities. A private hauler charged an average of $14.40 per month during 1988 to collect garbage from a home. Very few haulers had restrictions on the amount of garbage they would pick up; it would cost the same to have a hauler collect a half full can or 3 full cans. However, as soon as a resident begins to use the curbside program that persons' overall collection bill rises. Not only does the homeowner pay an average of $173.00 a year for private sector garbage collection, the public sector is now paying an additional $17.00 to $33.00 per year to provide curbside recycling for that household.

Because of the dual collection services for garbage and recycling collection, a household's overall garbage bill will rise if they recycle. If one entity were providing both residential recycling and garbage collection, it would be a matter of redistributing collection revenues received between the two activities. This would allow a household's overall bill to remain stable or to limit cost increases due to recycling. Recycling will continue to increase the overall system costs unless a redistribution of funds occurs.

SECTION THREE: Program Expansions

Introduction

In 1988, Champaign County recycled an estimated 62,159 tons or 35% of the municipal solid waste generated in the County. The recycling rate drops to 30% or 59,524 tons, when the non-processible fraction of construction/demolition waste is included in the total calculated generation rate. The Solid Waste Planning and Recycling Act requires the development and adoption of a solid waste plan by March, 1991 which establishes a program to achieve, at a minimum, 15% and 25% recycling rates after three and five years from the date of plan adoption. In order to meet the minimum requirements of 25% by March 1996, Champaign County would have to be recycling approximately 45,200 tons of municipal waste to meet this 25% minimum. Clearly, the current 1988 rate, if maintained, would be sufficient to meet the state mandated recycling requirements.

There has always been a strong commitment to recycling in Champaign County. This commitment, as previously discussed, predates any state mandates on solid waste initiatives. Consequently, there is a strong local public policy preference as embodied in the Association Agreement to go beyond state mandated minimums and to design programs which will recover materials "from the solid waste stream to the maximum extent possible." Based on this charge and given the current programs, the following expansions have been examined:

(1) Expanding participation rates in the current curbside recycling programs in Champaign-Urbana;

(2) Expanding the number of units served by current curbside recycling programs in Champaign-Urbana;

(3) Expanding the types of materials collected by the current recycling programs in Champaign-Urbana;

(4) Expanding the County Hometown program and service to the urbanized fringe areas in Champaign County;

(5) Expanding yardwaste collection programs in Champaign County;

(6) Expanding the University of Illinois recycling program;

(7) Expanding Village of Rantoul recycling programs to curbside collection;

(8) Expanding commercial sector recycling programs and services.

Basis of Projection Methods

Given Champaign County's well established recycling collection and processing database, it was possible to use locally derived data for the purpose of projecting the results of various expansion scenarios. The assumptions used were based on locally derived information, except where noted:

(1) Participation has been locally defined as two recycling set-outs per month per eligible unit for curbside programs. Based on U-Cycle and Reeecycle operating experience, 16 pounds per set-out has been used for each unit participating. This set-out weight and distribution of materials collected (26% glass, 67% newspaper and 7% metals by weight) was held constant during the projection period (1988-2010). No attempt was made to account for material redistribution in the wastestream (i.e. increasing plastics and decreasing metals and glass).

(2) The base participation rate for curbside programs for comparative purposes was established at 40% for the projection period which begins in 1990. The actual participation rate in 1988 was 34% for Champaign and 39% for Urbana. Expanded participation rates for continued voluntary programs were set at 45% and 55%. Participation rates for mandatory programs were set at 65% and 75%. These values were derived from national experience with both types of programs. The upper value for both programs (voluntary and mandatory) represent the upper level of performance for each approach to increased participation.

(3) For expansions into multi-family settings, generation rates for recycling set-outs and set-out compositions were considered the same as for the current curbside program. However, participation rates were set at 30% for voluntary programs and 50% for mandatory programs. The lower rates

were used because the features that make curbside recycling in single-family homes successful may not be present in a multi-family setting. There may be less peer pressure as it would be difficult to determine who is setting buckets out. The use of containers may not be possible in smaller units due to lack of space. Smaller households may not produce enough recyclable material, thereby decreasing the possibility of participation.

(4) U-Cycle and Reeecycle curbside program expansions were evaluated against collection capacity. The collection capacity is represented by the equipment and manpower currently available in each program. The additional tonnage was plotted against the collection capacity to determine when new capacity had to be added. The County's Hometown program was assumed to be more elastic; it would require more collection trips, not more collection vehicles.

(5) No projections were made based on changing to commingled systems or changing to commingled collection vehicles. All curbside and rural drop-off programs assume the same collection and processing system configuration.

(6) The University of Illinois recycling program was assumed to reach its target by 1993 and held constant (adjusted by 5% per year for inflation) for the remainder of the projection period.

(7) The results of increasing collection tonnages from curbside and rural drop-off recycling programs were plotted against available processing capacity at the Community Recycling Center. In 1988, the Community Recycling Center processed 5,344 tons of material of which 1,724 tons (32%) was delivered by public collection programs. For projection purposes, CRC's base tonnage was fixed at the adjusted 1988 level (without public collection program material) and allowed to grow at 5% a year for the period 1988-2010. Processing capacity was considered inelastic because CRC's physical plant is not expandable. The range for overall processing capacity has been set by CRC at between 8,400 to 9,400 tons of material per year. This exists as a range since processing capacity is different for different materials. Therefore, any one processing limit becomes the processing limit for all materials delivered by public sector programs to CRC.

(8) Public sector costs for program expansions were projected for the period 1990-1995. This time frame was used because it is during this period that the majority of capital costs, for either collection or processing, were assumed to be necessary for the projected expansions.

(9) No cost estimates were prepared for the Village of Rantoul since their cost avoidance structure is unlike the rest of the County because they own and

operate their landfill.

Program costs were calculated and projected by combining the processing and collection costs and subtracting landfill cost avoidance and material revenues. Process costs for 1988 were calculated at $38 per ton which was the average processing cost calculated by CRC. CRC estimates that the average cost in 1989 would be $30 per ton. The processing costs were extrapolated to 1995 by assuming $30 per ton and an inflation rate of 5% per year. The per ton cost was multiplied by the projected tonnage for the Reeecycle, U-Cycle and Hometown programs.

Collection costs for the Hometown and Reeecycle programs were assumed to increase at 5% per year from the present contract cost. The U-Cycle program cost increased by 5% per year and an additional $91,000 when projected volumes showed it would be necessary to increase collection capacity. This was the assumed cost, amortized over 5 years, for another collection vehicle, trailer, and bins plus the annual cost of labor for two new employees and associated administration costs.

Cost avoidance was calculated by assuming that the cost of collection, transport and landfilling was $74 per ton in 1988. The cost was extrapolated by assuming that the landfill tipping fee (16% of the per ton cost) increases at a rate of 10% per year and that the collection and transport costs increase (84% of the per ton cost) at a rate of 5% per year.

Material revenue was calculated by determining the percent of distribution of materials for 1988 and assuming that this distribution remained constant through 1995. New materials were added by recalculating the distribution based on the assumed weight of material that could have been collected in 1988. Material prices per ton were determined using the average per ton prices reported by CRC for the 12 month period September 1988 through August 1989. Projected prices were based on the August 1989 prices inflated at 5% per year except for the price for old newspaper. Newspaper price was fixed at $10

per ton for 1990 and not inflated. The 1989 material prices were used to assure the most accurate prices possible.

Increased Voluntary Participation in Existing Curbside Programs

The participation rate for Champaign and Urbana recycling averages about 40% percent. While this is about average for a voluntary program, it indicates that it may be possible to increase participation through increased education and awareness programs. The Household Survey found that, of all the households eligible for curbside service in the Champaign-Urbana sample, an average of 78% said curbside recycling was available in their neighborhood. When broken down into housing types, residents of single-family homes were more aware of the service; an average 82% knew that curbside collection was available. However, residents in duplex, triplex or fourplex units reported availability 58% of the time. The follow-up question, to the respondents that said no curbside program was available in their neighborhood, asked if they would participate if such a program was available. Eighty-five percent of the respondents said that they would participate if such a service was offered. This would indicate that it may be possible to increase participation through targeted education and awareness programs. Moreover, these programs could be specifically directed toward that portion of the housing units currently serviced with the highest occupancy turnover rates, that is, multi-unit buildings.

At a consistent participation level of 45% of eligible units, the City of Urbana's annual tonnage would increase from the 1988 value of 645 tons to 743 tons. A consistent participation level of 55% would have increased this tonnage to 908. The results of these increased, voluntary participation rates are found in Table 9.

One limiting factor in increased voluntary participation would be collection vehicle capacity. Given the current collection vehicle operated by the City of Urbana and the City's collection practices, the maximum annual collection capacity available to the U-Cycle program was estimated to be about 700 tons. Consequently, even at 40%

participation rate within 10 years, the City of Urbana would require additional collection capacity. Since the additional collection capacity would have been added to accommodate the increasing tonnage to reach the 45% participation rate, no new collection equipment

TABLE 9

Expanded U-Cycle Collection Tonnages

Voluntary Program For Single-Family Through Fourplex Residences, 1990-2010

Participation Rates[1]	1990	1995[2]	2000[2]	2005[2]	2010[2]
40% Participation	661	668	716	745	775
45% Participation	743	773	805	837	872
55% Participation	908	945	983	1023	1065

(1) Total tonnages for participation rates based on number of eligible households in 1988.

(2) Annual increases represent a natural growth rate of 0.8% per year.

would be needed at the 55% participation level. The relationship between collection capacity for the City of Urbana and the U-Cycle program are found in Figure 9.

The increase in participation levels would increase the costs of the U-Cycle program. The capital costs for new equipment to service the 45% level was estimated at $91,000. If one man crews were used, this cost would decrease. (See Appendix 2 for a detailed cost analysis.) There would also be an increase in the operating cost for the program. At the 45% level, it was estimated that net operating costs would be approximately $178,000. The only item deducted was revenue generated from material sales. If the savings attributed to cost avoidance were deducted, the program cost would be about $116,700, or $157 per ton. At the 55% level, the net operating costs were estimated at $180,000 for the first year. Subtracting the calculated cost avoidance lowers the cost to $104,700, or $115 per ton. The estimated cost to collect, transport and dispose of one ton of

municipal solid waste in either Danville or Villa Grove was $83 for the same year.

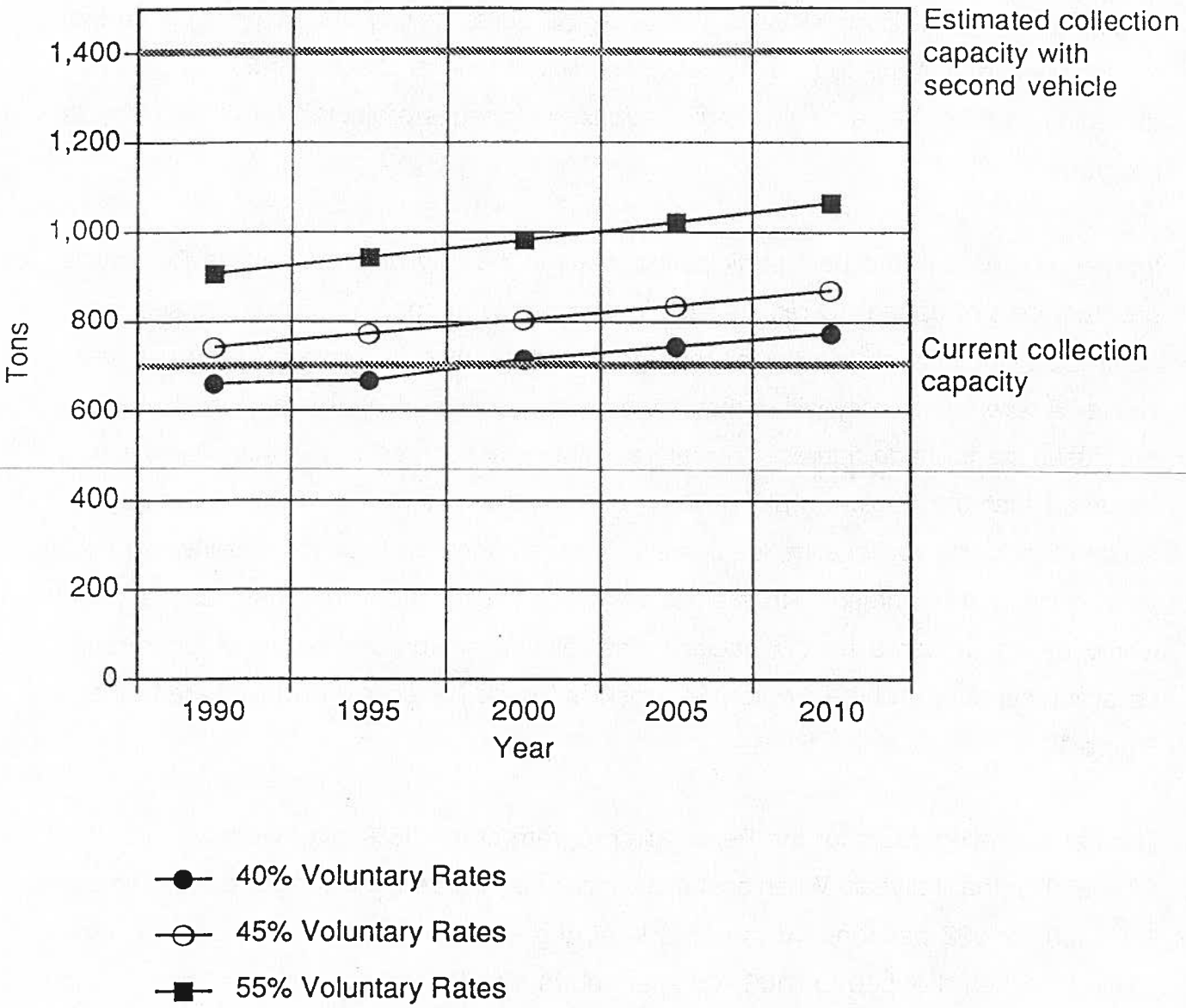


FIGURE 9

Relationship of U-Cycle Collection Capacity to Projected Collection Tonnage:
Voluntary Program for Single-Family through Fourplex Residences

At a consistent participation level of 45% of eligible units, the City of Champaign's annual tonnage would be 1,352 tons. A consistent participation level of 55% would increase the tonnage to 1,652. Table 10 shows the increased tonnages projected for the Reeecycle program.

Increased voluntary program participation levels in the City of Champaign's Reeecycle program do not appear to require additional collection capacity. Since the service is contracted out to a private hauler through January, 1992, it was assumed that there would be level of flexibility within that hauler's organization. The current contract fee is not based on tonnage figures. Therefore, if the total tons collected increased, it was assumed that the hauler would have to accommodate that increase. This may be accomplished by reallocating equipment from another part of the business or by purchasing new equipment. No attempt was made to estimate what type of capital costs would be encumbered by the hauler. The relationship between City of Champaign collection capacity and the program expansions for the Reeecycle program are found in Figure 10.

The net operating costs for the Reeecycle program at the 45% level were estimated at $237,600 for the first year. When cost avoidance was included, the program cost became $125,400, or $93 per ton. At the 55% level, the estimated net operating costs were $240,800 which dropped to $103,700 after subtracting the cost avoidance figure. That lowered the per ton cost to approximately $63.00 per ton compared to $83.00 per ton to simply landfill the waste.

Mandatory Participation in Curbside Programs

Mandatory participation in curbside recycling programs is predicted on some type of punitive action against non-participants. For example, a homeowner's garbage is not collected or the homeowner is fined or both if they do not recycle. However, these punitive measures presuppose that a municipality actively participates in the collection

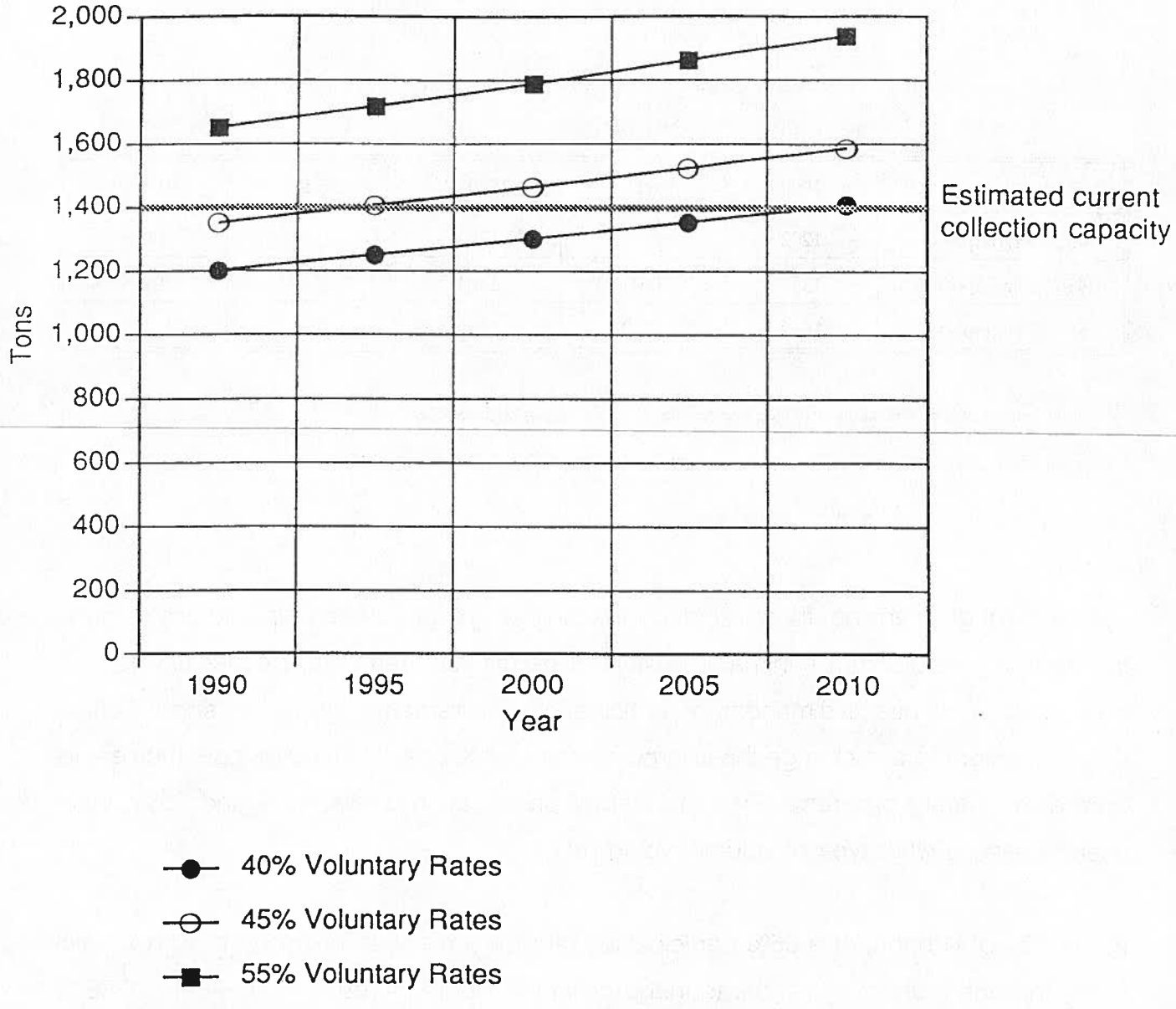


FIGURE 10

Relationship of Reeecycle Collection Capacity to Projected Collection Tonnage:
Voluntary Program for Single-Family through Fourplex Residences

TABLE 10

Expanded Reeecycle Collection Tonnages

Voluntary Program For Single-Family Through Fourplex Residences, 1990-2010

Participation Rates[1]	1990	1995[2]	2000[2]	2005[2]	2010[2]
40% Participation	1202	1251	1302	1355	1410
45% Participation	1352	1407	1464	1524	1586
55% Participation	1652	1719	1789	1862	1938

(1) Total tonnages for participation rates based on number of eligible households in 1988.

(2) Annual increases represent a natural growth rate of 0.8% per year.

system through licensing, franchising, contracting or outright ownership and provision of the service. Aside from minimal license and permit requirements, neither city is in a position to cause effective mandatory participation requirements. However, should either Champaign or Urbana change these circumstances, it is possible to anticipate the results from a mandatory program. Two mandatory participation levels, 65% and 75%, were used to assess what type of volume would result.

In the City of Urbana, at a 65% participation rate for a mandatory program with single-family through fourplex units, the tonnage collected would increase from 645 in 1988 to 1,074. If the participation rate in the U-Cycle program increased to 75% due to mandatory requirements, then the collected tonnage would rise to 1,239. The results of these participation rates are shown in Table 11. Additional collection capacity that would be required at the 65% mandatory participation level was assumed to have been added at the 45% level; this would accommodate the tonnage at the 65% level as well as the tonnage at the 75% level. The relationship between collection capacity and increased participation can be seen on Figure 11.

TABLE 11

Expanded U-Cycle Collection Tonnages

Mandatory Program For Single-Family Through Fourplex Residences, 1990-2010

Participation Rates[1]	1990	1995[2]	2000[2]	2005[2]	2010[2]
Current Participation					
40% Participation	661	668	716	745	775
Mandatory Participation					
65% Participation	1074	1118	1163	1211	1260
75% Participation	1239	1289	1342	1397	1453

(1) Total tonnages for participation rates based on number of eligible households in 1988.

(2) Annual increases represent a natural growth rate of 0.8% per year.

At the mandatory levels of 65% and 75%, the estimated net operating costs for the U-Cycle program were $181,800 and $183,600, respectively. With cost avoidance deducted, the costs decrease to $92,700 at the 65% level and $80,800 at the 75% level.

In the City of Champaign, as shown in Table 12, a 65% participation rate for a mandatory program with single-family through fourplex units would increase the tonnage collected by the Reeecycle program to 1,953. If the participation rate in the Reeecycle program increased to 75%, then the collected tonnage would rise to 2,253.

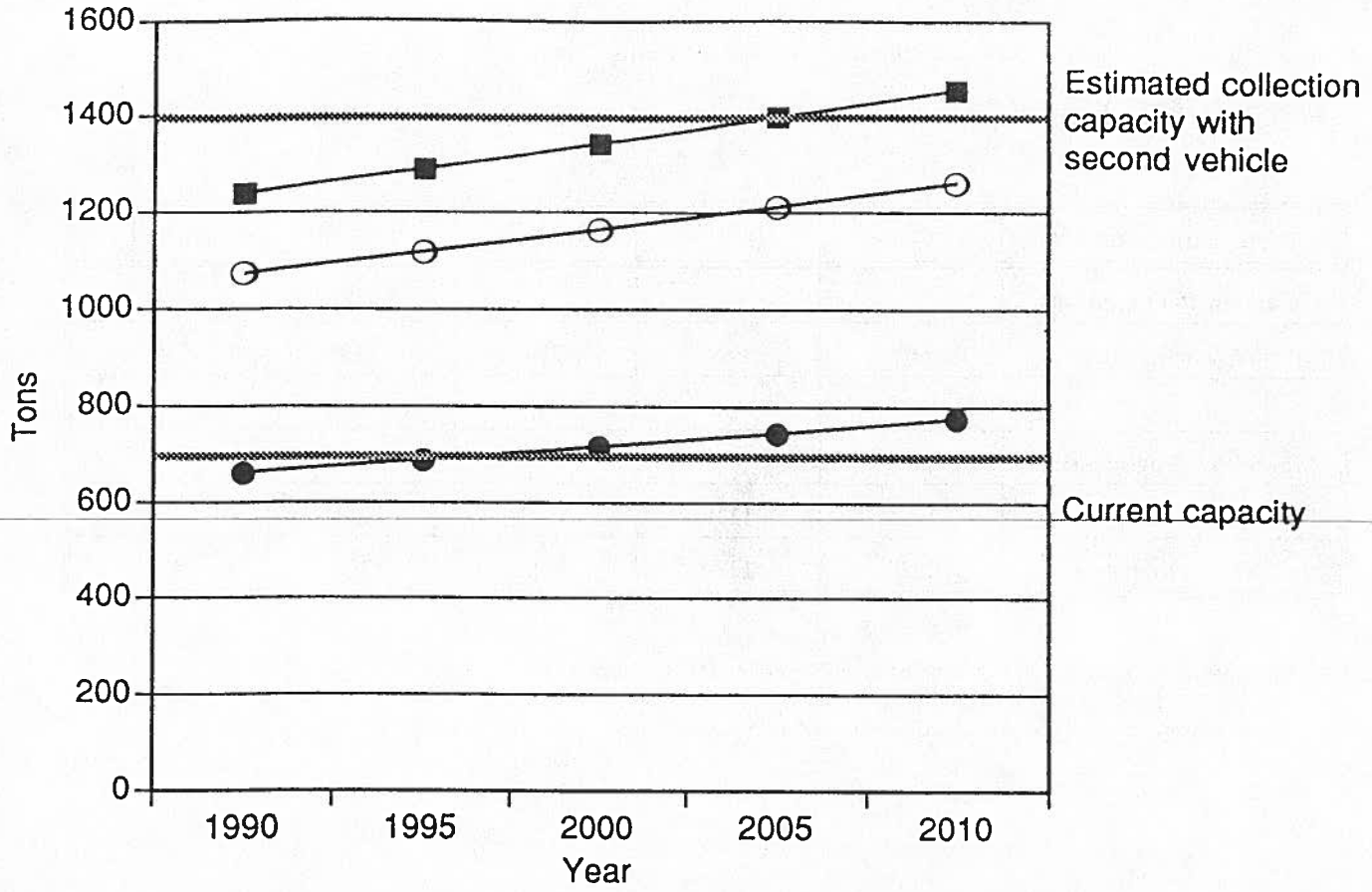


FIGURE 11

Relationship of U-Cycle Collection Capacity to Projected Collection Tonnage:
Mandatory Program for Single-Family through Fourplex Residences

TABLE 12

Expanded Reeecycle Collection Tonnages

Mandatory Program For Single-Family Through Fourplex Residences, 1990-2010

Participation Rates[1]	1990	1995[2]	2000[2]	2005[2]	2010[2]
Current Participation					
40% Participation	1202	1251	1302	1355	1410
Mandatory Participation					
65% Participation	1953	2033	2115	2201	2291
75% Participation	2253	2345	2440	2539	2643

(1) Total tonnages for participation rates based on number of eligible households in 1988.

(2) Annual increases represent a natural growth rate of 0.8% per year.

Under a mandatory program, Champaign's collection costs were estimated to remain at the current contract level. As previously mentioned, the contractor is required to pick up all material set-out by the eligible single-family through fourplex residences. The net operating costs at the 65% level were estimated at $244,000 and $247,100 at the 75% level. The contractor could probably renegotiate the contract with the City if participation reached the mandatory levels. The relationship between collection capacity and increased participation can be seen in Figure 12.

Expansion Into Multi-Family Structures with 5-9 Units

Current curbside residential recycling programs directly serve approximately 62% of the housing units in Champaign and 60% of the housing units in Urbana. The distribution of housing units in Champaign County is shown in Table 13.

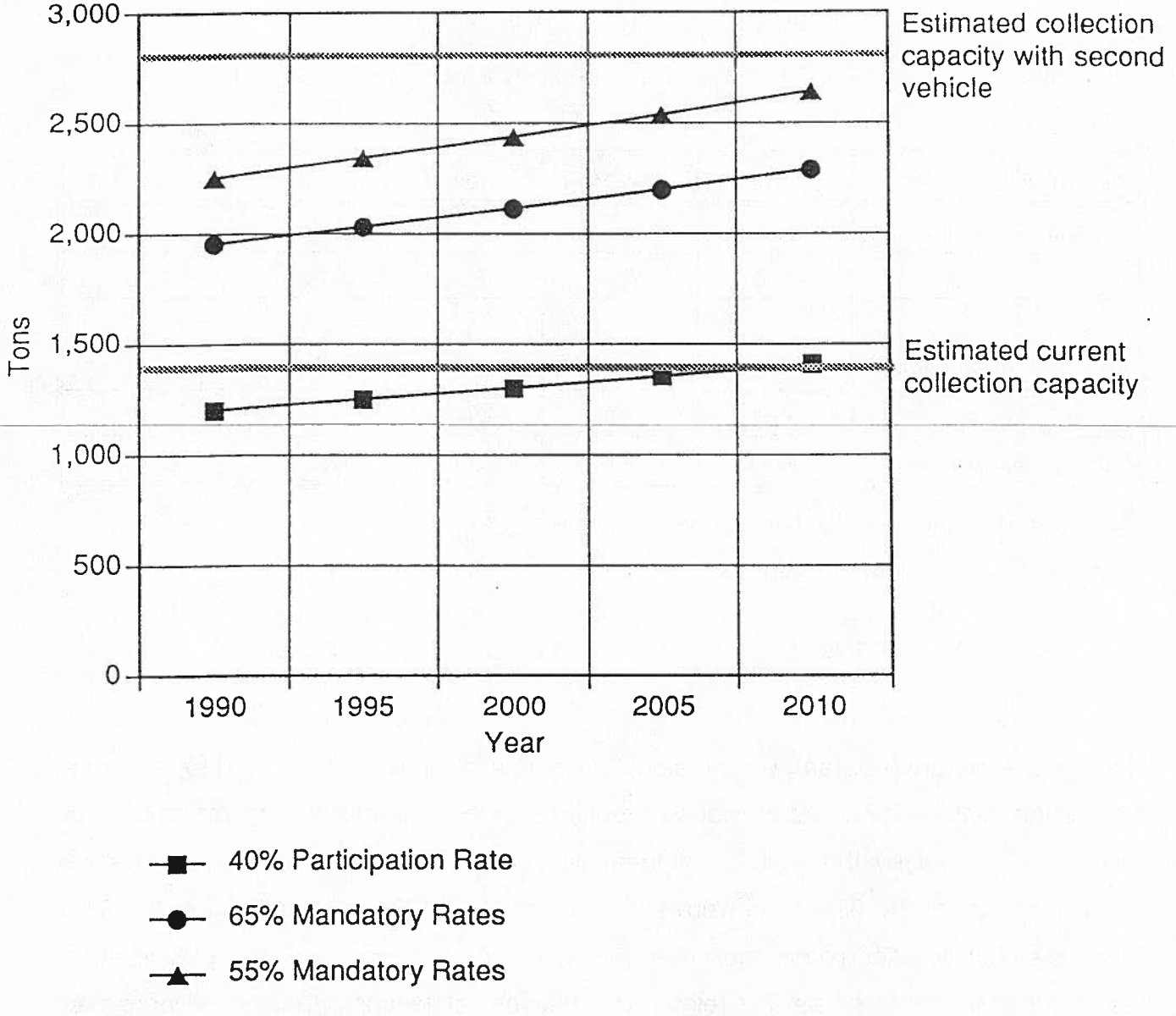


FIGURE 12

Relationship of Reeecycle Collection Capacity to Projected Collection Tonnage:
Mandatory Program for Single-Family through Fourplex Residences

TABLE 13

Distribution Of Housing Stock In Champaign County, Champaign City And Urbana City, 1980

	Champaign County		Champaign City		Urbana City	
Units in Structure	No.	%	No.	%	No.	%
1	36,942	59%	11,845	53%	6,172	48%
2	3,272	5%	1,163	5%	800	6%
3 to 4	2,802	4%	945	4%	816	6%
5 to 9	4,733	8%	1,860	8%	1,508	12%
10 to 49	9,388	15%	5,601	25%	2,401	19%
50 or more	1,727	3%	775	3%	793	6%
Mobile Homes	3,627	6%	351	2%	261	2%
TOTAL	62,491		22,540		12,751	

Note: Totals may not add to 100% due to rounding.

Source: 1980 U.S. Census of Housing.

The only multi-family structures currently served by the current curbside collection are duplex, triplex, and fourplex units. Other multi-family units are not provided with any municipal recycling service (one exception was some sororities and fraternities). The only readily available choices for apartment dwellers would be to use in-town drop-off sites. However, based on survey data collected in November 1988, it appears that apartment residents (in structures with 5 or more units) were less likely to know where a drop-off site is located (51%) and even less likely to use a drop-off (35%) than residents in single-family through fourplex units.

In addressing the issue of what type of recycling program should be developed for multi-family units, it should be noted that there are several unique "problems" with recycling in

apartments. One problem is the lack of space. Many apartments are small, thereby making storage of recyclables difficult. A corresponding problem is the lack of space for a centralized collection container(s). Placement of containers in hallways or basements may be a health and safety hazard; it may also be a violation of fire codes in some cases. Other space concerns deal with placement of dumpsters outside. Additional dumpsters may pre-empt parking spaces or open spaces. Both could possibly present a violation of zoning for a landlord.

While individualized collection of all apartments would be complex and expensive, it may be feasible to offer curbside collection to some apartment dwellers. In Champaign, there are approximately 2,024 units in buildings with 5-9 units; in Urbana there are 1,549 units. These represent about 8% of the housing stock in Champaign and 12% of the housing stock in Urbana. Using (7) as the average number of units in a structure, these units represent an additional 289 buildings in Champaign and 221 buildings in Urbana where collection vehicles could stop.

In 1988, the maximum annual number of participating stops for the U-Cycle program was 206,466. With the addition of collection services to structures containing 5-9 units, the number of possible stops would rise to 246,740. This just represents the number of units, and not the number of actual stops. It is not possible to tell how many units in a particular building will participate. One building may have residents of all five units setting material out, while another eligible building may have one resident participating. This would decrease the actual number of stops the vehicle would have to make, while increasing the number of "units" serviced. For this discussion, each unit will be viewed as an individual stop.

In Urbana at the 40% baseline level, if 5-9 dwelling units were added, the *total* program tonnage would be 790 tons. As the participation among the single-family through fourplexes rises to 45%, the tonnage would increase to 888 tons. At the 55% participation level, the total program tonnage would increase to 1,086. Table 14 shows the tonnage

TABLE 14

Expanded U-Cycle Collection Tonnages

Voluntary And Mandatory Programs For Single-Family Through Nine-Unit Residences, 1990-2010[1]

Participation Rates[2]	1990[3]	1995[3]	2000[3]	2005[3]	2010[3]
Voluntary Participation					
40% Participation	790	822	856	890	927
45% Participation	888	924	962	1001	1042
55% Participation	1086	1130	1176	1224	1274
Mandatory Participation					
65% Participation	1283	1335	1390	1446	1505
75% Participation	1480	1540	1603	1668	1736

(1) Participation rates in five to nine-unit residences were held at 30% for all voluntary rates and at 50% for all mandatory rates. Participation rates shown reflect the rates in single-family through fourplex residences.

(2) Total tonnages for participation rates based on number of eligible households in 1988.

(3) Annual increases represent a natural growth rate of 0.8% per year.

figures. Under a mandatory program the tonnages would rise to 1,283 at the 65% level and 1,480 at the 75% level; Table 14 displays these tonnage figures. Both the voluntary and mandatory program tonnages are illustrated in Figure 13 against the current collection capacity.

If Urbana added 5-9 unit apartments, their net operating costs would be assessed at $179,900 when there was a 45% participation level in single-family through fourplexes. When participation in single-family through fourplexes rose to 55% (with 5-9 units remaining at 30%) the net operating costs rose to $182,000 for the first year. With the addition of 5-9 units, additional containers would have to be purchased. The initial expense for buckets would be $6,000.00. Replacement buckets were included in the operating costs. The calculated cost avoidance was $73,700 at the 45% level which would lower the program costs to $106,200. At the 55% level, the cost avoidance was calculated at $90,100; program costs would decrease to $91,800.

Under the mandatory participation levels, net operating costs were figured to be $184,100 at the 65% level; after cost avoidance, the costs were $77,600. At the 75% level, a third collection vehicle would be required, which increased the operating costs by another $91,000. Net operating costs were then estimated to be $277,100. With the deduction of $122,100 calculated for cost avoidance, the costs drop to $154,300.

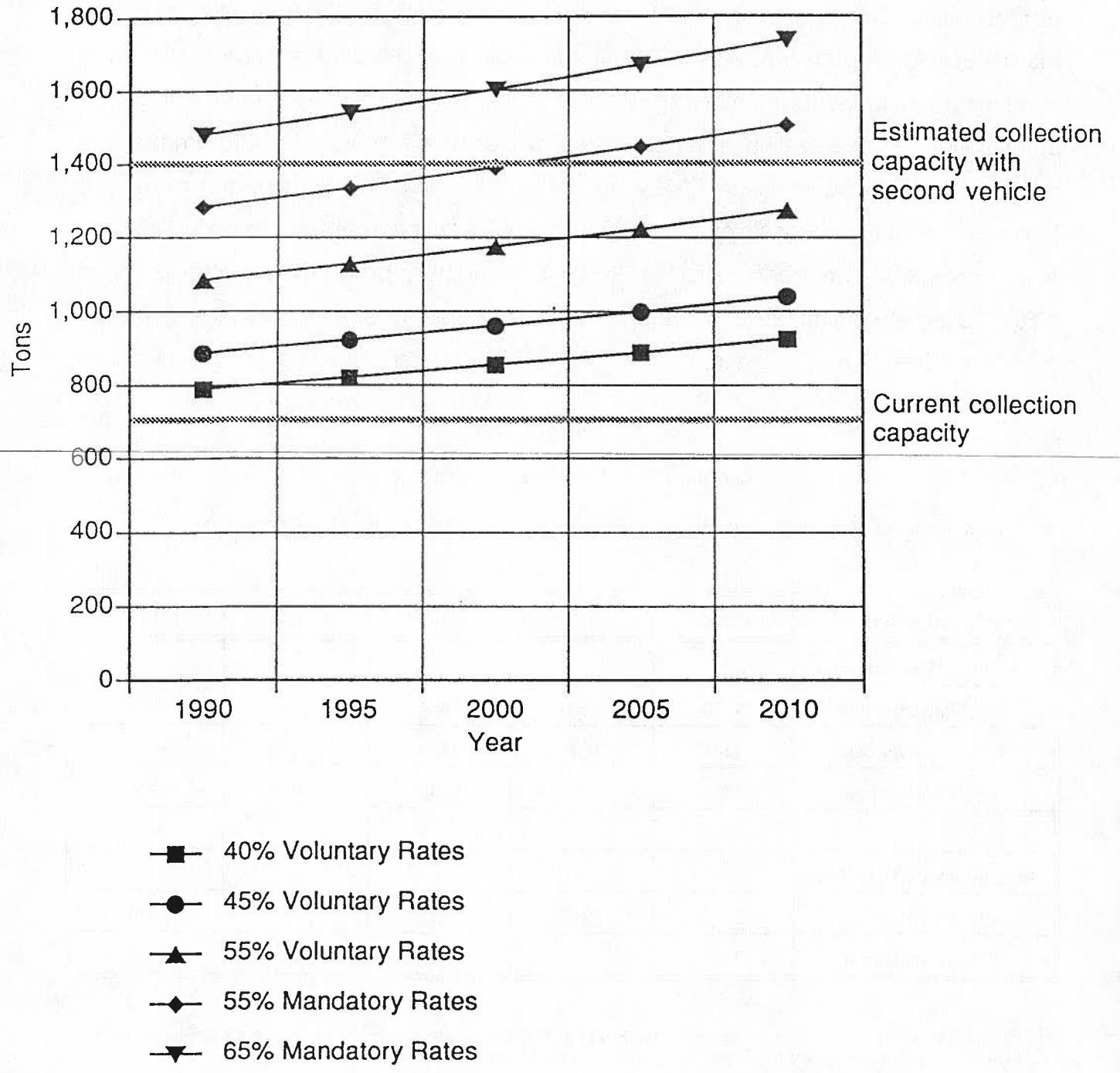


FIGURE 13

Relationship of U-Cycle Collection Capacity to Projected Collection Tonnage:
Voluntary and Mandatory Programs for Single-Family through Nine Unit Residences

For the City of Champaign, the 1988 maximum annual number of participating stops for the Reeecycle program was 375,492. With the addition of collection service to structures containing 5-9 units, the number of possible stops would rise to 428,116. Using 40% participation as the baseline, if 5-9 units were added to the Reeecycle program the total program tonnage would rise to 1,370. Under the 45% and 55% voluntary programs, with 5-9 units the total tonnages would be 1,541 and 1,884, respectively as shown in Table 15. At the 65% and 75% participation levels for a mandatory program, the total program would collect an estimated 2,226 and 2,569 tons. Table 15 also shows the mandatory collection rates. The tonnages, projected over 20 years, are illustrated in Figure 14.

TABLE 15

Expanded Reeecycle Collection Tonnages

Voluntary And Mandatory Programs For Single-Family Through Nine-Unit Residences, 1990-2010[1]

Participation Rates[2]	1990[3]	1995[3]	2000[3]	2005[3]	2010[3]
Voluntary Participation					
40% Participation	1370	1426	1484	1544	1607
45% Participation	1541	1604	1669	1737	1808
55% Participation	1884	1961	2041	2124	2210
Mandatory Participation					
65% Participation	2226	2317	2411	2509	2611
75% Participation	2569	2674	2782	2896	3014

(1) Participation rates in five to nine-unit residences were held at 30% for all voluntary rates and at 50% for all mandatory rates. Participation rates shown reflect the rates in single-family through fourplex residences.

(2) Total tonnages for participation rates based on number of eligible households in 1988.

(3) Annual increases represent a natural growth rate of 0.8% per year.

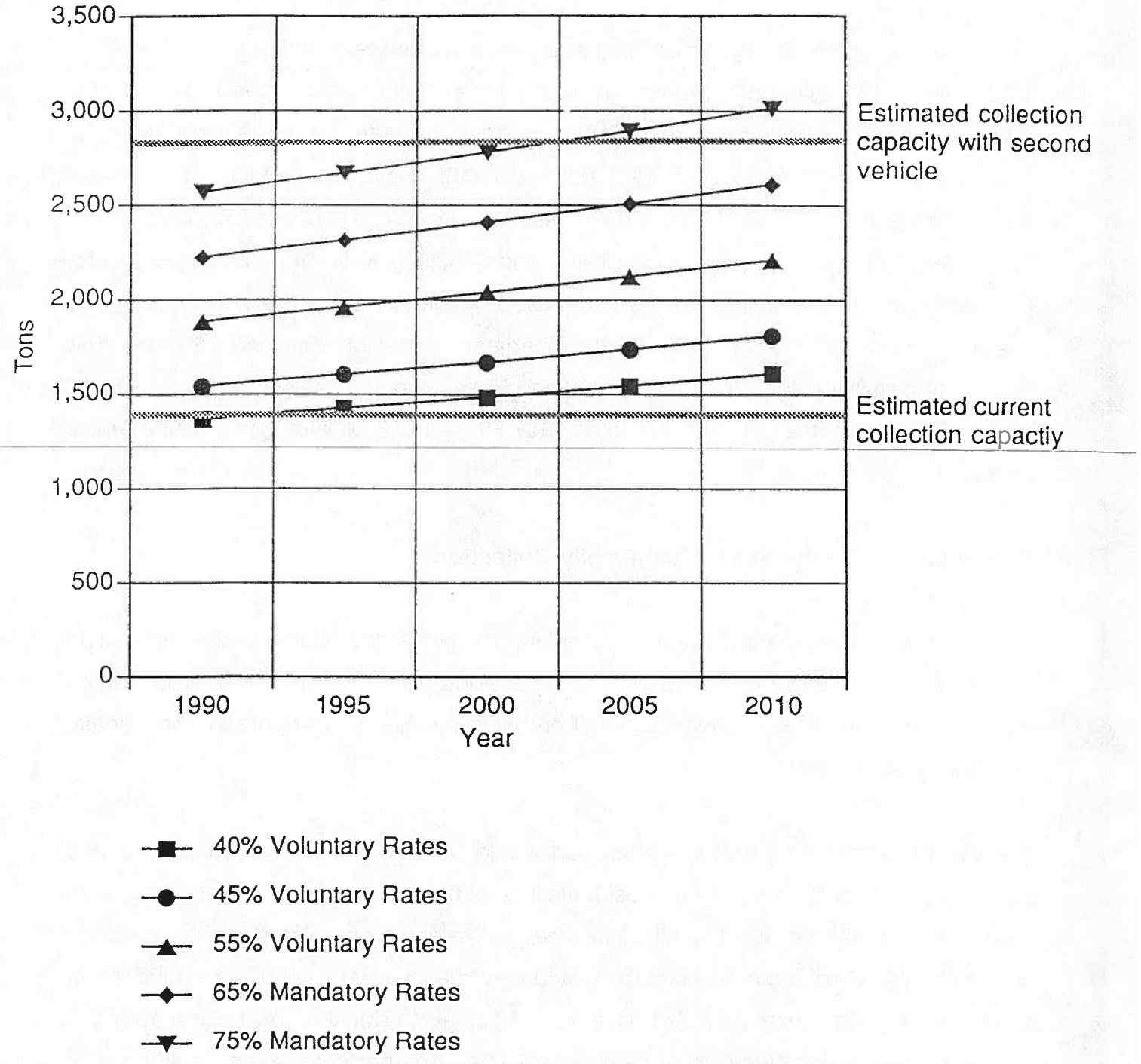


FIGURE 14

Relationship of Reeecycle Collection Capacity to Projected Collection Tonnage:
Voluntary and Mandatory Programs for Single-Family through Nine Unit Residences

Net operating costs for the voluntary participation levels were estimated to begin at $285,300. The addition of 5-9 units would allow the contractor to renegotiate with the City. To project the possible increase in the contract, the collection costs were raised to $275,000 from the current level of $208,000. At the 55% level, the net operating costs were projected to be $288,900 for the first year. When cost avoidance calculations are subtracted, the cost decreased to $157,400 and $132,500 at the 45% and 55% levels. Containers for the 5-9 units could be purchased by the city or by the contractor. The cost would be about $8,000.00. At the mandatory levels of 65% and 75%, the net operating costs were figured to be $292,500 and $296,100 respectively. With adjustments for cost avoidance, the net costs would be $107,800 at the 65% level and $82,900 at the 75% level.

Expansion into Large Scale Multi-Family Collection

Expansion into buildings with 10 or more units pose some operational problems that do not mirror the problems associated with the expansions previously discussed. It becomes increasingly impractical to offer traditional curbside service to residents in large scale, multi-family structures.

The two main problems with this approach would be visual impact of containers and collection/ownership. If 50% of the residents in a thirty unit complex were recycling each week, there would be 30 (15 units times two containers) containers on the curb on collection day. Also, the collection staff would become inefficient servicing a hundred or so containers. Residents may also have trouble retrieving buckets for these reasons, a container collection strategy would be more efficient. Another cost which would have to be considered would be the increased education and supply information designed for the multi-family resident. This investment would be necessary both for start-up of the

program, and on an on-going basis because of the high turnover rate of the population in multi-family units.

Consequently, the large scale multi-family buildings would require a different collection method. The most common type of collection for these types of units involves placing dumpsters outside the building. Residents may, or may not, be given containers, however, they have access to the dumpster at any time. This would decrease the room needed to store recyclables in an apartment. However, most dumpster collection systems involve commingled materials, usually glass and cans. This would not be compatible with the current processing system at the Community Recycling Center. Segregated dumpsters compatible with the current collection system would be available at a cost of $5,000-$6,000 each.

In Champaign, an estimated 200 buildings would use this type of collection system. If one dumpster was purchased for each building, the cost would be $1,100,000.00. In Urbana, approximately 95 buildings of 10 or more units would use this collection system. Purchasing dumpsters for those buildings would cost about $522,500.00.

There are other commingled systems using dedicated dumpsters or various types of bags which are placed in the regular dumpster that would provide a lower cost alternative for the 10 plus structures. However, these cannot be used until there is a facility capable of processing commingled recyclables.

Additional Material Collection

The net effect of expanding the number and types of materials collected by recycling programs is to increase the amount of material collected per set-out. In other words, to increase the weight of the containers per participating household. An analysis was made of the expected increase in per set-out weight for the following materials; plastics (HPDE and PET); residential cardboard/paperboard; and used oil.

The addition of these materials would increase the type and range of household products that could be recycled. High density polyethylene (HDPE) is used primarily in plastic milk

jugs. It is also used for liquid detergent or antifreeze containers. HDPE is the largest plastic resin used within the blow molded container market. Polyethylene Terephthalate (PET) is used for plastic bottles. The base cups on these bottles are usually formed with HDPE. The PET beverage container, HDPE base cups and HDPE milk jugs are considered the highest value plastics. Recyclable cardboard and paperboard are any boxes that tear brown, grey, or white. Cereal boxes, tissue boxes and packaging boxes of all types would be recyclable through curbside pick-up. Used motor oil from cars, lawn mowers, or other small engines is also recyclable. Used oil is currently accepted at the in-town drop off sites in Champaign County but is being collected elsewhere in the United States through curbside programs.

The Reeecycle program began accepting HDPE plastic milk jugs in 1988. The average set-out has included about 0.1 pounds per set-out of HDPE. The Naperville Area Recycling Center (NARC) in Naperville, Illinois has also been collecting HDPE milk jugs through its curbside program. They estimate a collection rate of 2.5 pounds per household per year. In Champaign, the annual collection rate would be about 2.6 pounds per household per year. At the 40% baseline rate, Champaign could collect 8 tons of HDPE a year. In Urbana, at the 40% level, 4 tons could be recycled. Table 16 and 17 show the increasing quantities of material that could be collected at various participation levels in Champaign and Urbana Tables 18 and 19 show the increasing tonnage figures with the addition of 5-9 units.

The above figures represent HDPE milk jugs only. Other HDPE containers could also be collected. Generation rates for those types of containers are not readily available. However, according to CRC, milk jugs make up about 75% or more of the HDPE they collect. Education may increase collection of other HDPE containers, but milk jugs will probably remain the largest segment. While these tonnage figures alone would not necessitate additional collection vehicles, due to the nature of plastic, some alteration in the current collection system may be necessary due to the bulky nature of plastic.

Various methods have been developed to handle plastics on curbside collections. These include on-truck densifiers or granulators. Other methods for handling plastics include using bulk lift bags for vertical storage on a collection vehicle. Increasing the number of trips to the processing center would also be an option. Many curbside programs that pick up plastic have a larger collection vehicle designed for the plastic volume. No matter which option would be selected there would be some increase in the cost of collection. However, the option selected must remain compatible with the current processing system. CRC uses fork lifts to off-load bins from the collection trucks. Purchasing a new vehicle or trailer designed to dump plastic would require changes at CRC; an additional capital cost.

TABLE 16

U-Cycle Curbside Additional Tonnages

Total Tons With Additional Materials Added At Voluntary And Mandatory Participation Rates For Single-Family Through Fourplex Residences, 1990-2010

Participation Rates[1]	1990[2]	1995[2]	2000[2]	2005[2]	2010[2]
Voluntary Participation					
40% Participation	661	688	716	745	775
Paperboard	206	214	223	232	242
HDPE Plastic	4	4	4	5	5
PET Plastic	6	6	7	7	7
Used Oil	9	9	10	10	11
Subtotal	**225**	**234**	**244**	**254**	**264**
45% Participation	743	773	805	837	872
Paperboard	232	241	251	262	272
HDPE Plastic	5	5	5	5	5
PET Plastic	7	7	8	8	8
Used Oil	10	10	11	11	12
Subtotal	**254**	**264**	**275**	**286**	**297**
55% Participation	908	945	983	1023	1065
Paperboard	284	296	308	320	333
HDPE Plastic	6	6	6	6	7
PET Plastic	9	9	9	10	10
Used Oil	13	14	14	15	15
Subtotal	**311**	**324**	**337**	**351**	**365**
Mandatory Participation					
65% Participation	1074	1118	1163	1211	1260
Paperboard	336	350	364	379	394
HDPE Plastic	7	7	7	8	8
PET Plastic	10	11	11	11	12
Used Oil	15	16	16	17	18
Subtotal	**368**	**383**	**398**	**415**	**431**
75% Participation	1239	1289	1342	1397	1453
Paperboard	387	403	419	436	454
HDPE Plastic	8	8	8	9	9
PET Plastic	12	12	13	13	14
Used Oil	17	18	18	19	20
Subtotal	**423**	**441**	**458**	**477**	**497**

(1) Total tonnage figures for materials and participation rates are based on the number of eligible units in 1988.
(2) Annual increases represent a natural growth of 0.8% per year.

TABLE 17

Reeecycle Curbside Additional Tonnages

Total Tons With Additional Materials Added At Voluntary And Mandatory Participation Rates For Single-Family Through Fourplex Residences, 1990-2010

Participation Rates[1]	1990[2]	1995[2]	2000[2]	2005[2]	2010[2]
Voluntary Participation					
40% Participation	1202	1251	1302	1355	1410
Paperboard	375	390	406	423	440
HDPE Plastic	8	8	9	9	9
PET Plastic	11	11	12	12	13
Used Oil	19	18	18	19	20
Subtotal	**411**	**428**	**445**	**463**	**482**
45% Participation	1352	1407	1464	1524	1586
Paperboard	422	439	457	476	495
HDPE Plastic	8	8	9	9	9
PET Plastic	13	14	14	15	15
Used Oil	17	18	18	19	20
Subtotal	**460**	**479**	**498**	**518**	**540**
55% Participation	1652	1719	1789	1862	1938
Paperboard	516	537	559	582	605
HDPE Plastic	10	10	11	11	12
PET Plastic	16	17	17	18	19
Used Oil	19	20	21	21	22
Subtotal	**561**	**584**	**608**	**632**	**658**
Mandatory Participation					
65% Participation	1953	2033	2115	2201	2291
Paperboard	610	635	661	688	716
HDPE Plastic	12	12	13	14	14
PET Plastic	18	19	19	20	21
Used Oil	23	24	25	26	27
Subtotal	**663**	**690**	**718**	**747**	**778**
75% Participation	2253	2345	2440	2539	2643
Paperboard	704	733	762	794	826
HDPE Plastic	14	15	15	16	16
PET Plastic	21	22	23	24	25
Used Oil	27	28	29	30	32
Subtotal	**766**	**797**	**830**	**863**	**899**

(1) Total tonnage figures for materials and participation rates are based on the number of eligible units in 1988.
(2) Annual increases represent a natural growth of 0.8% per year.

U-Cycle Curbside Additional Tonnages

Total Tons With Additional Materials Added At Voluntary And Mandatory Participation Rates For Single-Family Through Nine-Unit Residences, 1990-2010

Participation Rates[1]	1990[2]	1995[2]	2000[2]	2005[2]	2010[2]
Voluntary Participation					
40% Participation	790	822	856	890	927
Paperboard	247	257	268	278	290
HDPE Plastic	5	5	5	6	6
PET Plastic	7	8	8	8	9
Used Oil	11	11	12	12	13
Subtotal	**270**	**281**	**293**	**305**	**317**
45% Participation	888	924	962	1001	1042
Paperboard	278	289	301	313	326
HDPE Plastic	6	6	6	6	7
PET Plastic	8	9	9	9	10
Used Oil	12	12	13	14	14
Subtotal	**304**	**316**	**329**	**343**	**356**
55% Participation	1086	1130	1176	1224	1274
Paperboard	339	353	367	382	398
HDPE Plastic	7	7	7	8	8
PET Plastic	10	11	11	11	12
Used Oil	15	16	16	17	18
Subtotal	**371**	**386**	**402**	**418**	**435**
Mandatory Participation					
65% Participation	1283	1335	1390	1446	1505
Paperboard	401	417	434	452	470
HDPE Plastic	8	8	9	9	9
PET Plastic	12	12	13	14	14
Used Oil	18	19	19	20	21
Subtotal	**439**	**457**	**475**	**495**	**515**
75% Participation	1480	1540	1603	1668	1736
Paperboard	463	482	501	522	543
HDPE Plastic	9	9	10	10	11
PET Plastic	14	14	15	16	16
Used Oil	21	22	23	24	25
Subtotal	**507**	**528**	**549**	**571**	**595**

(1) Total tonnage figures for materials and participation rates are based on the number of eligible units in 1988.
(2) Annual increases represent a natural growth of 0.8% per year.

Reeecycle Curbside Additional Tonnages

Total Tons With Additional Materials Added At Voluntary And Mandatory Participation Rates For Single-Family Through Nine-Unit Residences, 1990-2010

Participation Rates[1]	1990[2]	1995[2]	2000[2]	2005[2]	2010[2]
Voluntary Participation					
40% Participation	1370	1426	1484	1544	1607
Paperboard	428	445	464	482	502
HDPE Plastic	9	9	10	10	11
PET Plastic	13	14	14	15	15
Used Oil	19	20	21	21	22
Subtotal	**469**	**488**	**508**	**529**	**550**
45% Participation	1541	1604	1669	1737	1808
Paperboard	482	502	522	543	565
HDPE Plastic	10	10	11	11	12
PET Plastic	14	15	15	16	16
Used Oil	22	23	24	25	26
Subtotal	**528**	**549**	**572**	**595**	**619**
55% Participation	1884	1961	2041	2124	2210
Paperboard	589	613	638	664	691
HDPE Plastic	12	12	13	14	14
PET Plastic	18	19	19	20	21
Used Oil	26	27	28	29	30
Subtotal	**645**	**671**	**699**	**727**	**757**
Mandatory Participation					
65% Participation	2226	2317	2411	2509	2611
Paperboard	696	724	754	785	816
HDPE Plastic	14	15	15	16	16
PET Plastic	21	22	23	24	25
Used Oil	31	32	34	35	36
Subtotal	**762**	**793**	**825**	**859**	**894**
75% Participation	2569	2674	2782	2896	3014
Paperboard	803	836	870	905	942
HDPE Plastic	16	17	17	18	19
PET Plastic	24	25	26	27	28
Used Oil	36	37	39	41	42
Subtotal	**879**	**915**	**952**	**991**	**1031**

(1) Total tonnage figures for materials and participation rates are based on the number of eligible units in 1988.
(2) Annual increases represent a natural growth of 0.8% per year.

Another plastic that may be added to the curbside collection is PET. PET is not collected through curbside collection in Illinois although Arlington Heights is due to add it shortly. The curbside collection program in Charlotte, North Carolina does include PET in its weekly collection. The annual average recovery rate is 4 pounds per household; that would indicate the average set-out of PET would be .15 pounds. Using pounds per household, Champaign could collect 11 tons per year (Table 17 & 19). In Urbana, the annual tonnage of PET could be 6 tons (Table 16 & 18). As with HDPE, PET presents handling problems because of the high volume and low weight. Some alteration in the current collection system would have to be made to accommodate PET and so there would be a corresponding capital expenditure.

Paperboard/cardboard is another material that could be added to the curbside collection. Paperboard is the material that cereal and many other food products are packaged in. Using national averages established by Franklin and Associates in 1987, it has been estimated that the daily per capita generation rate for paperboard is 0.2 pounds. Using 2.3 persons per household, the average daily generation rate for a household would be 0.5 pounds or 182 pounds per year. If all of that was generated within a home and if that household recycled all of their paperboard, the average set-out could increase by 7 pounds. Using a lower figure of 5 pounds per set-out, at the baseline rate of 40%, 375 tons of material could be generated in Champaign and 206 tons separated in Urbana (Tables 16 & 17). At the 45% participation level, 422 tons of paperboard would be collected in Champaign while Urbana's tonnage would increase to 232. Tables 17 & 19 show the increased tonnages for the Reeecycle program and Table 16 & 18 show the U-Cycle tonnages.

Used motor oil is another material that can be picked up at the curb. Two communities that currently collect used oil at the curbside are Naperville, Illinois and Sunnyvale, California. In Champaign County, used motor oil is currently collected at the in-town drop-off sites. In 1988, CRC collected 51 tons of used oil through the drop-offs. The Naperville Area Recycling Center (NARC) has estimated it collects 0.75 gallons of used

oil per household per year. Sunnyvale estimates its collection rate at one gallon per household. Using the NARC figures, an estimated 17 tons of used motor oil could be collected in Champaign and 9 tons in Urbana. Tables 17 & 19 shows the increasing tonnage of used motor oil that could be collected at increasing participation rates in Champaign. Tables 16 & 18 shows the same figures for Urbana.

Collection of used motor oil poses some serious collection and operational challenges. Most residents place their oil in old HDPE milk jugs. However, experience at NARC shows that the oil tends to soften the plastic, increasing the possibility that the jugs may rupture. Therefore, it is important to store the jugs vertically, not horizontally. This increases the amount of space on the collection vehicle required to accept used oil. The option of pouring the oil into a tank mounted on the truck does not appear to be feasible. The first factor prohibiting this activity is that productive time per stop would decrease, increasing collection time and cost. Secondly, the legal requirements surrounding the handling of used motor oil are in a state of flux. There is a push to clarify the status of used oil as a hazardous or non-hazardous waste. Classification as a non-hazardous waste would facilitate the collection of used oil by recycling centers. However, current laws require special permits and site design for storage and handling facilities. Transferring the oil to a tank on a collection truck would lead to the question of permitting each truck. Until this issue is resolved, the only type of collection will probably be in containers. As with plastics, beginning this type of program would require modification of the current collection vehicles. The cost and type of modifications are unknown.

Expanded County Program

The Hometown program has established rural drop-off sites within five miles of 88% of all the County residents living outside Champaign-Urbana. Nine of the eleven largest villages in the County are served by a site. There appears to be limited expansion opportunities for establishing additional sites. However, the County could expand its program in two

ways: 1) increase the number of materials collected at the current drop-off sites and 2) curbside service to County residents in areas contiguous to Champaign and Urbana.

Materials that may be added to the Hometown drop-off collections include cardboard, paperboard, used motor oil and PET containers. Estimating the tonnage additional material may generate is somewhat difficult because of the lack of information on the number of people or the number of households using the sites. While exact numbers are unclear, CRC has estimated the number of households using the drop-off sites at 750. Using the total 1988 tonnage of 128, household would have deposited 341 pounds of material at a site in 1988. The County Coordinator estimates the Hometown program will level off in 1990 at about 400 tons a year. Using the previously calculated 341 pounds, this means an estimated 2,300 households would be expected to use the drop-off sites.

Assuming approximately 2,300 households will use the drop-off sites, an estimate can be made on tonnages additional materials may generate. With the addition of PET an additional 5 tons per year collected. Paperboard collection could generate an additional 193 tons per year while 7 tons, or 1,725 gallons, of used oils might be collected.

The addition of paperboard, or cardboard, could probably be accommodated with the current drop-off containers, however, the frequency of collection may have to be increased. Adding PET could be accommodated in the same manner the HDPE containers are currently collected. It may be possible to mix the PET with the HDPE containers or a separate bag could be provided. The addition of used oil may require the greatest alteration in the sites. A separate container may be needed for the oil. This could make collection more difficult because a second truck or a second trip to the site may be needed to pick up the oil.

The second program expansion possible for the County would be to begin curbside service in the residential areas contiguous to Champaign and Urbana. Areas such as Scottswood, east of Urbana, and Maynard Lake, west of Champaign, that are directly

adjacent to incorporated areas in Champaign and Urbana. Extending curbside service would consist of a truck continuing down the street or crossing to the next block. However, it is not realistic to expect the County to develop its own curbside program to service these areas. It would be more practical to extend either the Reeecycle or U-Cycle routes to incorporate these neighborhoods.

To determine the number of potential units in the urban fringe, data by Census Tract was used. Table 20 displays the number of residential structures per Census Tract and Figure 15 shows which Census Tracts were reviewed. The total number of eligible structures would be 4,718, this is the total of single-family, duplex, triplex, and fourplex residential structures. To determine which City's program would be expanded, the Census Tracts can again be used as a guideline. Tracts 8, 9, 12.02, and 13 would be assigned to Champaign and tracts 54, 55, 56, 57, 60 and 106 would be assigned to Urbana. This distribution would mean an additional 2,343 single-family through fourplex units for the Champaign program and 2,375 single-family through fourplex units for the Urbana program.

TABLE 20

Distribution Of Residential Structures In The Urban Fringe, 1980

Census Tracts	Number of Units in Structure						
	1	2	3 to 4	5 to 9	10 to 49	50+	Mobile Homes/Trailers
Champaign Fringe							
8	323	61	7	35	30	-	23
9	416	13	13	42	174	40	4
12.02	700	116	65	66	51	-	67
13	571	15	43	48	32	-	4
Urbana Fringe							
54	828	148	13	13	8	35	792
55	819	17	-	5	44	-	156
56	204	29	-	10	-	-	-
57	77	-	-	-	10	-	-
60	26	3	-	-	228	-	-
106(1)	211(1)	-	-	-	-	-	-
TOTAL	**4175**	**402**	**141**	**219**	**587**	**75**	**1,046**

(1) Due to the size of Census Tract 106, population figures for Census Blocks were used. Census Blocks used were 101, 102, 105, 106, 107, 108, 109, 110, 111, 112, 113 and 114. Population figures for these blocks were divided by 2.3 persons per household to determine the number of households. It was assumed that all households were single-family residences.

Source: 1980 U.S. Census Bureau.

Some of these units may be too remote from a residential neighborhood to be included in a curbside program. A review of the location of the units would be needed prior to beginning a program. For this scenario, it was assumed that all of the units, or the maximum number, were to be serviced. Using the same set-out averages as Champaign and Urbana and a 40% participation rate, the total tons this program could collect would

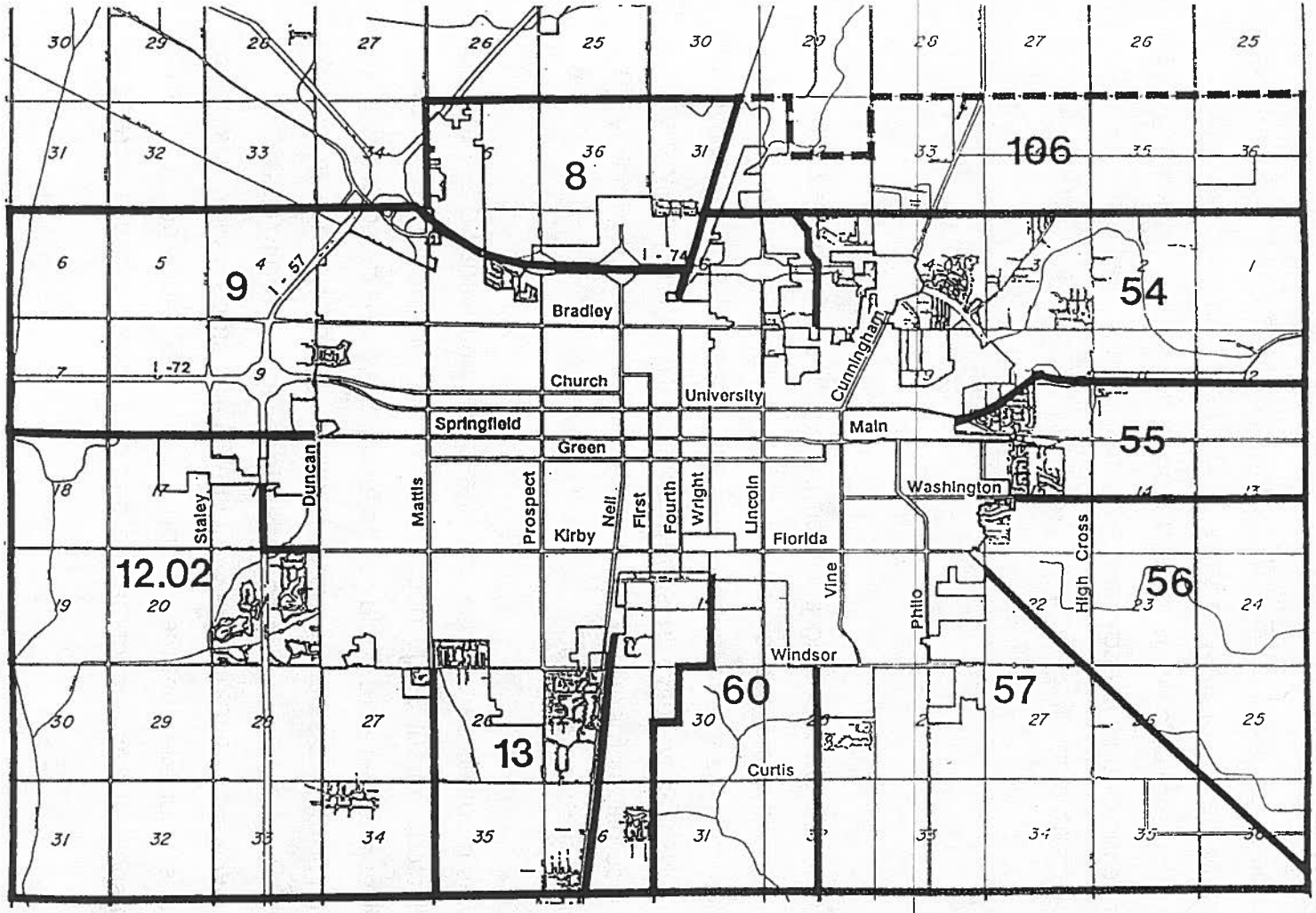


FIGURE 15

Census Tracts Used to Determine Distribution of Households in the Urban Fringe

be approximately 370 tons per year; 180 tons through Champaign and 190 tons in U-Cycle. Using the actual current cost per ton for recycling (including collection, transportation, and processing), cost estimates for this expansion would be $108,850. The County would reimburse Champaign $58,500 for the use of the Reeecycle vehicles and $50,350 to Urbana for the use of U-Cycle service. Deduction for landfill avoidance, energy savings and post-closure care would lower the costs accordingly. These figures may also be altered since the County already pays a processing fee equal to the fee paid by the Cities while generating a significantly lower volume of recyclable material.

Rantoul

Rantoul could expand it's current recycling activities by creating a curbside collection program. The Village currently uses public works crews to collect yardwaste. There is also a private hauler located in the Village that operates a buy-back center and a drop-off site. Since this hauler is already active in some aspects of recycling, they may be receptive to operating a curbside program. This same hauler collects approximately 70% of the Village's residential garbage collection.

If Rantoul's program was modeled on U-Cycle and Reeecycle, an estimated 291 tons of material could be collected. About 3,500 households in the Village are the focus of current recycling activities and therefore could be the focus of a curbside program. This would mean a maximum of 182,000 stops per year. However, if participation is measured as 2 set-outs per month, the total number of potential stops would drop to 91,000 stops per year. At a participation level of 40%, there would be 36,400 stops a year. Using 16 pounds as the average set-out rate, that means approximately 291 tons per year could be collected. Table 21 shows the amount of material that could be collected at increasing participation levels.

TABLE 21

Projected Curbside Tonnages For The Village Of Rantoul

Participation Rates	Tons Per Year
Voluntary Participation	
40% Participation	291
45% Participation	328
55% Participation	400
Mandatory Participation	
65% Participation	473
75% Participation	546

The Village could also examine the possibility of bi-weekly pick-up. Since there are only two haulers operating in town, there may be more flexibility in alternating weeks between regular garbage collection and recyclable collection. The participation levels may be slightly lower under a bi-weekly collection program.

Yardwaste Program Expansions

Currently, Urbana and Rantoul are the only municipalities in Champaign County with a comprehensive yardwaste program. Champaign does offer the Leafcycle and Treecycle programs, but they are operated on a limited basis. The diversion of yardwaste may be the most pressing issue because of the ban on yardwaste from landfills which becomes effective July 1, 1990 (PA 85-1430). Basically, the new requirements prohibit disposal of yardwaste with other residential garbage. Garbage haulers could have their loads rejected at area landfills if they contained residential garbage mixed with yardwaste. Faced with this possibility, they in turn would have to refuse to collect it.

Public Act 85-1430 amended the Environmental Protection Act and added a new section. This section, Section 22.19, has the following requirements:

(a) Beginning July 1, 1990, no person may knowingly mix landscape waste that is intended for collection or for disposal at a landfill with any other municipal waste.

(b) Beginning July 1, 1990, no person may knowingly put landscape waste into a container intended for collection or disposal at a landfill unless such container is biodegradable.

(c) Beginning July 1, 1990, no owner or operator of a sanitary landfill shall accept landscape waste for final disposal, except that landscape waste separated from municipal waste may be accepted by a sanitary landfill if 1) the landfill provides and maintains for that purpose separate landscape waste composting facilities and composts all landscape waste, and 2) the composted waste is utilized by the operators of the landfill or by any other person as part of the final vegetative cover for the landfill or for such other uses as soil conditioning material.

In reviewing yardwaste expansion options, the most difficult factor was determining the generation rate of yardwaste in the County. Yardwaste mixed in with municipal solid waste is really only an issue in urban areas. In rural areas, whatever yardwaste is generated is usually composted or burned on site. Therefore, yardwaste expansion will focus on the largest urban areas in the County, Champaign, Urbana and Rantoul.

The best techniques for estimating yardwaste generation are those based on household rather than on a per capita rate. Estimates based on population tend to be low since generation rates for yardwaste would be attributed to the entire population, many of whom do not have yards. For example, the Brown, Vence and Associates (BVA) report used a per capita approach in its estimation of yardwaste generation. BVA reported a per capita yardwaste generation rate of 0.55 lbs per day (0.44 cubic yards per person per year). Based on an average occupancy rate of 2.4 persons per household, this resulted in approximately 1.1 cubic yards per year. For contrast, the Illinois Department of Energy and Natural Resources (DENR) estimated a single-family home generates 4.4 cubic yards

of yardwaste annually. Using BVA's generation rates, a 9-unit apartment building with 21 residents (2.4 persons per unit) would generate 9.2 cubic yards of yardwaste annually. This appears to be contrary to what actually occurs. Residents in apartment buildings can not be assigned the same square footage of yard that can be assigned to people living in single-family homes. Because of this relationship, the ISWDA staff assumed that the majority of yardwaste would be generated by single-family homes and similar structures. Since curbside services are provided to single-family through fourplex residences, the ISWDA staff used this housing stock for yardwaste program analyses.

After review of the Yardwaste Reclamation Site volumes and discussions with local haulers, the BVA yardwaste generation rate did appear to be low. Local haulers believed the generation rate to be 3 cubic yards per household per year. While staff, through various analyses, placed the figure around 2 cubic yards per household per year. To confirm the range of 2 to 3 cubic yards, the Village of Rantoul was used as a control. In Rantoul, free yardwaste collection has been a well established program which has been offered for many years. It was assumed that such a program would attract the maximum number of participants interested in that program. The Village showed that in their last full year of collection (Fall 1988 to Fall 1989), they collected an average of 2 cubic yards per household was collected.

However, yardwaste generation would be dependent on a number of factors. Lot size or yard size would be one factor. Obviously, larger lots will produce more yardwaste than smaller lots. Yardwaste generation rates would also be sensitive to weather conditions as well as seasonal variations. More yardwaste would be produced during summer and fall, however drought conditions could significantly curtail generation, as seen in the summer of 1988. It was also assumed that not all yardwaste generated would be available for recycling. Some of the yardwaste generated would be used in backyard composting piles used as mulch or left to degrade naturally.

Due to the variability of yardwaste generation, there were a wide array of generation

estimates. Estimates for Champaign County ran from 1.1 cubic yards per household per year according to (BVA) to the State's Department of Energy and Natural Resources estimate of 4.4 cubic yards per household per year. Therefore, the ISWDA staff assumed the range of yardwaste generation to be within 2 to 3 cubic yards per household for single-family through fourplex dwellings. For planning purposes, the upper end of the range, 3 cubic yards, was used as the generation rate. Table 22 shows the generation rates for Urbana, Champaign, and Rantoul.

TABLE 22

Estimated Yardwaste Generation And Recycling In Cubic Yards For Champaign, Urbana And Rantoul, 1988

	Estimated Generation(1)	Estimated Available for Recycling(2)	Currently Recycled	Potential Expansion
Champaign	43,500	29,100	10,900	18,200
	10,005 tons	6,693 tons	2,507 tons	4,186 tons
Urbana	22,200	14,500	9,900	4,600
	5,106 tons	3,335 tons	2,277 tons	1,058 tons
Rantoul	10,500	7,100	7,100	0
	2,415 tons	1,633 tons	1,633 tons	0
TOTAL	**76,200**	**50,700**	**27,900**	**22,800**
	17,526 tons	11,661 tons	6,417 tons	5,244 tons

(1) Based on 3 cubic yards per household; includes single-family through fourplex residences.

(2) Based on the Rantoul program, this is 67% of yardwaste generated.

Conversion formula = cubic yards multiplied by 460 lbs per cubic yard divided by 2,000 lbs per ton = tons of material. The conversion factor of 460 lbs per cubic yard was determined from the Urbana Yardwaste Site.

Table 22 also shows the volume of yardwaste "Estimated Available for Recycling". This figure was developed because, as previously mentioned, it was assumed that not all yardwaste generated would be obtainable through a centralized collection system. Yardwaste may or may not have been collected or residents may have used the leaves

and grass in compost piles or as mulch. Some cities, such as Champaign and Rantoul, still permit burning of yardwaste as a disposal method. These alternatives would reduce the amount of yardwaste available for collection.

Since it was assumed that not all yardwaste generated would be available for recycling, it was necessary to determine what amount of yardwaste would be available. The Village of Rantoul was used to determine this figure. The Village collected approximately 2 cubic yards of yardwaste per household. The generation rate was estimated at 3 cubic yards per household, therefore, the Village collected 67% of the yardwaste generated. As previously discussed, due to the nature of Rantoul's collection, it was assumed that their program collected the maximum amount of possible yardwaste. Consequently, 67% of the total yardwaste generated was designated to be the maximum amount of yardwaste available for recycling. Table 22 shows the generation rates and the amount of yardwaste available for recycling. Table 22 also shows the number of cubic yards of yardwaste currently recycled and the potential for expansion.

To determine the amount of yardwaste currently recycled in Champaign and Urbana, a two-plex process was used. First, the volumes brought to the yardwaste site through the municipal programs was estimated. In Urbana, that number was calculated using the number of U-Bags sold. In Champaign, the hauler under contract to the City for Leafcycle and Treecycle, provided the estimate. Those figures were deducted from the total volume handled at the yardwaste site. Also deducted from the total were volumes brought to the site by public works crews and the University of Illinois. The remainder was not assigned to a particular program. It was assumed to have been brought in by residents or landscape firms. The distribution of single-family through fourplex units in the housing stock was used to determine what city the remainder should be assigned to. Urbana was allocated 34%, or 3,800 cubic yards of the remainder while Champaign was allocated 7,400 cubic yards. These figures were then added to the totals previously estimated for the respective municipal program to obtain the current recycling rates for Champaign and Urbana.

Rantoul was assumed to be collecting the maximum amount possible, therefore, there would be no expansion potential. New housing development could increase the maximum possible, however, in light of Chanute Air Force Base's closing, no new development was anticipated in the near future. To determine Urbana's recycling rate, the number of U-Bags sold was reviewed. The yardwaste manager has reported that 50,000 U-Bags were sold in 1988. It was assumed that not all bags sold were used for a number of reasons; residents outside of Urbana purchased the bags, residents purchased too many bags for their needs, the bags were used for other purposes. Therefore, the yardwaste site manager has estimated that about 75% of all the bags were are collected. Each U-Bag holds approximately 4.4 cubic feet of material. If 37,000 U-Bags were collected, that equaled 165,000 cubic feet, or about 6,100 cubic yards of material. Add that to the 3,800 cubic yards previously calculated for Urbana and a current recycling rate of 9,900 cubic yards per year was estimated. That represents 32% of the estimated yardwaste available for recycling in Urbana. An estimated 3,700 cubic yards remain available that are currently disposed of in some other manner, such as in residential garbage. Champaign had the largest room for program expansion. The private hauler collecting yardwaste in Champaign estimated that about 3,500 cubic yards was picked up through the Leafcycle and Treecycle programs. When added with the previously calculated amount of 7,400 cubic yards, Champaign was attributed with a recycling rate of 10,900 cubic yards per year. Approximately 39% of the available yardwaste was recycled by Champaign residents. Almost 19,000 cubic yards of yardwaste appears to be currently disposed of in residential garbage.

Five collection or management options for yardwaste collection expansion reviewed:

(1) Intensive residential backyard composting program;

(2) Separate hauler sponsored collection programs;

(3) No formal municipal program;

(4) Expanded Municipal collection programs;

(5) Expansion to the urban fringe.

Backyard Composting

There are a number of ways to develop an intensive residential backyard composting program. Some programs revolve around education. Information would be provided to residents through mailings or other promotional avenues and be designed to encourage backyard composting as an alternate way to dispose of yardwaste. Other programs, such as Seattle, Washington's, involve a more direct approach. Seattle will begin their intensive backyard composting program in the Spring of 1990. It will consist of providing a compost bin and a half-hour of instructions on how to compost to 6,000 households. Free instruction on how to compost is already available to Seattle residents. The county in which Seattle is located, King County, will also begin a similar program during which they intend to distribute 14,000 bins. Seattle's program will not charge homeowners for the bins, which cost the city $26.00 each, while the County will charge $8.25 per bin. Volunteers from a local environmental organization will distribute the bins and provide the instruction. Seattle will use a combination of direct solicitation in targeted areas and unsolicited requests from the remainder of the city to distribute the bins. The city is not projecting what level of reduction in yardwaste collection they anticipate from this program.

If Champaign were to begin a program similar to Seattle's with bins costing $26.00 each, it would cost the city approximately $377,000 to provide compost bins to all single-family through fourplex residences. In Urbana, the cost would be $192,400. In Champaign and Urbana, it may be appropriate to begin this type of program by targeting single-family homes in older neighborhoods with mature landscaping. Using census tracts to determine the number of homes in a potential target area, Champaign could begin with 3,100 homes and Urbana with 2,300 homes. This was calculated using data from census tracts 5, 6 and 11 in Champaign and tracts 56 and 58 in Urbana (see Figure 16). Assuming the bins cost $26.00 each, the cost for bins alone would be $80,600 in Champaign and $59,800 in Urbana. In subsequent years, additional areas of the Cities could be targeted for bin distribution. As with Seattle, it is unclear how this would impact the amount of yardwaste available for recycling through a collection program.

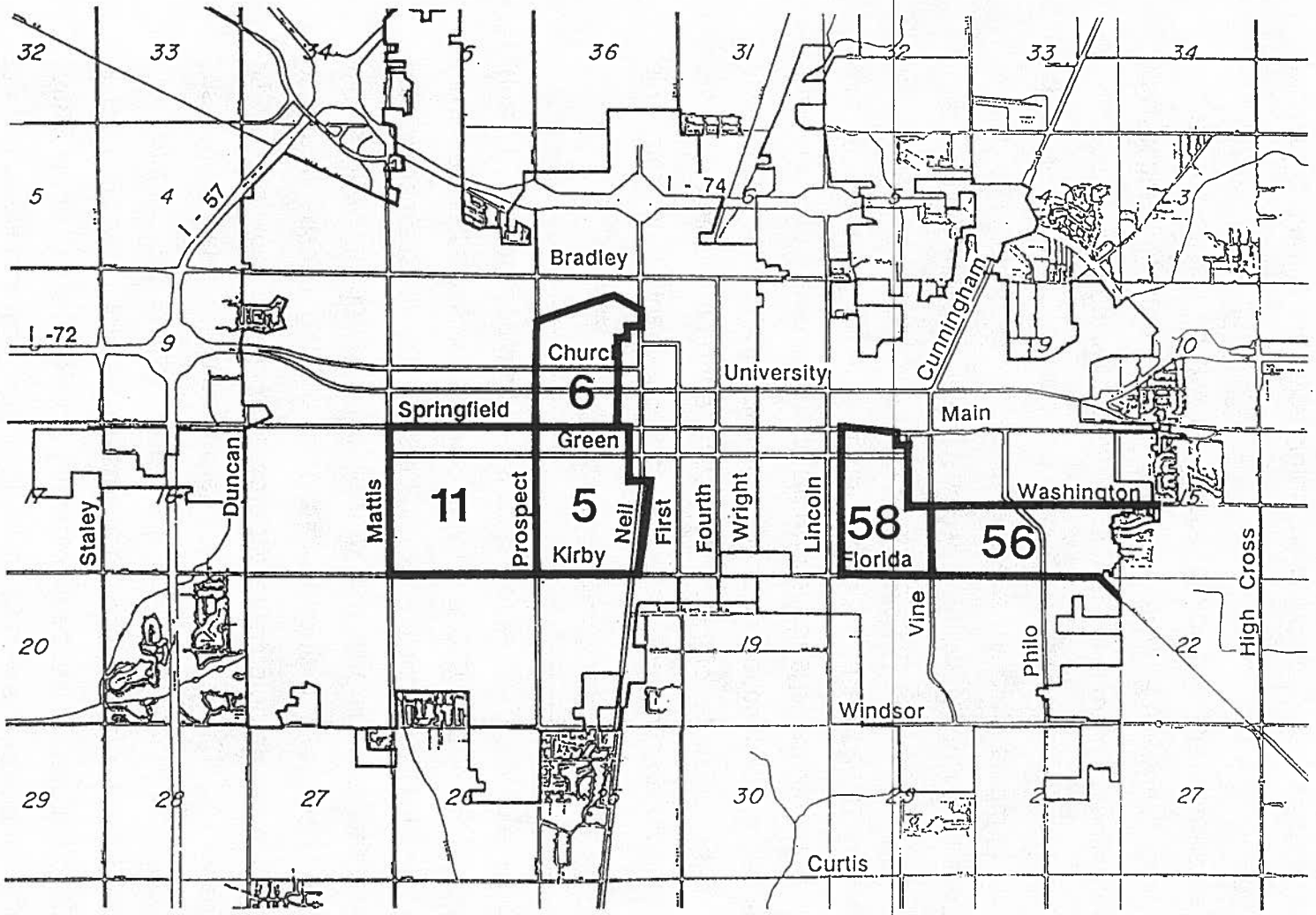


FIGURE 16

Targeted Neighborhoods for
an Intensive Backyard Composting Program
By Census Tract

Hauler-Sponsored Collection

The second option would be to encourage separate, hauler-sponsored collection programs. This would entail private haulers offering separate yardwaste collection pick-up to their customers. Since the yardwaste cannot be mixed with municipal solid waste, one-truck operators would have to reorganize their routes to make trucks available for yardwaste collection or purchase additional equipment. This seems unlikely. Multi-truck operators may have more flexibility in designating a vehicle for yardwaste collection. However, this approach may not provide uniform service since it was assumed customers would have to subscribe. This could leave a large number of residents without any yardwaste service. One method to overcome this situation would be to develop a contract or franchise arrangement for yardwaste collection.

No Formal Municipal Program

The third option would be to abstain from any formal program development. This would require individual homeowners to find alternate means of yardwaste disposal. The likelihood of compliance with the yardwaste ban would probably be low. Homeowners may try to "sneak" yardwaste into their regular garbage, creating problems for the haulers and landfill operators. In addition, there could be an increase in illegal dumping. This option would make it difficult on residents, haulers and landfill operators.

Expanded Municipal Program

Expansion of the current municipal programs would be the fourth option. It has been assumed that Rantoul collected all of the available yardwaste. Therefore, they do not have any room for expansion. Urbana has been collecting about 32% of the yardwaste estimated available for recycling. (Table 22) This would indicate that there is room for the program to expand. An estimated additional 3,700 cubic yards a year could be collected. Champaign has the largest room for expansion. It was estimated that the Leafcycle and Treeecycle programs collected about 37% of the yardwaste. This leaves an estimated 63% of the yardwaste currently being disposed of with residential garbage or by other means.

These programs would be self-supporting. Currently, Urbana sells the U-Bags for $.50 a piece. This covers the cost of the bag, distribution of the bag, and collection. An

expansion of Urbana's program would continue this arrangement. It was also assumed that Champaign would develop their yardwaste collection program so that it would be self-supporting.

Urban Fringe Expansion

The final program expansion option would be offering yardwaste collection to homes located in the urban fringe. As previously stated, yardwaste is an issue primarily in urban areas. The urban fringe represents an urban area in an area traditionally defined as rural; that is, the unincorporated County. Using the generation rates developed for Champaign, Urbana and Rantoul, the estimated yardwaste available for recycling in the urban fringe would be 13,200 cubic yards. (Table 23).

The amount of yardwaste estimated to be available in the urban fringe would be close to the amount of yardwaste available in Urbana. The same collection problems as those associated with expanding curbside recycling collection to the area would exist. Those would be the irregular and discontinuous collection areas. Again, it would be logical to extend the existing City service to the contiguous area instead of having the County purchase collection equipment. If no formal program is developed for this area, residents would have to find alternate disposal methods on their own. This could cause problems for the haulers when residents try to dispose of their yardwaste with their garbage.

Yardwaste generation rates should remain fairly constant. Only the creation of "new yards" should increase yardwaste generation. This occurs primarily through new development of single-family homes. Other new development such as duplexes, triplexes, and fourplexes, would also increase the yardwaste generation. However, larger multi-unit structures traditionally have smaller yards with a corresponding decrease in vegetation. The smaller yards should not markedly effect the generation rate. During the 1980's, new

development of single-family through fourplexes was about 3.3% a year in the Urban Fringe. Champaign has seen an approximate annually growth of 1.2% in single-family through fourplex structures while Urbana's growth rate has been about 0.5% per year. The projected available yardwaste in Table 23 incorporates these growth figures.

The final item reviewed was how the program expansions would affect the capacity at the Yardwaste Reclamation Site. At the end of 1988, there were six acres available for composting for a total capacity of 42,000 cubic yards of compost. An additional 20,000 cubic yards of space was available for brush and 7,000 cubic yards of space was available for firewood. This would give the Yardwaste Reclamation Site a total capacity of approximately 67,000 cubic yards. According to the Yardwaste Reclamation Site manager, about 50% of the site was used in 1989. It was assumed that the Cities will not collect 100% of the *available* yardwaste. This was due to the fact that Urbana currently charges for their U-Bags and U-Ties and it was assumed Champaign would have a similar fee. A target of 85% of the available yardwaste has been set for the Cities' collection programs. At that rate they would deliver about 37,700 cubic yards annually to the yardwaste site. The public works crews would add an estimated 4,000 cubic yards per year. This would increase the total to 41,700 cubic yards. If the University of Illinois continues to bring about 1,200 cubic yards of material to the site, the total becomes approximately 43,000 cubic yards. This would appear to be well within the current capacity of the Yardwaste Reclamation Site. Figure 17 shows the relationship between the yardwaste site capacity and estimated program volumes.

TABLE 23

Projected Yardwaste Available And Recycled
In Cubic Yards By Sector, 1988-2010

	1988	1990	1995	2000	2005	2010
Urbana						
Available[1]	14,500	14,600	15,000	15,400	15,800	16,200
Recycled[2]	9,900	12,400	12,800	13,100	13,400	13,800
Champaign						
Available[1]	29,100	29,800	31,600	33,600	35,600	37,800
Recycled[2]	10,900	25,300	26,900	28,500	30,300	32,100
Urban Fringe						
Available[1]	13,200	14,100	16,600	19,500	22,900	27,000
Recycled	UNK	12,000	14,100	16,600	19,500	23,000
Rantoul						
Available[1]	7,100	7,100	7,100	7,100	7,100	7,100
Recycled[3]	7,100	7,100	7,100	7,100	7,100	7,100
University of Illinois[4]						
Available	1,200	1,200	1,200	1,200	1,200	1,200
Recycled	1,200	1,200	1,200	1,200	1,200	1,200
Public Works (Urbana and Champaign)[4]						
Available	4,000	4,000	4,000	4,000	4,000	4,000
Recycled	4,000	4,000	4,000	4,000	4,000	4,000

(1) Defined as 67% of the estimated yardwaste generated; this is based on experience from the Village of Rantoul's program.

(2) The 1988 recycling rate was based on actual volumes. Beginning in 1990, the recycling rate was estimated to be 85% of the available yardwaste.

(3) It was assumed Rantoul collected 100% of the available yardwaste due to the nature of their collection program. No growth was calculated for the Village.

(4) Defined as the volume brought to the Yardwaste Reclamation Site by the program. No increases in program volumes were estimated.

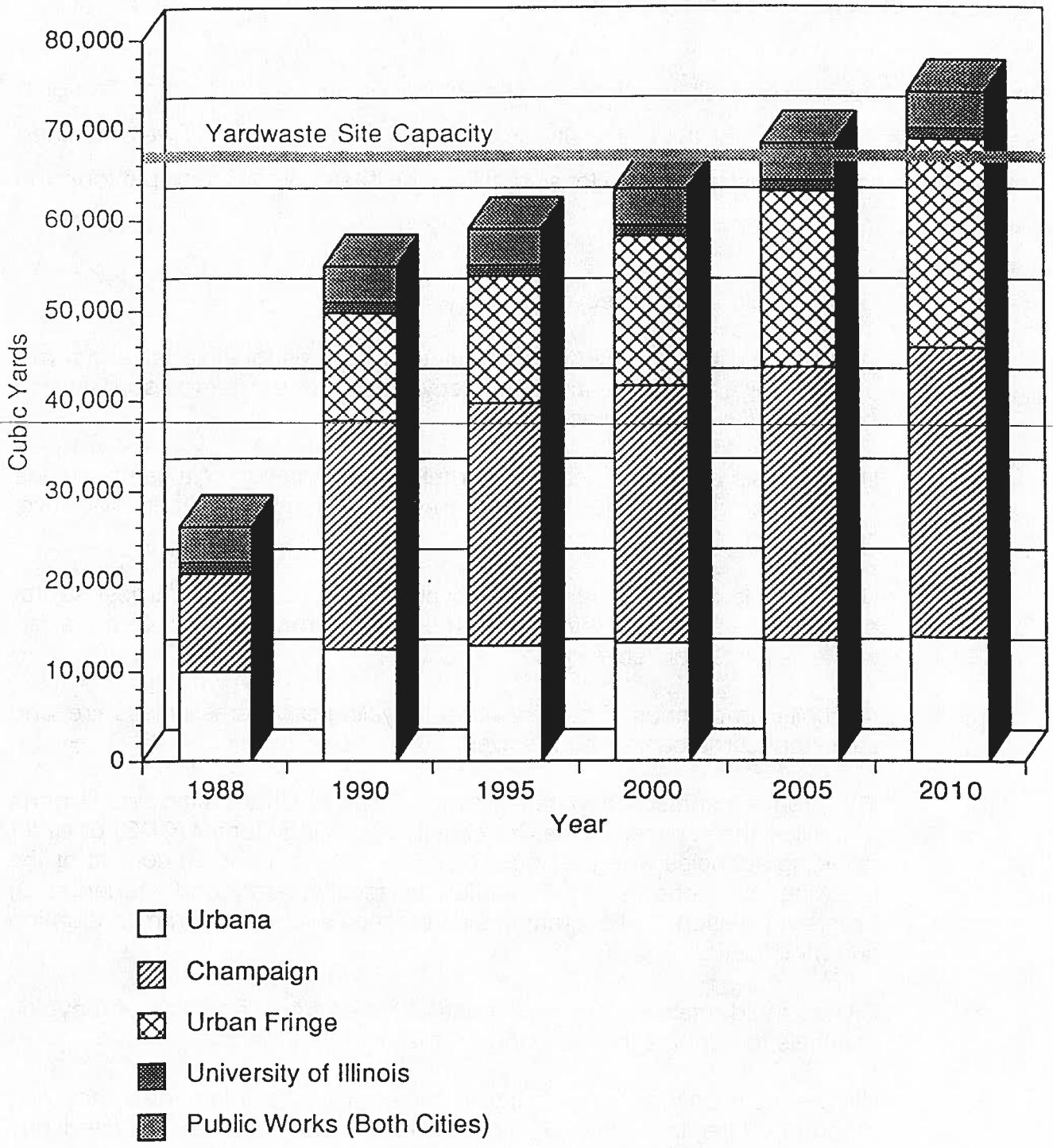


FIGURE 17

Relationship of Projected Recycled Yardwaste Volumes to the Current Yardwaste Reclamation Site Capacity, 1989

University of Illinois Recycling Programs

In October 1988, the University of Illinois presented their 5-year recycling plan. The plan set a 30% recycling goal for the University by 1993. Recycling programs were outlined for the Academic/Administrative and Housing units. The Task Force Report put forth the following recommendations:

(1) UIUC should adopt a recycling policy.

(2) UIUC should hire a recycling coordinator to be responsible for Academic and Administrative areas and hire a recycling administrator to coordinate all housing recycling activities.

(3) UIUC should develop a schedule for full implementation of a campus-wide recycling program by 1993 in cooperation with academic, administrative, and housing staff.

(4) UIUC should first concentrate its recycling efforts on 1) the largest sector of the wastestream, 2) items which are typically recycled and 3) materials with a potential for recycling.

(5) All units on campus should develop recycling programs unless fire and safety concerns cannot be resolved.

(6) The program should cooperate with the Cities of Champaign and Urbana and utilize the services of the Community Recycling Center (CRC) or other recycling agencies wherever possible. The program should consist of the following components: 1) Education of faculty, staff and students; 2) Program initiation, 3) Program implementation and 4) Program evaluation and modification.

(7) UIUC should retain and use revenues obtained from the sales of recycled materials to support the recycling program.

(8) UIUC should change its purchasing behavior to complement a recycling program. After initial investigation, UIUC should purchase recycled and recyclable products when practical.

(9) Authority for the program should be placed under the Vice-Chancellor for Administrative Affairs with Academic and Administrative programs functioning under the guidance of the Director of Operations and

Maintenance and housing programs functioning under the Director of Housing. In addition, it is recommended that a recycling advisory board be created consisting of representatives from the Housing Division, O&M and the faculty, staff and student populations.

The programs described by the plan would be voluntary. While an overall goal was set for each year, there was no outline describing how many buildings or which buildings would be targeted. However, the recycling coordinator for the academic/administrative units has a backlog of buildings requesting assistance in beginning a recycling program. The Housing Division has recently begun their recycling program in all of the dormitories.

In 1988, the University recycled an estimated 800 tons of material. Additional recycling of hazardous material and topsoil raises the University's reported recycling rate to 1,100 tons. The mixed paper, office paper, cardboard, newspaper, glass, aluminum an plastic from the University's recycling programs were processed by the Community Recycling Center (CRC). Three items were processed by different sources; scrap metal by the state contractors, fat, bone and offal by National-By-Products, and yardwaste by the Yardwaste Reclamation Site. Table 24 shows the average annual tonnage of the University's wastestream.

In 1988, the University sent 360 tons of material to CRC for processing. Cardboard was one exception since the transfer station on campus began recycling some cardboard in the fall of 1988 (a large scale cardboard baling program began in July 1989). CRC did act as a broker for the University's cardboard. At the projected recycling rates, the University will be sending higher volumes to CRC. Adjusting the total tonnage for materials that would be handled elsewhere, at the 10% rate, the University would send CRC approximately 1,205 tons. At the 15% rate, CRC would have received about 1,628 tons; at 20%, 1,690 tons; at 25%, 2,113 tons; and at 30%, 2,536 tons. The relationship of the University's expansion on the capacity at CRC will be discussed under the section on the Community Recycling Center.

The University has budgeted $680,000 over five (5) years to expand its recycling programs. Due to this commitment and the adoption of the Task Force recommendations by the Vice-Chancellor, for the purposes of this plan, it was assumed that the recycling rates proposed will be met. While no official reporting mechanism has been established, the University has been cooperative in documenting their recycling rates. Further documentation will be available as long as the University uses CRC to process and broker materials.

TABLE 24

University Of Illinois Wastestream Distribution And Projected Recycling Rates, 1988

	Total Tons[1]	Recycling Rates (Tons Recycled)				
		10%	15%	20%	25%	30%
Mixed Paper	3,000	300	450	600	750	900
Office Paper	2,400	240	360	480	600	720
Corrugated Cardboard	2,000	200	300	400	500	600
Newspaper	360	36	54	72	90	108
Glass	320	32	48	64	80	96
Aluminum Cans	260	26	39	52	65	78
Plastic	112	11	17	22	28	34
Subtotal	**8,452**	**845**	**1,268**	**1,690**	**2,113**	**2,536**
Yardwaste[2]	1,598	160	240	320	400	480
Miscellaneous[2]	1,464	147	220	293	366	439
Metals[2]	240	24	36	48	60	72
TOTAL	**11,754**	**1,176**	**1,764**	**2,351**	**2,939**	**3,527**

(1) Combined Academic/Administrative divisions plus Housing.

(2) These items were listed separately because they are handled by vendors other than CRC.

Commercial Sector Recycling

The collection of recyclable materials from commercial and industrial establishments has been occurring to a marked degree in Champaign County. Businesses such as grocery, department and appliance stores, bars and restaurants as well as wholesalers and manufacturers recycle a number of materials as opposed to paying for disposal. Recycling different components of the commercial solid wastestream can be profitable for both the collectors and the businesses that recycle. One Champaign County business reported saving as much as $100 per day by recycling their cardboard and office paper during 1988. Private recyclers collect corrugated cardboard, high grade office paper and plastics from large businesses. The Community Recycling Center (CRC) collects cardboard, office paper, glass and aluminum from smaller businesses.

Because recycling the different components of the commercial solid waste stream can be profitable, the current recycling rate in Champaign County was projected to increase. Commercial solid waste is composed of cardboard, high grade paper, plastics, newspaper, mixed paper, glass, aluminum and other metals, wood, organics and other miscellaneous items. Commercial solid waste includes industrial waste such as packaging materials as well as wastes from retail activity but does not include waste which results from industrial processing. Previous solid waste studies in Champaign County have indicated that the commercial portion made up 30% of the daily solid waste stream. Reports have also indicated that the generation rate of commercial solid waste in 1985 in Champaign County was 8.2 lbs per employee per day.

The major employers in Champaign County are federal, state and local government and the University of Illinois. Government employers in Champaign County include the University of Illinois, Chanute Air Force Base in Rantoul, the Army Corps of Engineers and other Federal Offices, Champaign County and the Cities of Champaign and Urbana. After the government, the major employers in Champaign County were the retail, services and manufacturing industry. The breakdown of employers by number of employees, number

of establishments and number of establishments by employee-size class for Champaign County in 1986 are shown in Table 25. Table 25 excludes federal, state and local government offices.

The major retail employers include eating and drinking establishments with 6,152 employees, general merchandise stores employing 2,058 people, miscellaneous retail stores and food stores with approximately 1,800 employees each.

TABLE 25

Distribution Of Commerce And Industry In Champaign County, 1986[1]

Category	Total Employees	Total Establishments	Establishments by Employee-Size Class 1 to 4	5 to 9	10 to 19	20+
Retail Trade	15,198	959	337	247	178	197
Services	13,838	1,168	664	247	129	128
Manufacturing	8,755	138	42	25	18	53
Wholesale Trade	3,581	209	80	50	50	29
Finance, Insurance and Real Estate	3,075	311	188	56	29	38
Transportation and other Public Utilities	2,390	143	53	25	32	33
Contract Construction	1,866	281	163	62	37	19
Unclassified Establishments	837	395	348	32	10	5
Agricultural Services, Forestry and Fisheries	184	44	33	7	3	1
Mining	36	5	2	1	2	0
TOTAL	**49,760**	**3,653**	**1,910 (52%)**	**752 (21%)**	**488 (13%)**	**503 (14%)**

(1) Table does not include federal, state or local government or University of Illinois offices.

Source: U.S. Bureau of the Census, County Business Patterns, 1986, "Illinois".

TABLE 26

Distribution Of Major Retail, Service And Manufacturing Employers
In Champaign County, 1986[1]

Class	Total Employees	Total Establishments	Establishments by Employee-Size Class 1 to 4	5 to 9	10 to 19	20+
Retail:						
Eating and Drinking Places	6,152	257	53	35	58	111
General Merch.	2,058	27	4	2	6	15
Misc. Retail	1,894	221	99	68	38	16
Food Stores	1,834	84	26	30	8	20
Service:						
Health Services	5,398	163	94	30	12	27
Business Services	1,668	164	79	35	33	17
Hotels and Lodging Places	1,379	85	53	9	6	17
Membership Org.	1,342	199	116	48	18	17
Manufacturing:						
Food Products	(N/A)	11	1	1	0	9
Printing and Publishing	998	39	15	4	12	8
Rubber and Plastic Products	804	7	1	1	0	5
Machinery	420	14	2	5	0	7
TOTAL	23,947[2]	1,271	543 (43%)	268 (21%)	191 (15%)	269 (21%)

(1) Table does not include federal, state or local government or University of Illinois offices.

(2) Total does not include food product manufacturing employees.

Source: U.S. Bureau of the Census, County Business Patterns, 1986, "Illinois".

The major service employers are health services with 5,398 employees, business services with 1,668 employees, hotels and other lodging places with 1,379 employees and membership organizations with 1,342 employees. Food product manufacturers, printing and publishing businesses, rubber and plastic product manufacturers and non-electrical machinery manufacturers are the major manufacturing employers in the County. The total employees in this group was over 2,000. Table 26 shows a breakdown of the major retail, service and manufacturing employers in Champaign County by number of employees, number of establishments and number of establishments by employee-size class. Although there are several large employers, the majority of businesses in Champaign County have a small number of employees. Over 70% of all businesses in Champaign County employ less than ten (10) persons, and over 50% of all businesses employ less than five (5) persons. This uneven distribution poses a challenge for expanded commercial sector recycling.

The majority of commercial solid waste is corrugated cardboard and other related paper products. In 1986, the corrugated cardboard generation rate in Champaign County was 163.9 lbs per person per year. It has been estimated that 14,128 tons of cardboard were generated in Champaign County in 1988 through the Res/Comm wastestream. It was assumed that a portion classified as industrial included some cardboard. Therefore, it was estimated that approximately 17,000 tons of cardboard were generated in Champaign County in 1988 and over 7,500 tons were recycled. Collection by private recyclers and direct shipments by cardboard generators to out of county markets were responsible for over 7,000 tons, or 90%, of all corrugated cardboard recycled. The Community Recycling Center collected 271 tons, approximately 2%, of all corrugated cardboard recycled. CRC's 1989 Program Goals include beginning cardboard collection from small businesses.

Another major component of commercial solid waste is office paper. Office paper is sorted into many different grades. High grade office paper is composed of computer

sheet paper, letterhead stationery and xerographic paper. Other office paper is composed of manilla envelopes, forms and computer cards. Mixed paper is composed of newspapers, phone books and other miscellaneous paper products. The office paper generation rate used in Champaign County is 0.202 tons per office employee per year. Using information from the U.S. Bureau of the Census, County Business Patterns, 1985, "Illinois", the U.S. Office of Personnel, Federal Civilian Employment: The Biennial Report of Employment by Geographic Area, December 31, 1986 and the U.S. Bureau of the Census, Local Government Employment in Major County Areas: 1985 it was estimated that there were approximately 18,074 office employees in Champaign County in 1985. It was estimated that 3,157 tons of high grade office paper and 19,394 tons of other paper were generated in Champaign County in 1988. Studies conducted by the U.S. Environmental Protection Agency have shown that recycling office paper can reduce the amount of solid waste generated by businesses by 34%. The Community Recycling Center collected 593 tons, or 19% of the estimated high grade office paper generated. It is unknown what amount of office paper was collected by private recyclers. CRC's 1989 Program Goals include expanding collection of high grade office paper at businesses and institutions such as the University of Illinois and Parkland College.

Plastics are a potential recyclable component of the commercial solid waste stream as markets for the many types of plastic increase. Markets for HDPE plastic are currently more defined than for PET plastic, although in general, markets for plastic are not as well developed as for other recyclable materials. While plastic has the second highest buy back value next to aluminum, it is more difficult to recycle than other materials due to the problems associated with collection. Because plastic is much less dense than other materials, more space is needed for storage and collection. In addition, more frequent pick-ups are needed which collect a much lower weight for the volume. Another problem associated with the recycling of plastic is that there are many different types of plastic which must be sorted. Often, it is difficult to tell the difference between the types of plastic. After sorting the plastic, many recyclers will granulate the plastic in order to be

cost efficient. If the plastic has not been sorted properly, a large load of granulated plastic may be rejected.

It was estimated that 6,677 tons of plastic were generated in Champaign County in 1988. Currently, a few manufacturers in Champaign County produce large amounts of plastic in the form of packaging material and waste products. At least one manufacturer recycles in-house by reusing the waste product in its manufacturing process. This would be an example of generator-based waste reduction in Champaign County. A few manufacturers contract with private recyclers to collect large amounts of plastic. However, it is unknown what amount of plastic was collected by private recyclers. The Community Recycling Center collected 19 tons of HDPE plastic in Champaign County in 1988. The amount of plastic collected by CRC appears to be small when compared to the total amount of plastic generated in Champaign County. However, the calculation of plastic generated in Champaign County includes all types of plastic. Currently, the only type of plastic collected by CRC is HDPE, mainly in the form of milk jugs. Due to processing costs, CRC was not collecting PET plastic in 1988-1989. CRC's 1989 Program Goals included expanding collection of HDPE plastic to businesses as well as curbside and County dropoffs.

Currently, the private sector appears to collect the majority of recyclable material from the commercial solid wastestream. The total amount of commercial material that is collected by private recyclers was unknown. In the past few years, private recyclers have become more involved in the collection of recyclables as opposed to only processing materials. Collection of recyclable material is becoming profitable for private recyclers due to increases in markets and prices for recyclable materials. Private recyclers are assumed to be better equipped to handle market fluctuations than public sector collectors as private recyclers are more flexible in the amount and types of materials they can collect. Processing in the private sector is also regarded as flexible.

Recyclable material in the commercial solid waste stream is also collected through CRC's High Volume program. These materials include high grade office paper, glass and aluminum collected from small businesses. CRC's High Volume collection program includes two types of businesses; offices and bars and restaurants. In 1988, CRC collected high grade office paper from approximately 280 business offices in Champaign County including the University of Illinois. CRC also collected glass and aluminum cans from approximately 70 bars and restaurants in Champaign County in 1988. CRC currently does not charge for collection of recyclable materials. However, CRC is in the process of negotiating a fee for the collection of high grade office paper at the University of Illinois. CRC's cost for collecting at the University was estimated at $72 per ton of paper in 1988. CRC does not have plans to charge businesses in Champaign County for collection of materials. In a recent survey conducted by CRC, businesses stated they would stop recycling if they were charged for collection. The distribution of the business establishments involved in recycling in Champaign County in 1988 is shown in Table 27. This listing is not comprehensive but is indicative of the pattern of commercial and industrial recycling in Champaign County. Full disclosure of some recycling activities is not possible for proprietary reasons.

In addition to the businesses listed in Table 27, all of the schools in Champaign and Urbana including the University of Illinois and Parkland College have recycling programs. Most of the government offices in Champaign County including local, state and federal offices also have recycling programs. All of the Champaign County and Cities of Champaign and Urbana offices recycle office paper. In addition, some local and state government offices have preferential procurement policies concerning recycled products. (See Appendix 3 for resolutions and ordinances).

As previously stated, the majority of businesses in Champaign County are small employing less than five persons. However, the available data indicates that the majority of businesses which were conducting recycling programs were the larger businesses, employing twenty or more persons. Of those businesses which were participating

Distribution Of Recycling By Employers In Champaign County, 1988

Class	Establishments Recycling	Total Establishments	Establishments by Employee-Size Class[1] 1 to 4	5 to 9	10 to 19	20+
Retail:						
Eating and Drinking	49	257	53 (1)	35 (10)	58 (22)	111 (16)
Misc. Retail	6	221	99 (0)	68 (5)	38 (0)	16 (1)
Food Stores	14	84	26 (0)	30 (0)	8 (1)	20 (13)
Auto Dealers	2	131	54 (0)	44 (2)	19 (0)	14 (0)
Service:						
Health Services	7	163	94 (0)	30 (0)	12 (0)	27 (7)
Business Services	15	164	79 (1)	35 (6)	33 (5)	17 (3)
Hotels and Lodging Places	4	85	53 (0)	9 (0)	6 (0)	17 (4)
Membership Org.	9	199	116 (4)	48 (3)	18 (1)	17 (1)
Recreation Services	9	30	17 (3)	3 (3)	2 (2)	8 (1)
Misc. Services	4	125	80 (0)	23 (1)	13 (3)	9 (0)
Legal Services	2	78	50 (0)	15 (2)	9 (0)	4 (0)
Finance, Insurance and Real Estate:	12	311	188 (0)	56 (6)	29 (2)	38 (4)
Manufacturing:						
Food Products	2	11	1 (0)	1 (0)	0 (0)	9 (2)
Printing and Publishing	9	39	15 (5)	4 (0)	12 (0)	8 (4)
Fabricated Metals	1	7	0 (0)	2 (0)	0 (0)	5 (1)
Electrical Equipment	6	9	3 (0)	0 (0)	1 (1)	5 (5)
Stone, Clay and Glass	3	8	3 (0)	1 (1)	3 (1)	1 (1)
TOTAL	**154**	**1,922**	**931 (14)**	**404 (39)**	**261 (38)**	**326 (63)**
% RECYCLING	**8.0%**		**1.5%**	**9.7%**	**14.6%**	**19.3%**

(1) Numbers in parentheses indicate establishments with recycling programs in 1988.

Source: U.S. Bureau of the Census, County Business Patterns, 1986, "Illinois". Champaign-Urbana Industrial Community Directory, August 1987. 1988 recycling estimates based on ISWDA staff estimates and interviews with private recyclers. Some data suppressed to avoid disclsures. Does not include University of Illinois and governmental offices' programs.

in recycling programs, 19.3% employ twenty or more persons, 14.6% employ ten to nineteen persons, 9.7% employed five to nine persons and 1.5% employed one to four persons. The data shown in Table 27 suggests that smaller businesses found it difficult to implement recycling programs. These difficulties are discussed below. There are a number of issues associated with implementing across the board recycling programs in businesses in Champaign County. One of the primary issues to address is the lack of storage space. As shown in the preceding tables, 70% of businesses in Champaign County are small, that is, employing less than ten persons. Smaller businesses often do not have space available to store recyclable material. Businesses which lease space often have little room available for storage of any kind. These businesses may need to adhere to strict guidelines in their lease stating where materials can be stored and what types of materials can be stored. This is especially true for non-anchor stores in the local malls. According to a survey completed for ISWDA in March, 1989, Problems and Prospects for Commercial Sector Recycling: A Pilot Study in Champaign County, (Commercial Survey, see Appendix 4), most non-anchor stores in malls would be willing to separate recyclables, especially cardboard. The larger anchor stores have their own trash compactor and at least one anchor store currently recycles their own cardboard. However, smaller non-anchor stores must share trash compactors and have no space available for storage of cardboard for recycling. In addition, stores must share trash compactors with restaurants which contaminate the cardboard with food waste.

Another issue to be addressed is that businesses find it difficult to start recycling programs because of the costs involved, real or perceived. Because businesses, especially those in the retail industry, are interested in maximizing space for revenue generating uses, they often find it difficult to justify setting aside space for storage of recyclable material. In the Commercial Survey, businesses that were not recycling stated they would not expect to experience a major savings in trash disposal costs by recycling. These businesses felt that recycling would not be worth the investment in time and energy required given the economic return. However, businesses surveyed that were recycling *did* report cost savings or an economic return from recycling.

Other difficulties associated with implementing recycling programs in small businesses would be the employee turnover rates and the need for employee training. These difficulties would be especially true in the case of eating and drinking establishments where kitchen employees, waiters, waitresses and bartenders have high turnover rates. In addition, these employees must work at a fast pace and have little time to recycle, according to one restaurant manager in the Commercial Survey. Managers in the Commercial Survey also expressed the difficulty of training employees to recycle. This would be true for many businesses that depend on unskilled, temporary or part-time employees. Many business managers stated in the survey that training programs and educational material would be necessary in order to implement recycling programs.

Finally, smaller businesses do not generate large amounts of recyclable material. Private haulers will collect material where it is most profitable to do so, generally in larger businesses where a large volume of material is generated. Private recyclers appear to be hesitant to collect material from small generators. This may be due to the costs involved with the increased number of stops necessary to generate equivalent volume of material when compared to large commercial accounts. For this reason, the Community Recycling Center, a non-profit organization, expanded its pick-up services in the commercial sector.

Based on a review of the available data, it appears that a measurable portion of the waste stream generated by commercial and industrial activity in Champaign County was recycled. The majority of the materials being recycled were paper and paper board products. This was not unexpected because the economy of Champaign County was dominated by the non-manufacturing sector. However, it would appear that a dichotomy exists in the provision of commercial/industrial recycling services.

The data suggests that the larger the firm, in terms of number of employees, the more likely a firm would consider recycling as a solid waste management option. Moreover,

this recycling option would be pursued as a way in which to *minimize* waste disposal costs. Typically, the larger the recyclable waste volume, the more likely the private sector would provide collection and processing service. Therefore, in order to increase commercial/industrial recycling, the majority of the effort should be directed toward the small and medium size businesses with five to nineteen employees. This may be difficult due to the fact that in many cases, these generators do not necessarily produce enough recyclables to financially support someone to collect them. This is why the private sector's penetration into commercial recycling is limited to large volume generators. However, this targeted group represents about 36% of all businesses in Champaign County. This grouping, plus large scale employers with more than twenty (20) employees, would comprise 57% of all businesses in Champaign County.

The Community Recycling Center

The Community Recycling Center (CRC) is a multi-material , non-profit enterprise involved in the collection, processing and marketing of recyclables. In 1988, CRC's functions and programs included:

(1) Operating a Buy Back program at the Center including processing and marketing the materials brought to the Center; in 1989, the Center paid over $400,000 for materials brought to the Center;

(2) Operating nine Drop-off sites in Champaign and Urbana; collecting, processing and marketing materials left by residents (and businesses);

(3) Operating a High Volume program which involves collecting, processing and marketing materials, primarily high grade paper, from almost 300 buildings in Champaign, Urbana, and the University of Illinois;

(4) Processing and marketing materials collected by the Reeecycle and U-Cycle programs;

(5) Collecting, processing and marketing materials from, the County's Hometown program which is comprised of nine drop-off sites located in villages and towns throughout the County;

(6) Operating an education program that includes presentations and tours to schools, civic groups, businesses and others interested in recycling, and;

(7) Operating secondary programs that are compatible with CRC's operation and goals such as brokering processed materials from sources in town and selling recycled copier paper.

One of the major factors in expanding any public or non-profit recycling activity in Champaign County depends on having enough available capacity to process the material. Since CRC would be the only facility capable of processing all the materials collected through the curbside programs, it would be necessary to determine if the facility could handle the projected tonnage, as well as increased tonnages from their own programs.

CRC has grown significantly since its inception in 1978. That year, CRC collected 222 tons of glass, newspaper, cardboard, aluminum, bimetal, and used oil. The collection site was located near a local health food store in Urbana and was manned by volunteers. In 1988, 10 years later, CRC processed 5,344 tons of material; a 2,300 percent increase. Eleven materials including mixed paper and plastic were collected through one of six programs: Reeecycle, U-Cycle, Hometown, Buy Back, Drop-off, or High Volume. In 1978, the City of Champaign leased its old public works garage, located on 2.5 acres, to CRC for their processing center; they are still located at that site.

In 1988, the Center's Buy Back program generated 1,797 tons of material or 34% of the total material handled at CRC. As a group, the three municipal programs - Reeecycle, U-Cycle, and Hometown - produced 32% of the total, or 1,724 tons, of material. The Drop-off sites produced the third largest quantity of material with 946 tons, or 18% of the total. The High Volume program generated the least amount of material at 862 tons or 16% of the Center's total volume.

The Center's largest revenue generators in 1988 were, in order, aluminum, newspaper, glass, bimetal, and high grade paper. The Buy-Back program produced 93% and 95%, respectively, of all the Center's aluminum and bimetal. The municipal programs were the

largest collectors of newspaper (48%) and glass (43%). The Buy-Back program was the second largest collector of those materials, 33% of the newspaper and 23% of the glass. The High Volume program collected 90% of the high grade paper handled by CRC in 1988.

CRC estimates their capacity to be 8,400 to 9,400 tons per year with a maximum of 10,000 tons a year. One major capacity upgrade occurred in 1987. This was the result of recommendations made in The Long Range Solid Waste Management Plan prepared by Gershman, Brickner & Bratton (GB&B) which was completed in March, 1986. Many of the recommendations made in that plan were implemented including curbside collection and the County's Hometown program. To handle the increased tonnage projected from their recommendations, GB&B recommended that local processing capacity be increased. Their recommendation was that either a material processing facility be constructed or that approximately $100,000 be spent on improvements at CRC. The option to upgrade the Recycling Center was selected. The improvements made increased CRC's processing capacity from about 3,000 tons per year to the current level of 8,400 to 9,400 tons per year. The Center has since been involved in a number of upgrades and improvements. The largest commitment was provided by the two Cities and the County through the three year capital improvement fund. The total funding equalled $179,220 and was used to purchase more efficient equipment and improve processing lines. Such items as a downstroke baler, granulator, truck scales and a newspaper processing building were purchased with money from the capital improvement funds.

In 1988, the Center was operating at 63% of their capacity when it processed 5,344 tons of material. Figures for 1989 show that the total tonnage increased to 6,100 tons which was 72% of the Center's capacity. Storage of materials has become a problem according to the Center's director. Collection has also become another operational function to develop some problems. The In-town Drop-off sites were not serviced as frequently as needed and there were cases of service interruptions for the businesses participating in the High Volume program.

The CRC-sponsored programs have seen increasing, although not steady, growth. The Buy Back tonnage increased from 490 tons in 1983 to 1,797 ton in 1988. However, tonnages rose dramatically between 1983 and 1985 (490 tons to 1,176 tons) but fell back to 936 tons in 1986. The average annual growth rate for this program was about 45%. The Drop-Off program has also seen some erratic figures. There was steady growth between 1983 and 1986 when tonnages rose from 724 to 1,320. However, the figure dropped to 832 tons in 1987. This may have been due to the introduction of the curbside collection programs in the two Cities. Drop-off volumes have begun to rise in the last two years. With the curbside programs in place, the increase in the Drop-off volumes may be attributed to people who do not have curbside service but are aware of the recycling opportunities in the County. Businesses also appear to use the Drop-off sites, primarily to deposit cardboard. However, the tonnage figures have not yet rebounded to the 1986 level. The average annual growth rate was about 5%. Tonnage figures for the High Volume program have never declined. In 1983, 112 tons of material were collected while 862 tons of material were collected in 1988. This reflects an average annual growth rate of 111%.

If CRC's programs continue to grow at the above rates, CRC would reach their capacity between 1991 and 1993. The High Volume program alone would generate over 9,000 tons of material per year within two to three years. This erratic development made it difficult to project tonnages for these programs. A more conservative projection using a 5% growth rate for all three programs was completed. One adjustment made to the High Volume program was that the University of Illinois was separated from the community contributors. This was done to more accurately reflect the University's contribution to the total tonnage at CRC in light of their 1988 recycling plan. In 1988, the University was responsible for generating 40% of CRC's High Volume material. Using the University's projected figures under their recycling plan, by 1995, 79% of the Center's High Volume material will be collected from the University (Table 28). Figure 18 shows the relationship of this projected growth to the processing capacity available at CRC.

TABLE 28

Projected Tonnages For The Community Recycling Center For All Programs, 1988-1995

	1988	1989	1990[1]	1991	1992	1993	1994	1995
High Volume[2]								
U of I	359	377	845	1,268	1,690	2,113	2,536	2,663
Community	490	515	540	567	596	625	657	689
Other	13	14	15	15	16	17	17	18
Buy-Back[3]	1,797	1,887	1,981	2,080	2,184	2,293	2,408	2,529
Drop-Off[3]	946	993	1,043	1,095	1,150	1,207	1,268	1,331
Reeecycle[4]	951	999	2,023	2,124	2,230	2,342	2,459	2,582
U-Cycle[4]	645	677	1,166	1,224	1,286	1,350	1,417	1,488
Hometown[3]	128	134	400	420	441	463	486	511
Other[3]	15	16	17	17	18	19	20	21
TOTAL	**5,344**	**5,611**	**8,029**	**8,811**	**9,611**	**10,430**	**11,269**	**11,832**

(1) Begin recommended program expansions in curbside programs; add paperboard; add five to nine-unit residences at a 30% participation level and increase participation in single-family through fourplex residences to 45%.

(2) Tonnage figures for the University of Illinois are based on the University's Recycling Plan. All materials currently going to CRC continue to go to CRC. Tonnage figures for the remaining High Volume programs inflated 5% annually.

(3) Inflated 5% annually.

(4) After 1990, inflated 5% annually.

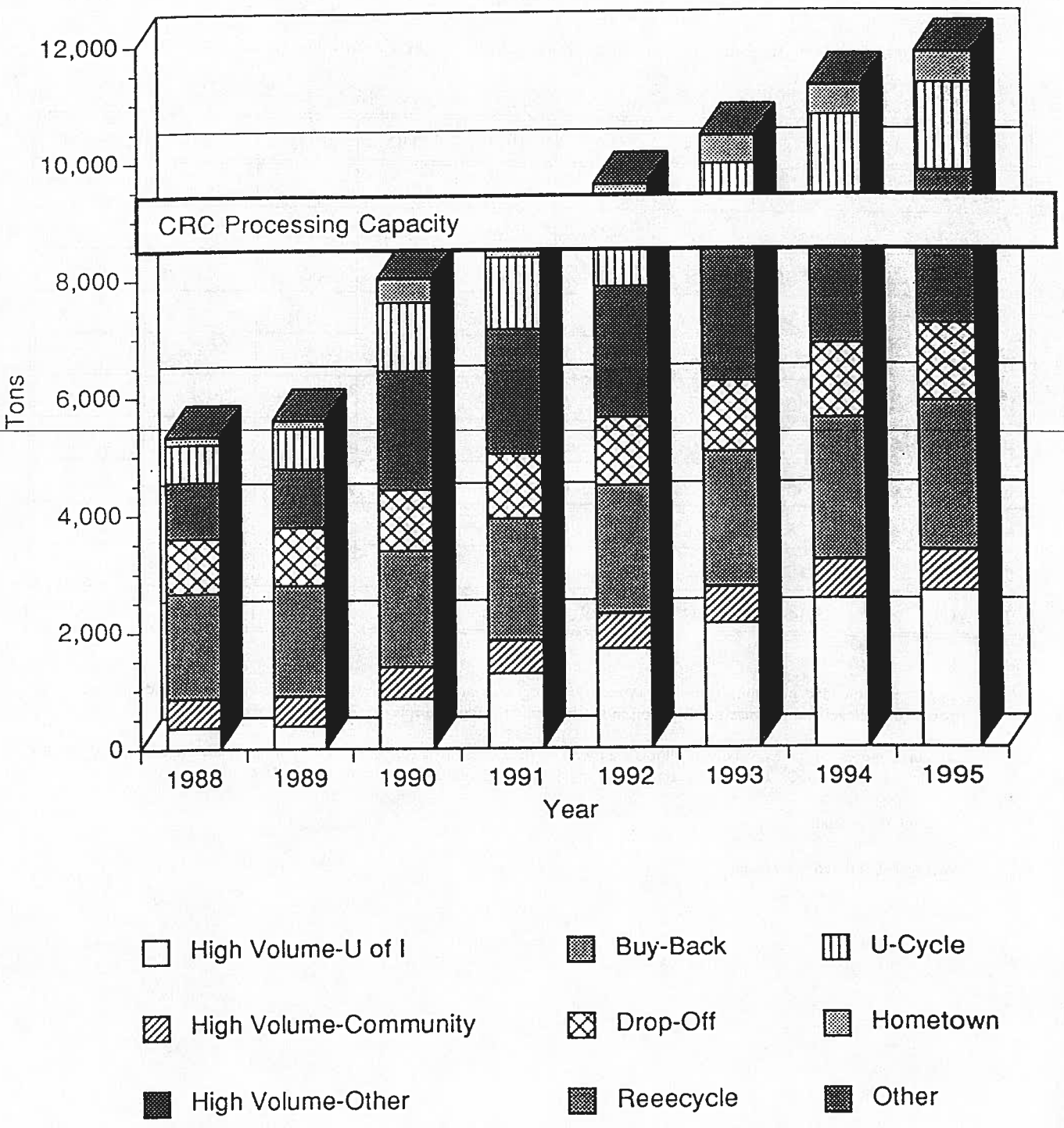


FIGURE 18

Relationship of Projected
CRC Tonnages to Current
Processing Capacity

SECTION FOUR: Recommendations

Introduction

The State's Solid Waste Planning and Recycling Act (PA 85-1198) was intended to require counties in Illinois to set up recycling programs - curbside or drop-off. These programs, incorporated into a twenty-year plan, were to be designed to recycle 15% of a county's solid waste three years after the plan's adoption; after five years, the programs were to be designed to recycle 25% of the solid waste. Even with a perfunctory review of Champaign County's recycling programs, it is apparent that the County has fulfilled the State's intent under PA 85-1198. Therefore, the purpose of the recycling portion of the Champaign County Solid Waste Plan is to expand the State's intent by developing a more extensive recycling program.

The analysis done in this portion of the plan is intended to move recycling activities in Champaign County beyond the simple, three material system of curbside collection or drop-off sites. This should be viewed as an extension of earlier solid waste planning and implementation efforts. It builds upon studies and plans dating back to 1974, well before the State enacted PA 85-1198. The last major plan was the Long Range Solid Waste Management Plan for Champaign County prepared by Gershman, Brickner & Bratton in 1986. That plan proposed several recommendations, such as full-scale curbside program for the Cities of Champaign and Urbana and the County rural drop-off program, which required a significant capital investment. Those programs, along with the processing improvements recommended, were implemented and have begun to reach their maximum levels.

Consequently, the recycling portion of the Champaign County Solid Waste Management Plan reviewed potential expansions in relation to:

(1) Program goals as set by the State in the Solid Waste Planning and Recycling Act, PA 85-1198; (dated January, 1989);

(2) Program goals set by the Intergovernmental Solid Waste Disposal Association Agreement (dated July, 1986), and;

(3) Compatibility with current collection and processing systems.

The recommended program expansions also focus on increasing recycling of the top three materials by weight in the residential/commercial wastestream: other papers (all paper not including newspaper, office paper, or corrugated cardboard), yardwaste and corrugated cardboard (see Table 29.) These materials are also high volume materials, especially the yardwaste and cardboard. By weight, the category "other papers" comprised 18% of the solid waste generated in Champaign County in 1988. Yardwaste was the second largest waste item equalling 16% of the wastestream, while corrugated cardboard was the third largest segment of the wastestream accounting for 13% of the waste generated. The addition of cardboard/paperboard to the curbside collection programs address the first and third segments of the wastestream. Expansion of the yardwaste collection program in Urbana and Champaign addresses the second largest segment of the waste- stream. As shown in Table 30, if all the recommended program expansions were to be implemented, it was estimated that the publicly sponsored programs alone would divert approximately 22% of the City of Champaign's residential solid waste from landfill and about 19% would be diverted in the City of Urbana.

TABLE 29

Distribution Of The Residential/Commercial Wastestream By Weight
In Champaign County, 1988

	Total Tons	Percent of Wastestream[1]	Tons Recycled	Percent Recycled
Other Papers[2]	19,394	18%	113	6%
Yardwaste	17,487	16%	5,523	32%
Corrugated Cardboard	14,128	13%	4,671	33%
Glass	9,856	9%	1,056	11%
Food/Misc. Organics	9,793	9%	415	4%
Large Bulky Items	7,313	7%	900	12%
Newspaper	7,121	7%	2,588	36%
Plastics	6,677	6%	19	0.3%
Other Products[3]	5,405	5%	120	2%
Ferrous Metals	5,087	5%	4,104	81%
Office Paper	3,157	3%	593	19%
Aluminum	1,590	1%	365	23%
TOTAL	**107,008**		**20,467**	

(1) Percent of residential/commercial wastestream only.

(2) Includes all paper except office paper, corrugated and newspaper.

(3) Includes non-ferrous metals, rubber, leather and textiles.

TABLE 30

Projected Percent Of Champaign-Urbana's Residential Wastestream Recycled Through Recommended Program Expansions

	Champaign[1]		Urbana[2]	
Program Expansions	**Tons[3]**	**Percent**	**Tons[3]**	**Percent**
Single-Family Through Fourplex Increased Participation				
45% Participation	1,352	3.5%	743	3.2%
55% Participation	1,652	4.5%	908	3.9%
Add Five Through Nine-Unit Residences[4]				
45% Participation	1,541	4.2%	888	3.9%
55% Participation	1,884	5.1%	1,086	4.8%
Add Cardboard Collection[5]				
45% Participation	2,023	5.5%	1,166	5.1%
55% Participation	2,400	6.5%	1,425	6.2%
Yardwaste Collection[6]				
45% Participation	7,839	21.0%	4,016	18.0%
55% Participation	8,216	22.0%	4,275	19.0%

(1) Based on 86,613 tons of residential/commercial waste generated per year in Champaign (59,180 persons multiplied by 3.39 lbs per day multiplied by 365 days divided by 2000 lbs per ton).

(2) Based on 22,824 tons of residential/commercial waste generated per year in Urbana (36,892 persons multiplied by 3.39 lbs per day multiplied by 365 days divided by 2000 lbs per ton).

(3) Tons listed are cumulative. Each program includes the tonnage figure from the same participation level from the previous program.

(4) Participation levels for all five through nine-unit residences would remain at 30%.

(5) All cardboard/paperboard from single-family through nine-unit residences.

(6) Yardwaste capture based on 85% of yardwaste available.

Program Goals As Set By The State In The Solid Waste Planning And Recycling Act, PA 85-1198 Dated January, 1989

The Solid Waste Planning and Recycling Act establishes very specific recycling program performance standards to be incorporated in the plan. If the current level of recycling in Champaign County continues, the State Mandated goals will be met. However, if the public commitment to recycling declines, the 25% minimum would not be achieved. A review of the statutory language and Champaign County's action show that each recycling requirement has been addressed.

(1) *"...shall be implemented throughout the county and include a time schedule for implementation of the program."*

In 1988, there were well defined and funded recycling programs operating in Champaign County. These public sector programs included Champaign, Urbana, Champaign County and the Village of Rantoul. In addition, the University of Illinois had an established and expanding recycling program in place.

(2) *"...shall provide for the designation of a recycling coordinator to administer the program."*

Each governmental entity in Champaign County which is providing recycling services has an identifiable staff position assigned to coordinate of recycling activities. In addition, the ISWDA also indirectly assists in the coordination of recycling activities.

(3) *"...shall be designed to recycle, by the end of the third and fifth years of the program respectively, 15% and 25% of the municipal waste generated in the county, subject to the existence of a viable market for the recycled material."*

Combined public, non-profit and private recycling activities during 1988 recycled 62,159 tons or 35% of the municipal wastestream generated in the County, based on the interpretations provided by Illinois EPA.

(4) *"...may provide for the construction and operation of one or more recycling centers by a unit of local government or for contracting with other public or private entities for the operation of recycling centers."*

The Cities of Champaign and Urbana and Champaign County have purchased equipment for use in conjunction with the Community Recycling Center. At the

end of 1988, this capital improvement commitment had reached approximately $179,000. Moreover, these three entities have a five year operation and processing contract with CRC worth $174,000 annually.

(5) *"...may require residents of the county to separate recyclable materials at the time of disposal or trash pick-up."*

As of 1989, all recycling programs in Champaign County were voluntary in nature. The Cities of Champaign and Urbana provide regularly scheduled once-a-week curbside service to all single-family through fourplex units.

(6) *"...may make special provisions for commercial and institutional establishments that implement their own specialized recycling programs, provided that such establishments annually provide written documentation to the county of the total number of tons of material recycled."*

No special provisions have been made by the public sector for commercial or institutional establishments regarding recycling programs. No annual documentation is required from private sector recycling firms or commercial or industrial firms which recycle.

(7) *"...shall provide for separate collection and composting of leaves."*

In 1988, there were several programs in Champaign County which provide for collection and composting of leaves and other landscape wastes. The Village of Rantoul and the Cities of Champaign and Urbana all have formal collection programs and composting sites.

(8) *"...shall include public education and notification programs to foster understanding of and encourage compliance with the recycling program."*

All publicly sponsored recycling programs in Champaign County have an education component. The Cities of Champaign and Urbana and Champaign County have funds earmarked for education and program promotion. The Cities and the County also provide funding for the education coordinator position at the Community Recycling Center. The Village of Rantoul also employs a part-time education coordinator.

(9) *"...shall include provisions for compliance, including incentives and penalties."*

There are no compliance provisions in any of the existing programs since all programs in Champaign County are voluntary.

(10) *"...shall include provisions for (i) recycling the collected materials, (ii) identifying potential markets for at least 3 recyclable materials and (iii) promoting the use of products made from recovered or recycled materials among businesses, newspapers and local governments in the county."*

All formal publicly sponsored recycling collection programs in Champaign County accept at least three materials: glass, cans and newspaper. As of 1988, marketing of these materials is contracted to the Community Recycling Center for Champaign, Urbana and County programs. The Village of Rantoul's materials are collected and marketed by a private firm located in Rantoul. Champaign has passed a resolution promoting the purchase of recycled products, especially paper. Urbana has developed a recycling and procurement ordinance which is currently under legal review. The County and Rantoul use varying amounts of recycled paper but do not have any local legislation requiring the purchase of recycled materials.

(11) *"... may provide for the payment of recycling diversion credits to public and private parties engaged in recycling activities."*

There have been no diversion credit programs utilized in Champaign County. The present system of private sector residential and commercial garbage collection and public sector residential recycling collection does not allow the use of the diversion credit concept. Most diversion credit programs have the public sector, which provides residential collections, crediting the private sector for recycling services. The opposite circumstances exist in Champaign County at the present time. The private sector provides residential and commercial sector garbage collection while the public sector provides residential recycling collection. Commercial sector recycling collection is largely provided by the private sector.

Program Goals As Set By The Intergovernmental Solid Waste Disposal Association Agreement Dated July 1986

Recommending expansion and maintenance of recycling programs in the County also follow the goals of the ISWDA. Specifically, the following are the goals set by the ISWDA.

(1) *"That solid waste should be looked upon as a resource of the community to use and not as a 'problem'."*

By collecting recyclable material, the municipal governments in Champaign County show that there is a value to this action. This value can be measured as an actual

monetary return in the form of revenues or it can be a more intangible value such as long-term environmental benefits.

(2) *"That the volume of solid waste generated be reduced to the maximum feasible extent by promotion of alternative solid waste reduction strategies."*

Collection of recyclable materials through a curbside collection program is the promotion of alternative solid waste reduction strategies. This type of collection is not the *only* type of alternative solid waste reduction strategy available however it is a part of an integrated solid waste management plan.

(3) *"That materials and energy (in optimum proportions) be recovered from the solid waste stream to the maximum extent possible."*

If the private sector continues the same level of recycling as in 1988 and recommended curbside recycling programs were implemented, by 1995 43% of the total solid waste generated in Champaign County could be diverted from landfills. While an optimum proportion of material recovery has not yet been determined, this plan does outline a basis for establishing what the upper range of that proportion is.

(4) *"That the recovery of energy and materials from solid waste and the disposal of the irreducible remainder be accomplished by use of environmentally sound technologies."*

Curbside recycling, Drop-off, Buy-back and yardwaste composting are generally considered environmentally safe technologies for solid waste handling.

Compatibility With And Capacity Of Current Collection And Processing Systems

The current collection system revolves around residents separating materials into three categories: glass, cans and newspaper. The vehicles used in both programs have designated sections to receive the materials. At the processing center, fork lifts are used to lift and tip the bins from the trucks. The processing lines are designed to separate glass by color and cans by composition. Newspapers, which are usually placed in brown bags, are dumped into a hopper. There the brown bags and other inappropriate

materials are removed before the newspapers are loaded into a trailer. Newspaper containers from the Drop-off sites are also dumped into the hopper and cardboard as well as other inappropriate materials are removed prior to loading. Yardwaste in Urbana is collected nine and one-half months of the year and taken to the Yardwaste Reclamation Site. Champaign's scaled down yardwaste collection also takes materials to the Yardwaste Site. This is the collection and processing system the program expansions were based upon.

Recommendations are divided into near-term programs and long-term goals. The near-term programs focus on the next five years, through 1995. The majority of capital expenditures required to expand the recycling programs will be required during this five-year period. Therefore, analysis, as well as recommendations, focused on determining the next steps or expansion required to maintain the overall recycling approach and the associated cost. The long-term recommendations cover some of the major organizational and policy changes that are required to continue moving Champaign County toward a fully integrated solid waste management structure. The implementation of any of the long-term recommendations will significantly impact the next set of capital investments made in recycling.

1990-1995 Programs

In reviewing the expansion alternatives, the following near-term program expansions are recommended due in part to their compatibility with current collection and processing systems and the capacity available in each. Other recommendations have been made based on the maturity of the current recycling programs in Champaign County. These individual programs and their level of complexity, including the size of the public investment in them, dictate that they be operated in a mature system.

General

(1) **The Cities and County should develop a unified recycling system and agency to operate the recycling programs.** This is in keeping with the intent of the ISWDA agreement; the Cities and the County created an agency to undertake unified solid waste planning and implementation. A single agency to oversee recycling activities in the County could facilitate many activities. It would allow better utilization of equipment and more efficient routing. It could also facilitate the inclusion of new residential areas in the County. There would be one agency to negotiate and monitor contracts.

~~As the University of Illinois begins to provide residential recycling services,~~ there would be three independent residential curbside collection programs operating within the County. This raises the question of the potential advantages of combining the collection services under the auspices of one governmental entity, such as the Association.

If a more efficient system were implemented, operational expenses could be reduced. The larger service base could attract bidders willing to provide the service, and competition could drive costs down. Some private firms may be willing to bid to provide recycling services countrywide. If a public agency provided collection then the City of Champaign and the University would need new equipment requiring an up-front capital investment. One region-wide system might provide some routing efficiencies. There could also be a reduction of administrative expense. If the Association were to provide services for two or three governmental entities, one staff person could operate the program. Coordination could provide more effective service to multi-family units and the University Campus housing.

(2) **The Cities and the County, through their membership in the Association, should develop a material recovery facility to 'mainstream' recycling in Champaign County.** This is also in keeping with the intent of the Association Agreement. Based on the review and analysis conducted for this portion of the Champaign County Solid Waste Plan, there is need for additional processing capacity. Moreover, as shown in the preceding analysis, there is an inherent linkage between the design and operation of the collection system and processing facility to which it is delivered. The current system put real limits on the ability to make recycling the central focus of all solid waste management efforts in Champaign County.

The construction of a facility specifically designed for processing recyclable materials and other forms of material recovery will confer several advantages to the current recycling programs operating in the County. First, it will allow the Association member governments to keep pace with the current rate of expansion occurring in the three material collection programs. Second, it will allow for the processing of compatible material expansions, even without any change in the collection system or the housing stock it services. This is particularly true for either paperboard or plastic collection expansion. Third, the expansion of processing capacity specifically designed to handle commingled collection would allow service to an additional 40% of the housing stock in the County to the recycling base. This would not mean that all the multi-family units would participate, but those collection areas could be developed. Since this would probably result in some type of commingled collection system, the same commingled approach could be adapted to the current single-family through fourplex collection system. This in turn would result in simplified homeowner participation requirements and possible increases in collection volumes.

Fourth, a facility specifically designed to handle recycled material collections can also be adapted to material recovery from mixed municipal waste. The technologies required for one are adaptable to the other. This would allow such a dual function facility (source separated and mixed waste processing) to maintain expanded curbside efforts as well as backstop those efforts in order to maximize material recovery prior to landfilling. In addition, this type of facility approach could allow for the recycling of the processible fraction of the construction/demolition wastestream. This is a wastestream component which is virtually untouched (except for concrete recycling). Moreover, there is no currently operating public, non-profit or private sector processing capacity available in Champaign County for this portion of the wastestream.

Finally, the development of a single facility to handle both delivered recyclable materials and material recovered from mixed municipal waste or construction/demolition debris provides the opportunity to merge solid waste collection and recycling services at one single point in the overall system of solid waste generation, collection, processing and disposal. Currently, the Cities and the County are directly involved with the costs to collect only recyclables. The private haulers in Champaign County are directly involved with the costs to collect only mixed municipal wastes. Consequently, there is no direct relationship between recycling and solid waste collection. This separation has effectively prevented the realistic pricing of the cost of solid waste processing and disposal. It has also prevented the development of true incentives for recycling by all generators of solid waste, while allowing landfilling (via private solid waste collection)

to appear to be a cost effective management option. There is no mechanism to capture the avoided cost savings provided by public non-profit recycling programs. Without such a linkage, recycling efforts and programs cannot be moved to the center of solid waste management in Champaign County. Moreover, there is no real guarantee that they can remain in an overall system of solid waste collection, transport, processing and disposal which operates in such a discontinuous fashion.

(3) **The Cities and the County should consider altering the current licensing structure for haulers.** This would include an increase in the licensing fee and an expansion of the requirements needed to obtain a license. Consideration should be given to establishing a licensing structure that would encourage haulers to provide incentives to their customers that recycle. Volume based service fees should be considered as an alternate service to simple once or twice a week multiple can pick-ups.

Residential

(1) **The implementing agency should identify which financial incentives would be the most feasible for implementation in Champaign County.** The economic incentives are intended to encourage source reduction and recycling. To identify the appropriate incentives, the implementing agency should review and study a variety of options including, but not limited to, volume-based pricing. The study may include pilot programs throughout the county to acquire data on various options including actual reductions and increased recycling rates obtained. The study should obtain input form, at a minimum, the following groups:

1) local government
2) private haulers
3) citizen organizations
4) curbside recycling service providers, and
5) local environmental groups

A report identifying which options would be best for the County, should be presented to the implementing agency's Board or Council within 2 years of the plan's adoption. Additional time may be granted if pilot programs are undertaken as part of the study. The report should also include exact wording for any ordinances, or changes to local government policies, if necessary.

(2) **The City of Champaign and the City of Urbana should expand their curbside collection programs to service buildings with 5-9 units with a targeted participation rate of 30%.** Current collection systems can be used to serve this type of housing stock. Urbana has 39% of their housing stock in structures of 4 units or greater while Champaign has 38% of their housing stock in this type of multi-family structure. Approximately 12% of Urbana's housing stock is in structures of 5-9 units; Champaign has 8% of its housing in structures of 5-9. With the extension of curbside to 5-9 unit dwellings, the curbside collection would be serving 73% of the housing stock in Urbana and 60% of the population. In Champaign 70% of housing stock and 64% of the population would then be served by curbside collection.

(3) **Both Cities should use educational and promotional means to raise participation rates above the participation rate recorded for the month of the plan's adoption.** Participation in curbside recycling should remain voluntary. An estimated additional 150 to tons in Champaign and 82 to tons in Urbana could be collected at the 45% participation level. At the 55% participation level, the additional tonnage would be 450 in Champaign and 247 in Urbana.

The education programs can be incorporated into the same structure as those for source reduction (see Part II). Promotional efforts should include more frequent advertising by doorhangers bout the curbside programs. This type of activity can also be targeted to zones or certain housing units that have lower participation rates. Currently the 2-4 housing units have lower participation rates than single family homes. An advertising campaign aimed specifically at these units could raise the participation rates. In the future, with a better database on participation, other promotional campaigns can be targeted to additional areas.

In addition, the block leader concept should be examined. This program is being used in other cities, such as Seattle. Volunteers from neighborhoods participate in short workshops on recycling. These workshops include what can and cannot be recycled and how to prepare material for recycling. After completing the course, the volunteer becomes the neighborhood "expert" on recycling. Neighbors can ask the block leader for information or assistance instead of calling an office. This would make recycling education readily available to many.

(4) **Both Cities should add the collection of cardboard/paperboard to the curbside programs (including the 5-9 unit buildings).** It was estimated that an additional 482 to 589 tons would be collected in Champaign and

278 to 339 tons in Urbana, if cardboard/paperboard was added to curbside collection.

(5) **Mandatory recycling should be reviewed and an implementation plan developed if participation rates in curbside recycling programs decrease for three consecutive quarters.** Upon notice of the first quarter's decrease, the implementing agency should begin the review of various program options and development of an implementation plan.

(6) **The County should maintain their current number of drop-offs.** Since this program began in late 1988, the level of participation has not leveled off. Maintaining the sites is encouraged with the possibility of adding additional materials as the processing capability develops.

Yardwaste

(1) **Both Cities should investigate the development of residential backyard composting programs.** Currently, both the Cities of Champaign and Urbana have collection programs to address yardwaste. The City of Urbana has a formal, municipally sponsored program called U-Bag and U-Tie and allows for pay-by-the-bag. The City of Champaign has worked with local haulers to have them provide pay by the bag yardwaste collection programs. An additional step could be taken directed towards yardwaste diversion prior to collection. Such a program would be educational with brochures on how-to-compost and other information on how to reduce yardwaste. It could be operated in conjunction with local garden clubs or other organizations such as Seattle's program.

Commercial

(1) **There should be no municipally sponsored programs intended to service large commercial and industrial firms in the County.** The financial incentives are already in place for the large waste producers in the County to recycle. Private haulers currently charge large generators by volume. Private haulers have begun to offer recycling services to these firms as a means of reducing the cost to collect, transport and dispose of the solid waste to the out-of-county landfills currently in use. The level of commercial recycling should be monitored. If the recycling rate begins to decline then the public sector should evaluate the situation and determine

if further action is necessary.

(2) **A partnership between the private haulers and the implementing authority should be developed to increase the recycling opportunities for small to medium sized businesses.** Approximately 70% of the businesses in Champaign County employ one to ten people. This implies that they are locally owned. If the owner or manager of the business recycles at home that awareness should be capitalized upon and used to encourage commercial recycling. Targeted businesses should be medium-sized retail enterprises, hotels, health and business services.

(3) **Both the Cities and the County should review their zoning, building codes, health and safety codes or any other ordinance or regulation that may hinder recycling activity in the commercial and industrial sector.** Revisions should require adequate space for the placement of collection bins both inside and outside of non-residential buildings. Fire and safety codes should be clarified to specifically state what type of recycling containers are required in particular situations. At a minimum, no residential or non-residential building owner should be penalized for recycling in a safe and efficient manner.

(4) **The implementing agency should employ a commercial recycling coordinator.** A person in this position would assist local businesses in setting up a recycling program by identifying what portions of their wastestream would be recyclable, selecting recycling containers, developing training programs to educate workers, to assist in securing collection services for the materials. The recycling assistance could be combined with the generator-based waste reduction waste audits.

Sludge

(1) **The current sludge disposal programs should be continued.** Current water and wastewater treatment programs for sludge disposal divert 96% of the sludge generated in Champaign County from landfills. Maintenance of the current programs is recommended to keep the diversion of sludge from area landfills.

Long-Term Goals and Recommendations

(1) **Curbside recycling should be offered to all villages and townships in Champaign County**. The ISWDA would provide a plan for curbside

recycling services to villages or townships in the County under the following circumstances:

1) The village or township board votes to join the ISWDA(as stipulated in Article V, Section 5.1.2 (a) or (b) of the Agreement);

2) The village or township enact flow control or take an equal action approved by the ISWDA Board, to insure that all solid waste generated within the incorporated boundaries is delivered to the ISWDA appointed facility;

3) That the village or the township be willing to follow other ISWDA programs; and,

4) That the village or township, if necessary, assist in financing those programs.

(2) **The database of waste generation, recycling and disposal information should be improved and routinely updated.** Specifically, data on household participation, set-out weights and set-out composition should be collected and maintained in a format to allow a variety of analysis. Information on set-out weights of single-family homes versus 5-9 unit set-outs may be important in the future to assess the impacts on service provision and if any changes are warranted. Information on generation rates will allow calculations that may make tracking source reduction programs possible. Currently, all generation rates are estimates based on 1988 data and national averages.

This type of database will also provide a base for making solid waste management decisions in the future as well as monitoring solid waste management programs.

(3) **The municipal programs should continuously adapt the materials collected to the changing mix of recyclable materials.** Materials now considered not recyclable may become recyclable as new technology develops; an example is junk mail and magazines. The municipal programs should retain a level of flexibility in order to accommodate changes in the recycling markets.

(4) **Studies on how to service 10 plus unit residential structures should be undertaken.** As new facilities come on-line, it may be possible to develop systems other than source separating. A commingled or "Bag-It" system

may be possible to use in these structures. The private sector-public sector question will also need to be addressed in relation to multi-family housing units. Regardless of which entity provides service, it will be extremely important for the public sector entity to maintain responsibility for the public awareness campaign. If each governmental entity, including each City and the University, were to provide multi-family services, there is a potential for having too much equipment. Some collection equipment might be used only intermittently. Similarly, staffing needs could be designed into the program and routing efficiencies taken into consideration.

Coordination of multi-family services could be managed with fewer supervisory staff if one entity was responsible for delivery of service. This would be true whether the actual service is provided by the public or private sector. If the University of Illinois decides to implement residential curbside collection, a cooperative service approach should be explored.

(5) **The recycling programs should be amended to accommodate generator-based waste reduction programs when appropriate.**

(6) **Continuing education programs should be developed and implemented along with a more aggressive promotional campaign.** Educational and promotional efforts should follow those outlined earlier (Part II and p. 136, Part III).

Perhaps the most important recommendation is to monitor the programs on an on-going basis. This, combined with a good database, will allow prompt appropriate adjustments to be made due to changing markets and technology. Continuing education is a another activity that should be maintained throughout the length of this plan. The Household Survey showed that there was a knowledge gap; people were not aware of services that were available e.g. curbside recycling. Upgrading current education efforts could raise the public's awareness and encourage more people to take advantage of the service. As materials are added to curbside collection, education and promotional efforts will enhance the success of the program. Recycling services and programs are becoming viewed as an essential municipal services, similar to police and fire protection. Implementation of the recommendations will be a step toward developing the same level of service that the police and fire departments offer.

APPENDIX ONE

Executive Summary

The Public on Solid Waste Disposal Issues: Champaign County Household Survey November 1988

THE PUBLIC ON SOLID WASTE DISPOSAL ISSUES: CHAMPAIGN COUNTY HOUSEHOLD SURVEY OF NOVEMBER 1988

An Executive Summary Prepared for the
Intergovernmental Solid Waste Disposal Association
Champaign County
City of Champaign
City of Urbana

by

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March 1989

EXECUTIVE SUMMARY

Local municipalities in conjunction with Champaign County have actively pursued the development of progressive solid waste management programs since the early 1980s. As city and county governments address future directions in their solid waste management policies and programs, it becomes important to determine public awareness of the issues and choices. To provide this kind of information, the Intergovernmental Solid Waste Disposal Association in Champaign County contracted with the Survey Research Laboratory of the University of Illinois to conduct a household survey in the fall of 1988. This is a summary of a much more detailed report on the findings from that countywide survey.

1. Awareness of Solid Waste Disposal Issues

Although almost two-thirds of the countywide population has a basic awareness of issues about solid waste disposal, there is little indication that the public is fully aware of the depth of the problem and of the need for waste reduction. Among the issues that people have heard about, the landfill siting problems and landfills reaching capacity are the best known. Issues that less readily come to mind in the public are the prospect of rising costs, new recycling efforts, and improved household hazardous waste disposal. Least well understood by the public, as discussed later in this summary, is the need for yard waste reduction in the flow of materials going to landfills.

2. Public or Private Responsibility for Solid Waste Management

New policy initiatives will have a better opportunity to succeed if they correspond to conceptions of who should be responsible for them. The survey found that the public generally favors public responsibility or joint public-private responsibility for providing landfills and for recycling programs, as was in fact the practice in most areas of the county at the time of the survey. More specifically, assigning joint responsibility for landfills and recycling is a preferred option by substantial portions of the population (nearly four out of ten), indicating a preference for cooperation or interdependence of roles between the sectors on these functions. On the other hand, in the public's view, the preferred assignment of responsibility for collecting and hauling away trash and for yard waste hauling tips slightly in the direction of the

private sector. This is not unexpected in that it mirrors the current system for the provision of such services.

3. Intergovernmental Responsibility for Solid Waste Management

There are a number of reasons why intergovernmental cooperation on solid waste management is important. There are certain economies of scale in sharing collection, disposal, processing, and treatment services. Some communities do not have appropriate sites or facilities. In recycling, income from saleable recyclables in order to cover fixed capital costs depends on volume. Any participation in waste management by the private sector is not easily restricted to a single governmental jurisdiction. Educational campaigns and service programs are sometimes more manageable if jurisdictional boundaries can be transcended. And, for the ordinary citizen, the motivation to participate in waste reduction and recycling efforts is stronger if it is widely shared among people in adjoining neighborhoods and communities. In that light, it is of considerable importance that the public in the county overwhelmingly (80%) favors "one joint program," countywide, for intergovernmental solid waste management.

4. Program Priorities

A series of questions was worded to help identify the priorities that the public thinks local governments should have. Highest priority was given to the program goals of recycling (53% said "high priority") and to proper disposal of household hazardous waste (80% "high priority"). There is less, but surprisingly strong, support for incineration (given high priority by 46%), a potentially air polluting option that gets virtually the same level of support in the cities as it does in the rural and village areas of the county.

In an apparent departure from the current waste management view that disposal of yard waste in landfills is unnecessary, economically unsound, and wasteful of a natural resource, 30% said that community-run composting of yard waste should be given high priority. The priority given this last program also varied little among areas of the county, nor did it differ greatly by type of housing (apartments vs. single-family houses). That is, one's likelihood of having a need for a place to put yard waste does not have much effect on the priority assigned to a program for community composting of yard waste. Instead, this appears simply to be a not-well-understood program that receives only relatively modest support in all areas of the county.

5. Landfill Location

Waste generators may have some interest in controlling their landfill, what goes into it, how safe it is, etc. With this in mind, people were asked

whether the landfill for Champaign County should be in the county with local government control over where and how the garbage is disposed of, or whether it should be outside of Champaign County with no control over it. Fully 90% supported locating a landfill in Champaign County under the control of local government. There was virtually no variation among the areas of the county in the public's support for this position.

6. Importance of Certain Policy Constraints

Policy is shaped, in part, by some constraints on how much can be spent, what effects on the environment are tolerable, and so on. The survey asked the public what importance they thought local officials should assign to four specific possible policy constraints. The public clearly and strongly considers it very important to avoid water pollution from waste disposal sites (95% said so), nearly as important to avoid air pollution from such sites (84% said "very important"), somewhat less important to minimize the amount of farm land used for such sites (60% said so, with only small differences among areas of the county and 78% of the farmers themselves saying that this was very important), and only somewhat important to minimize the costs of waste disposal (42% said "very important" and 53% said "somewhat important"). People appear to be more willing to pay additional waste disposal prices and to dedicate the necessary land to it than to suffer deterioration of the environment.

7. Expansion of Recycling, Hazardous Waste Diversion, and Yard Waste Composting Services

Because new programs in solid waste management involve some costs as well as benefits, survey respondents were asked whether they favored implementing various types of new or expanded programs. The cost of the program was noted in most of these questions. Two questions also asked how respondents would prefer to have new or expanded programs funded.

Over three-quarters of the surveyed households in Champaign-Urbana (78%) favor expanding curbside recycling to all households even at a cost of $1-$2 per household per year. Countywide, nearly the same percentage (73%) favor including plastic bottles and jugs in curbside recycling collections, this time at a cost of $2-$3 per household per year. To dispose of household hazardous waste, respondents gave greater preference to retaining annual collection events at $1-$2 per household per year than to establishing and maintaining collection centers that would be open once a month at a cost of $2-$4 per household per year. Fees on those using a hazardous waste program or a sales tax on hazardous products were about equally favored as ways of funding a household hazardous waste collection program. Finally, respondents generally favored paying haulers for removal of yard waste but gave a strong

second-place endorsement to funding by way of charging extra for special yard waste bags and twine.

8. Mandated Recycling, Required Deposits, and Banned Materials

Solid waste management may include laws that mandate recycling, require deposits on certain containers, and ban certain materials from retail sales or from the landfill. The survey asked respondents the extent to which they agreed or disagreed with eight such laws or policies. In general, the public solidly agrees with policies that would mandate recycling by households (81% agreed), mandate recycling by businesses (86%), require deposits on both glass (74%) and metal (62%) beverage containers, require a deposit on automobile tires and batteries (59%), ban (from retail sale) all nonrecyclable plastic containers (65%), and ban from landfills all household hazardous waste (81%). The public would be directly impacted by any of these policies, and it appears from this strong pattern of support that the public would be receptive to these policies.

Only banning yard waste from landfills (agreed to by 39%) fails to receive assent, perhaps reflecting a view that yard waste is exactly what ought to go into a landfill. The public's views on the undesirability of banning yard waste from landfills may seem out of place in its pattern of support for far more stringent and less easily implemented policies. It seems likely, however, that in the minds of the public, yard waste may seem to be less of an environmental threat than the other materials cited and thereby be innocuous material to landfill. The high cost of using a sanitary landfill for this type of disposal does not appear to be understood by the public. It also seems likely that the ease of diverting yard waste and the environmental benefits of community composting are not well understood yet. This lack of awareness may cause compliance problems for local officials and haulers in that all yard wastes are banned, by state law, from disposal in landfills by July 1990.

9. Curbside Recycling

Participation in curbside recycling is a key measure of public acceptance of and involvement in solid waste reduction and diversion programs. Among all surveyed households in Champaign-Urbana living in any dwelling type, 38% participated in curbside recycling. By city, the curbside participation rate was 39% in Champaign and 36% in Urbana. Among only those housing units that were officially eligible to participate (i.e., single-family to fourplex dwellings), over half said that they participated (53% in the two cities together; 55% in Champaign and 50% in Urbana). Of those living in apartments that were technically ineligible for curbside participation, one out of eight (13%) said that they nonetheless participated in curbside recycling.

Availability or perceived availability of a curbside recycling program are important factors in explaining participation. Three out of every five households (58%) in the combined two cities reported that a program was available in their neighborhoods. Although perceived availability was higher (78%) among those who lived in the types of housing units that were eligible to participate (i.e., single-family houses to fourplexes), there remained 22% of the eligible households where curbside recycling was perceived as not being available in their neighborhoods. Among apartments that were technically ineligible, a little over one-quarter (29%) said that a program was available in their neighborhoods.

Among the households that reported availability of a program, 64% participate. Most respondents indicated that they would participate if all households were provided with (or made aware of) a curbside recycling service. Nearly all participants were satisfied with the existing curbside recycling programs.

10. Dropoff Centers: Awareness, Location, Use, and Reasons for Nonuse

Nearly three-quarters of the households in the county are aware of the location of a recycling dropoff center. Countywide, 47% said that someone in their household used a dropoff site during the previous six months. There was little variation in this usage rate among areas in the county. The principal reason for not using a dropoff site was not having enough recyclables.

11. Recyclers of Glass, Newspapers, or Cans

All those who said that they did curbside recycling or dropoff recycling were asked whether they recycled "all, most, some, or none of your glass containers." They were also asked about how much of their newspapers, aluminum cans, and "tin" cans they recycled. Fully six out of ten households in the county recycle in some manner. There is remarkable uniformity in recycling rates throughout the cities and areas of the county, with the two major cities having a slightly higher rate than other areas.

12. Recycling Plastic Containers

Nearly one-quarter (22%) of the households in the county were aware of the existence of the plastic bottles recycling program. This program was barely six months old at the time of the survey and consisted principally of providing bins for plastic containers at dropoff centers. Over two-thirds (70%) of those who were aware of the program felt that they were able to distinguish between the types of plastics that were recyclable and those that were not. The

overall countywide participation rate in plastics recycling was low at only 8%, but this represents 36% of those who were aware of the program.

13. Recycling and Disposal of Oil

Motor oil is potentially the source of the greatest volume of household hazardous waste. Fully 42% of all households countywide changed their own motor oil at least once last year. Given the percentage of households that change oil and the fact that there is a significant volume even from one oil change, this presents a major disposal problem. If placed in landfills, used oil will increase the potential for adverse environmental impact of the landfill. There are similar but more direct adverse effects of dumping used oil on the ground or pouring it down a sewer.

Nearly half of those who change their oil also indicated that they recycle at least some of the used oil. Enough is recycled from households throughout the county to fill an estimated 1,000 standard 55-gallon barrels. However, for every ten gallons of used oil that are recycled by households, another gallon is poured down the sewers, an additional three gallons are put in the garbage, which is largely sent to landfills, and still another two gallons are dumped on the ground.

14. Recycling of Cardboard and Brown Paper Bags

Households are not big generators of cardboard waste, although they may accumulate some boxes from major purchases. They do acquire brown paper bags from grocery shopping. Countywide, 17% of households have dropped off cardboard or brown paper bags at a recycling center during the six months ending in November 1988. Recycling these materials is slightly more common among households in rural areas and Rantoul than among households in the twin cities.

15. Disposal of Pesticides, Poisons, and Herbicides

The most potent source of household hazardous waste is probably from improperly disposed of pesticides, poisons, and herbicides. One of the main reasons for the first two annual household hazardous waste collection events in Champaign County was to remove as much of this material as possible from the waste stream heading for landfills. Only 9% of households had occasion to dispose of any of these kinds of materials during the year ending in November 1988. Nearly half of these disposed of at least some of these materials by taking them to a household hazardous waste collection event. However, a little over half of those who disposed of these materials did so by putting them in garbage that generally went to a landfill.

16. Composting and Disposal of Yard Waste

Putting yard waste in a sanitary landfill is an unnecessarily expensive waste disposal solution for a material that has much better uses or cheaper waste disposal options. This concern applies to two-thirds of the households in the county, because only that fraction has yards that produce yard waste. A little over one-half of those with yards use at least some of their own yard waste as mulch or compost. A little more than one-quarter send some of the material to a community compost by way of special collection programs. Just over one-half also put at least some of their yard waste in their regular garbage for transport largely to a sanitary landfill.

Only a little more than one-quarter of respondents in Champaign-Urbana or the surrounding urban fringe were aware of the existence of the yard waste reclamation center in Urbana. Some 90% of those with regular trash haulers reported that their haulers accept yard waste and do so generally without charge. In general, programs aimed at diverting yard waste from landfills and maximizing at-home or community composting have attained some community recognition and involvement but have a long way to go before they become major programs that are well understood and widely participated in by the general population.

17. Use of Haulers

A key part of the solid waste management system is the provision of collection services. This has historically been a function of the private sector in Champaign County. Changes in service and makeup occur, providing little public record of the change or of the structure of the hauling industry as a whole. To expand knowledge of how this crucial service functions and is structured, several questions were included in the survey about services provided by haulers.

Two-thirds of households in the county pay haulers to carry away their trash. This represents nearly all single-family houses, nearly half of the duplex, triplex, and fourplex homes, and a small fraction of the apartments. Most households (56%) set out their trash in or by the house or garage, but one-third set it at the curb. Over two-thirds of the households countywide served by a hauler have twice-a-week trash pickup.

Respondents named 54 different haulers in Champaign County, most of whom operate in either of the twin cities or the urban fringe. There is some concentration in the provision of collection services, with 45% of the homes having contracts with one of the five largest haulers. The average monthly charge for routine household trash hauling service is approximately $11, although there is considerable variation in monthly charges.

18. Participation in Any Recycling or Composting

Counting all types of materials that could be recycled and that were included in the survey (glass, newspapers, aluminum cans, "tin" cans, plastic containers, motor oil, cardboard, and brown paper bags) and including composting or mulching yard waste, either at home or at a community compost site, the recycling participation rate of all households involved in some aspect of recycling in Champaign County is 74%. This varies somewhat among the areas of the county, with the rural areas and Rantoul having somewhat higher rates than the twin cities.

The greatest differences in participation in recycling were between single-family houses in the cities, which had nearly nine out of ten participating, and apartments in buildings with five or more units in the cities, which had less than one-half participating in any kind of recycling.

Methodological Note: Generally speaking, the countywide percentages reported in this summary have a possible sampling error of plus or minus 3 percentage points.

APPENDIX TWO

Calculations

ECONOMIC ANALYSIS OF
U-CYCLE PROGRAM EXPANSION
(in 1989 dollars)

Item	Amount
Labor	$36,633
Benefits	9,158
Administration	6,533
Benefits	1,633
Subtotal	**$53,957**
Vehicle Operation	$2,195
Equipment Maintenance	2,705
Equipment Debt Service	17,040
Container Replacement (8% per year)	487
Subtotal	**$22,427**
Office Supplies, telephone, travel	$1,414
Promotion	13,981
Subtotal	**$15,394**
Total	**$91,778**

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CONSTRUCTION/DEMOLITION WASTES

Assumptions based on national averages:

75% by volume is processible waste

25% by volume is clean fill (rock/dirt)

~~bulk density of processible wastes: 1,055 lbs per c.y.~~

(BVA report, 1988)

bulk density of clean fill (rock/dirt): 3,000 lbs per c.y.

Total weight of C/D: 58,100 tons

Calculations:

Total C/D bulk density:

(0.75)1,055 lbs per c.y.	791.25	
(0.25)3,000 lbs per c.y.	750.00	
	1,541.25	lbs per c.y.
	=> 0.77	tons per c.y.

58,100 tons divided by 0.77 tons per c.y. of C/D = 75,455 c.y. C/D

75,455 c.y. C/D multiplied by 0.25 c.y. clean fill per c.y of C/D waste = 18,864 c.y. clean fill

18,864 c.y. multiplied 1.5 tons per c.y. = 28,295 tons clean fill

58,100	Tons Total C/D Waste	
-28,300	Tons Clean Fill	(48.7%)
29,800	Tons Processible Waste	(51.3%)

Cost of Collection, Transport and Disposal

Since it is not possible to know the operation costs for individual haulers, costs were estimated based on information made available to staff through interviews with some of the local haulers. The solid waste hauling fleet in Champaign and Urbana is highly diverse in both composition and operating strategy. The volume capacities of the majority of packer trucks is 18 cubic yards, 20 cubic yards or 25 cubic yards. Compaction is possible to 1,200 pounds per cubic yards but it was assumed that most trucks are not loaded to capacity because:

(1) Compactors quickly wear out causing a loss of capacity with age.

(2) Time constraints prevent work crews from completely filing a large vehicle of high density capability in a normal working day.

(3) County and state road weight restrictions limit the practical loading of the vehicle.

(4) The practical limit to garbage compaction is less than 1,200 pounds per cubic yard for most types of solid waste.

Operation in Urbana is limited to backyard pick-up by ordinance. Champaign allows curbside pick-up but the majority of customers elect to pay for backyard collection. The average distance between stops was calculated at 995 feet and only one customer is served per stop. These estimates were based on a time and motion study conducted by ISWDA staff on a route at the invitation of a local hauler. The time and motion study found that productive time per stop for backyard collections averaged 2 minutes 20 seconds each; curbside collections averaged 2 minutes each; and for mixed backyard and curbside collections averaged 2 minutes 12 seconds each. Productive time per stop includes travel between stops and time for periodic compaction of the load.

The costs for 1988 were based on a series of 18 different scenarios. These scenarios were all permutations of disposal at either Danville or Villa Grove by vehicles of 18 cubic yard, 20 cubic yard or 25 cubic yard volumes and collection operations of backyard, curbside or a 54% backyard/46% curbside[1] mix, all with 995 feet between stops. An estimate of costs for 6 scenarios based on curbside collection with 200 feet between stops and disposal at either Danville or Villa Grove and 18 cubic yard, 20 cubic yard or 25 cubic yard compaction vehicles was prepared for comparison.

Attached are the lists of assumptions made for each scenario and a break-out of the costs of collection, transport and tipping. Costs of overhead, depreciation, operation, maintenance and labor were proportioned between collection and transport on a time

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[1] The breakout of 54% backyard and 46% curbside represents findings of the time and motion study on a single route. This is also similar to the findings in the November 1988 Household Survey.

weighed basis. The costs presented represent a range of $67 per ton and $89 per ton for collection, transport and tipping.

A blended cost was determined by making assumptions about the quantities of waste disposed by the scenarios previously described. It was assumed that approximately 40% of the Champaign and Urbana waste was hauled to Villa Grove and the remainder was hauled to Danville. It was also assumed that 20% of the waste was hauled in 18 cubic yard vehicles, 50% in 20 cubic yard vehicles and 30% in 25 cubic yard vehicles. This was for waste going to both Villa Grove and Danville. Fifty percent of the waste was assumed collected at the back-door regardless of the size of the collection vehicle or the final disposal site. With these assumptions, the average 1988 cost to dispose of waste at Villa Grove was $71 per ton and $76.70 per ton at Danville. The overall cost of landfilling garbage for the resident of Champaign and Urbana in 1988 was estimated at $74 per ton. These costs applied only to residential solid waste collection in the Cities of Champaign and Urbana.

Projected Tipping Fees Per Cubic Yard

Location of Landfill	1987	1988	1989	1990
Urbana	$4.20[1]	$4.20[2]		
Danville[3]	$2.20	$2.70	$3.50	$4.25
Villa Grove[3]	$3.00	$3.65	$4.45	$5.00

[1] Effective July 11, 1987

[2] Urbana Landfill closed in October of 1988

[3] This information provided by a hauler based on past records.

TABLE 7
ESTIMATED COST PER TON FOR AVOIDED COST CALCULATIONS IN CHAMPAIGN COUNTY

Collection Vehicle Distribution	Disposal at Villa Grove[1]	Disposal at Danville[2]
18 cubic yard[3]	$ 72(.2)=$14.4	$ 78(.2)=$15.6
20 cubic yard[4]	$ 70(.5)=$35	$ 76(.5)=$38
25 cubic yard[5]	$ 72(.3)=$21.6	$ 77(.3)=$23.1
	71(.4)=$28.4	76.7(.6)=$46

(1) Assumes that 40% of the Champaign-Urbana waste is hauled to Villa Grove.
(2) Assumes that 60% of the Champaign-Urbana waste is hauled to Danville.
(3) Assumes that 20% of the collection vehicle capacity is in 18 cubic yard vehicles.
(4) Assumes that 50% of the collection vehicle capacity is in 20 cubic yard vehicles.
(5) Assumes that 30% of the collection vehicle capacity is in 25 cubic yard vehicles.

Cost Avoidance for Champaign-Urbana is approximated at $74 per ton.

Estimated Cost Per Ton To Collect, Transport And Dispose Of Residential Solid Waste From Champaign-Urbana To Danville, 1989

	Vehicle = 18 Cubic Yards 760 Lbs per Cubic Yard 304 Services per Load 6.84 Tons per Load	Vehicle = 20 Cubic Yards 760 Lbs per Cubic Yard 338 Services per Load 7.60 Tons per Load	Vehicle = 25 Cubic Yards 650 Lbs per Cubic Yard 361 Services per Load 8.13 Tons per Load
Backyard Pick-Up 995 Ft per Stop			
Collection	$55.00	$54.00	$55.00
Transport	$24.00	$22.00	$21.00
Tipping	$11.00	$11.00	$12.00
Total	$90.00	$87.00	$88.00
Curbside Pick-Up 995 Ft per Stop			
Collection	$50.00	$50.00	$51.00
Transport	$24.00	$22.00	$21.00
Tipping	$11.00	$11.00	$12.00
Total	$85.00	$83.00	$84.00
54% Backyard Pick-Up 46% Curbside Pick-Up 995 Ft per Stop			
Collection	$53.00	$52.00	$53.00
Transport	$24.00	$22.00	$21.00
Tipping	$11.00	$11.00	$12.00
Total	$88.00	$85.00	$86.00
Curbside Pick-Up 200 Ft per Stop			
Collection	$42.00	$42.00	$43.00
Transport	$24.00	$22.00	$21.00
Tipping	$11.00	$11.00	$12.00
Total	$77.00	$75.00	$76.00

Assumptions: One-man crew, $11.25 per hour labor, overtime paid, guaranteed 40 hrs per week.
One service collected per stop, one load per day, truck emptied at end of each day.
$4.00 per cubic yard tipping fee.

Cost of Collection, Transport and Disposal

Type of Collection: Backyard Pickup, 25 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.33
Productive Time Per Load, hrs	14.02
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	148.05
Hours For Collection	14.02
Hours For Transport	3.39
Work Day Length	17.41

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.67
Depreciation	$2.95
Operation/Maintenance	$12.82
Labor	$30.63
Subtotal	$55.06
Transport Cost	
Overhead	$2.10
Depreciation	$0.71
Operation/Maintenance	$11.57
Labor	$6.14
Subtotal	$20.52
Tipping Fee	$12.31
Total	$87.89

Collection Fraction	0.805277	0.19	Collection Miles	73.05029
Collection O & M	6.063693		Transport Miles	75
Transport O & M	4.634716		Total Miles	148.0502

Cost of Collection, Transport and Disposal

Type of Collection: 54/46 Backyard/Curbside, 25 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.20
Productive Time Per Load, hrs	13.24
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	148.05
Hours For Collection	13.24
Hours For Transport	3.39
Work Day Length	16.63

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.57
Depreciation	$2.91
Operation/Maintenance	$12.79
Labor	$29.00
Subtotal	$53.28
Transport Cost	
Overhead	$2.20
Depreciation	$0.75
Operation/Maintenance	$11.59
Labor	$6.14
Subtotal	$20.67
Tipping Fee	$12.31
Total	$86.27

Collection Fraction	0.796117	0.20	Collection Miles	73.05029
Collection O & M	6.040637		Transport Miles	75
Transport O & M	4.657772		Total Miles	148.0502

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pick-up, 25 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	12.04
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	148.05
Hours For Collection	12.04
Hours For Transport	3.39
Work Day Length	15.43

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.40
Depreciation	$2.85
Operation/Maintenance	$12.75
Labor	$26.50
Subtotal	$50.51
Transport Cost	
Overhead	$2.37
Depreciation	$0.80
Operation/Maintenance	$11.63
Labor	$6.14
Subtotal	$20.94
Tipping Fee	$12.31
Total	$83.77

Collection Fraction	0.780209	0.21	Collection Miles	73.05029
Collection O & M	6.000600		Transport Miles	75
Transport O & M	4.697810		Total Miles	148.0502

Cost of Collection, Transport and Disposal

Type of Collection: Consolidated Curbside Route, 25 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	200
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	12.04
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	93.68
Hours For Collection	12.04
Hours For Transport	3.39
Work Day Length	15.43

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.40
Depreciation	$2.85
Operation/Maintenance	$4.72
Labor	$26.50
Subtotal	$42.48
Transport Cost	
Overhead	$2.37
Depreciation	$0.80
Operation/Maintenance	$11.63
Labor	$6.14
Subtotal	$20.94
Tipping Fee	$12.31
Total	$75.73

Collection Fraction	0.780209	0.21	Collection Miles	18.67845
Collection O & M	2.995928		Transport Miles	75
Transport O & M	4.697810		Total Miles	93.67845

Cost of Collection, Transport and Disposal

Type of Collection: Backyard Pick-up, 20 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.33
Productive Time Per Load, hrs	13.12
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	143.65
Hours For Collection	13.12
Hours For Transport	3.39
Work Day Length	16.51

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.56
Depreciation	$2.19
Operation/Maintenance	$12.98
Labor	$30.73
Subtotal	$54.46
Transport Cost	
Overhead	$2.21
Depreciation	$0.57
Operation/Maintenance	$12.39
Labor	$6.57
Subtotal	$21.74
Tipping Fee	$10.53
Total	$86.73

Collection Fraction	0.794589	0.20	Collection Miles	68.65319
Collection O & M	6.194031		Transport Miles	75
Transport O & M	4.983638		Total Miles	143.6531

Cost of Collection, Transport and Disposal

Type of Collection: 54/46 Backyard/Curbside Pick-up, 20 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.20
Productive Time Per Load, hrs	12.39
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	143.65
Hours For Collection	12.39
Hours For Transport	3.39
Work Day Length	15.78

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.46
Depreciation	$2.17
Operation/Maintenance	$12.95
Labor	$29.11
Subtotal	$52.68
Transport Cost	
Overhead	$2.31
Depreciation	$0.59
Operation/Maintenance	$12.42
Labor	$6.57
Subtotal	$21.90
Tipping Fee	$10.53
Total	$85.10

Collection Fraction	0.785060	0.21	Collection Miles	68.65319
Collection O & M	6.168390		Transport Miles	75
Transport O & M	5.009278		Total Miles	143.6531

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pick-up, 20 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	11.26
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	143.65
Hours For Collection	11.26
Hours For Transport	3.39
Work Day Length	14.65

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.28
Depreciation	$2.12
Operation/Maintenance	$12.91
Labor	$26.61
Subtotal	$49.91
Transport Cost	
Overhead	$2.49
Depreciation	$0.64
Operation/Maintenance	$12.46
Labor	$6.57
Subtotal	$22.16
Tipping Fee	$10.53
Total	$82.60

Collection Fraction	0.768541	0.23	Collection Miles	68.65319
Collection O & M	6.123941		Transport Miles	75
Transport O & M	5.053727		Total Miles	143.6531

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pick-up, 20 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	200
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	11.26
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	92.79
Hours For Collection	11.26
Hours For Transport	3.39
Work Day Length	14.65

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.28
Depreciation	$2.12
Operation/Maintenance	$4.88
Labor	$26.61
Subtotal	$41.88
Transport Cost	
Overhead	$2.49
Depreciation	$0.64
Operation/Maintenance	$12.46
Labor	$6.57
Subtotal	$22.16
Tipping Fee	$10.53
Total	$74.57

Collection Fraction	0.768541	0.23	Collection Miles	17.79461
Collection O & M	3.119269		Transport Miles	75
Transport O & M	5.053727		Total Miles	92.79461

Cost of Collection, Transport and Disposal

Type of Collection: Backyard Pick-up, 18 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.33
Productive Time Per Load, hrs	11.81
Depreciation, 1989 $/day	$19.23

Total Daily Mileage	137.29
Hours For Collection	11.81
Hours For Transport	3.39
Work Day Length	15.20

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.37
Depreciation	$2.18
Operation/Maintenance	$13.25
Labor	$30.91
Subtotal	$54.71
Transport Cost	
Overhead	$2.40
Depreciation	$0.63
Operation/Maintenance	$13.83
Labor	$7.30
Subtotal	$24.15
Tipping Fee	$10.53
Total	$89.39

Collection Fraction	0.776858	0.22	Collection Miles	62.28787
Collection O & M	6.411406		Transport Miles	75
Transport O & M	5.590385		Total Miles	137.2878

Cost of Collection, Transport and Disposal

Type of Collection: 54/46 Backyard/Curbside Pick-up, 18 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.20
Productive Time Per Load, hrs	11.15
Depreciation, 1989 $/day	$19.23

Collection Fraction	0.766748	0.23	Collection Miles	62.28787
Collection O & M	6.381179		Transport Miles	75
Transport O & M	5.620612		Total Miles	137.2878

Total Daily Mileage	137.29
Hours For Collection	11.15
Hours For Transport	3.39
Work Day Length	14.54

~~Costs In 1989 Dollars Per Ton~~

Collection Costs	
Overhead	$8.26
Depreciation	$2.16
Operation/Maintenance	$13.22
Labor	$29.29
Subtotal	$52.92
Transport Cost	
Overhead	$2.51
Depreciation	$0.66
Operation/Maintenance	$13.86
Labor	$7.30
Subtotal	$24.32
Tipping Fee	$10.53
Total	$87.77

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pick-up, 18 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	10.13
Depreciation, 1989 $/day	$19.23

Total Daily Mileage	137.29
Hours For Collection	10.13
Hours For Transport	3.39
Work Day Length	13.52

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.07
Depreciation	$2.11
Operation/Maintenance	$13.17
Labor	$26.79
Subtotal	$50.13
Transport Cost	
Overhead	$2.70
Depreciation	$0.70
Operation/Maintenance	$13.91
Labor	$7.30
Subtotal	$24.61
Tipping Fee	$10.53
Total	$85.27

Collection Fraction	0.749271	0.25	Collection Miles	62.28787
Collection O & M	6.328927		Transport Miles	75
Transport O & M	5.672864		Total Miles	137.2878

Cost of Collection, Transport and Disposal

Type of Collection: Consolidated Curbside Pick-up, 18 c.y. packer
Distance to Disposal: 35 miles
Place of Disposal: Danville at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	200
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	10.13
Depreciation, 1989 $/day	$19.23

Total Daily Mileage	91.52
Hours For Collection	10.13
Hours For Transport	3.39
Work Day Length	13.52

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.07
Depreciation	$2.11
Operation/Maintenance	$5.14
Labor	$26.79
Subtotal	$42.10
Transport Cost	
Overhead	$2.70
Depreciation	$0.70
Operation/Maintenance	$13.91
Labor	$7.30
Subtotal	$24.61
Tipping Fee	$10.53
Total	$77.24

Collection Fraction	0.749271	0.25	Collection Miles	16.51515
Collection O & M	3.324256		Transport Miles	75
Transport O & M	5.672864		Total Miles	91.51515

Estimated Cost Per Ton To Collect, Transport And Dispose Of Residential Solid Waste From Champaign-Urbana To Villa Grove, 1989

	Vehicle = 18 Cubic Yards 760 Lbs per Cubic Yard 304 Services per Load 6.84 Tons per Load	Vehicle = 20 Cubic Yards 760 Lbs per Cubic Yard 338 Services per Load 7.60 Tons per Load	Vehicle = 25 Cubic Yards 650 Lbs per Cubic Yard 361 Services per Load 8.13 Tons per Load
Backyard Pick-Up 995 Ft per Stop			
Collection	$53.00	$54.00	$54.00
Transport	$17.00	$15.00	$15.00
Tipping	$11.00	$11.00	$12.00
Total	$81.00	$80.00	$81.00
Curbside Pick-Up 995 Ft per Stop			
Collection	$49.00	$49.00	$50.00
Transport	$17.00	$15.00	$15.00
Tipping	$11.00	$11.00	$12.00
Total	$77.00	$75.00	$77.00
54% Backyard Pick-Up 46% Curbside Pick-Up 995 Ft per Stop			
Collection	$52.00	$52.00	$53.00
Transport	$17.00	$15.00	$15.00
Tipping	$11.00	$11.00	$12.00
Total	$80.00	$78.00	$80.00
Curbside Pick-Up 200 Ft per Stop			
Collection	$41.00	$41.00	$42.00
Transport	$17.00	$15.00	$15.00
Tipping	$11.00	$11.00	$12.00
Total	$69.00	$67.00	$69.00

Assumptions: One-man crew, $11.25 per hour labor, overtime paid, guaranteed 40 hrs per week.
One service collected per stop, one load per day, truck emptied at end of each day.
$4.00 per cubic yard tipping fee.

Cost of Collection, Transport and Disposal

Type of Collection: Backyard Pick-up, 25 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.33
Productive Time Per Load, hrs	14.02
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	118.05
Hours For Collection	14.02
Hours For Transport	2.85
Work Day Length	16.87

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.95
Depreciation	$3.04
Operation/Maintenance	$12.88
Labor	$29.50
Subtotal	$54.37
Transport Cost	
Overhead	$1.82
Depreciation	$0.62
Operation/Maintenance	$7.07
Labor	$5.01
Subtotal	$14.51
Tipping Fee	$12.31
Total	$81.19

Collection Fraction	0.831316	0.16	Collection Miles	73.05029
Collection O & M	6.129231		Transport Miles	45
Transport O & M	2.911332		Total Miles	118.0502

Cost of Collection, Transport and Disposal

Type of Collection: 54/46 Backyard Curbside Pick-up, 25 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.20
Productive Time Per Load, hrs	13.24
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	118.05
Hours For Collection	13.24
Hours For Transport	2.85
Work Day Length	16.09

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.86
Depreciation	$3.01
Operation/Maintenance	$12.86
Labor	$27.87
Subtotal	$52.61
Transport Cost	
Overhead	$1.91
Depreciation	$0.65
Operation/Maintenance	$7.09
Labor	$5.01
Subtotal	$14.65
Tipping Fee	$12.31
Total	$79.57

Collection Fraction	0.823112	0.17	Collection Miles	73.05029
Collection O & M	6.108581		Transport Miles	45
Transport O & M	2.931982		Total Miles	118.0502

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pick-up, 25 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	12.04
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	118.05
Hours For Collection	12.04
Hours For Transport	2.85
Work Day Length	14.88

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.71
Depreciation	$2.96
Operation/Maintenance	$12.82
Labor	$25.37
Subtotal	$49.87
Transport Cost	
Overhead	$2.06
Depreciation	$0.70
Operation/Maintenance	$7.13
Labor	$5.01
Subtotal	$14.90
Tipping Fee	$12.31
Total	$77.07

Collection Fraction	0.808805	0.19	Collection Miles	73.05029
Collection O & M	6.072572		Transport Miles	45
Transport O & M	2.967991		Total Miles	118.0502

Cost of Collection, Transport and Disposal
Type of Collection: Consolidated Curbside Pick-up, 25 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	25
Density Capacity, lbs/c.y.	650
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	100000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	200
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	361
Tons Per Day	8.13
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	12.04
Depreciation, 1989 $/day	$29.72

Total Daily Mileage	63.68
Hours For Collection	12.04
Hours For Transport	2.85
Work Day Length	14.88

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.71
Depreciation	$2.96
Operation/Maintenance	$4.79
Labor	$25.37
Subtotal	$41.84
Transport Cost	
Overhead	$2.06
Depreciation	$0.70
Operation/Maintenance	$7.13
Labor	$5.01
Subtotal	$14.90
Tipping Fee	$12.31
Total	$69.04

Collection Fraction	0.808805	0.19	Collection Miles	18.67845
Collection O & M	3.067900		Transport Miles	45
Transport O & M	2.967991		Total Miles	63.67845

Cost of Collection, Transport and Disposal

Type of Collection: Backyard Pick-up, 20 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.33
Productive Time Per Load, hrs	13.12
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	113.65
Hours For Collection	13.12
Hours For Transport	2.85
Work Day Length	15.96

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.85
Depreciation	$2.27
Operation/Maintenance	$13.05
Labor	$29.52
Subtotal	$53.69
Transport Cost	
Overhead	$1.92
Depreciation	$0.49
Operation/Maintenance	$7.58
Labor	$5.36
Subtotal	$15.35
Tipping Fee	$10.53
Total	$79.57

Collection Fraction	0.821741	0.17	Collection Miles	68.65319
Collection O & M	6.267091		Transport Miles	45
Transport O & M	3.138209		Total Miles	113.6531

Cost of Collection, Transport and Disposal

Type of Collection: 54/46 Backyard/Curbside Pick-up, 20 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.20
Productive Time Per Load, hrs	12.39
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	113.65
Hours For Collection	12.39
Hours For Transport	2.85
Work Day Length	15.23

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.76
Depreciation	$2.24
Operation/Maintenance	$13.03
Labor	$27.90
Subtotal	$51.93
Transport Cost	
Overhead	$2.01
Depreciation	$0.52
Operation/Maintenance	$7.61
Labor	$5.36
Subtotal	$15.49
Tipping Fee	$10.53
Total	$77.95

Collection Fraction	0.813175	0.18	Collection Miles	68.65319
Collection O & M	6.244043		Transport Miles	45
Transport O & M	3.161257		Total Miles	113.6531

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pickup, 20 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	11.26
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	113.65
Hours For Collection	11.26
Hours For Transport	2.85
Work Day Length	14.10

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.60
Depreciation	$2.20
Operation/Maintenance	$12.99
Labor	$25.40
Subtotal	$49.19
Transport Cost	
Overhead	$2.17
Depreciation	$0.56
Operation/Maintenance	$7.65
Labor	$5.36
Subtotal	$15.73
Tipping Fee	$10.53
Total	$75.45

Collection Fraction	0.798262	0.20	Collection Miles	68.65319
Collection O & M	6.203914		Transport Miles	45
Transport O & M	3.201386		Total Miles	113.6531

Cost of Collection, Transport and Disposal

Type of Collection: Consolidated Curbside Pick-up, 20 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	20
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	75000
Packer Salvage, 1989 $	15000
Loads Per Day	1.00
Distance Between Stops, ft	200
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	338
Tons Per Day	7.60
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	11.26
Depreciation, 1989 $/day	$20.98

Total Daily Mileage	62.79
Hours For Collection	11.26
Hours For Transport	2.85
Work Day Length	14.10

Costs In 1989 Dollars Per Ton

Collection Costs

Overhead	$8.60
Depreciation	$2.20
Operation/Maintenance	$4.96
Labor	$25.40
Subtotal	$41.16

Transport Cost

Overhead	$2.17
Depreciation	$0.56
Operation/Maintenance	$7.65
Labor	$5.36
Subtotal	$15.73
Tipping Fee	$10.53
Total	$67.42

Collection Fraction	0.798262	0.20	Collection Miles	17.79461
Collection O & M	3.199242		Transport Miles	45
Transport O & M	3.201386		Total Miles	62.79461

Cost of Collection, Transport and Disposal

Type of Collection: Backyard Pick-up, 18 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.33
Productive Time Per Load, hrs	11.81
Depreciation, 1989 $/day	$19.23

Total Daily Mileage	107.29
Hours For Collection	11.81
Hours For Transport	2.85
Work Day Length	14.65

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.68
Depreciation	$2.27
Operation/Maintenance	$13.34
Labor	$29.57
Subtotal	$53.85
Transport Cost	
Overhead	$2.09
Depreciation	$0.55
Operation/Maintenance	$8.48
Labor	$5.95
Subtotal	$17.06
Tipping Fee	$10.53
Total	$81.44

Collection Fraction	0.805781	0.19	Collection Miles	62.28787
Collection O & M	6.497878		Transport Miles	45
Transport O & M	3.534615		Total Miles	107.2878

Cost of Collection, Transport and Disposal

Type of Collection: 54/46 Backyard/Curbside Pick-up, 18 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.20
Productive Time Per Load, hrs	11.15
Depreciation, 1989 $/day	$19.23

Total Daily Mileage	107.29
Hours For Collection	11.15
Hours For Transport	2.85
Work Day Length	13.99

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.58
Depreciation	$2.24
Operation/Maintenance	$13.31
Labor	$27.94
Subtotal	$52.07
Transport Cost	
Overhead	$2.19
Depreciation	$0.57
Operation/Maintenance	$8.50
Labor	$5.95
Subtotal	$17.22
Tipping Fee	$10.53
Total	$79.81

Collection Fraction	0.796638	0.20	Collection Miles	62.28787
Collection O & M	6.470544		Transport Miles	45
Transport O & M	3.561949		Total Miles	107.2878

Cost of Collection, Transport and Disposal

Type of Collection: Curbside Pick-up, 18 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	995
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	10.13
Depreciation, 1989 $/day	$19.23

Collection Fraction	0.780761	0.21	Collection Miles	62.28787
Collection O & M	6.423073		Transport Miles	45
Transport O & M	3.609420		Total Miles	107.2878

Total Daily Mileage	107.29
Hours For Collection	10.13
Hours For Transport	2.85
Work Day Length	12.98

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.41
Depreciation	$2.20
Operation/Maintenance	$13.26
Labor	$25.44
Subtotal	$49.31
Transport Cost	
Overhead	$2.36
Depreciation	$0.62
Operation/Maintenance	$8.55
Labor	$5.95
Subtotal	$17.48
Tipping Fee	$10.53
Total	$77.31

Cost of Collection, Transport and Disposal

Type of Collection: Consolidated Curbside Pick-up, 18 c.y. packer
Distance to Disposal: 20 miles
Place of Disposal: Villa Grove at $4.00 c.y.

Assumptions:

Unit Volume, c.y.	18
Density Capacity, lbs/c.y.	760
Weight Per Service, lbs	45
Cost Of Unit, 1989 $	65000
Packer Salvage, 1989 $	10000
Loads Per Day	1.00
Distance Between Stops, ft	200
Containers Per Stop	2
Throwaways Per Stop	1
Services Per Stop	1
Tipping Fee, 1989 $	$4.00
Trips Per Day	1
Collection Labor Cost	$11.25
Transport Labor Cost	$11.25

Calculated Values:

Services Per Load	304
Tons Per Day	6.84
Productive Time Per Stop, min.	2.00
Productive Time Per Load, hrs	10.13
Depreciation, 1989 $/day	$19.23

Collection Fraction	0.780761	0.21	Collection Miles		16.51515
Collection O & M	3.418401		Transport Miles		45
Transport O & M	3.609420		Total Miles		61.51515

Total Daily Mileage	61.52
Hours For Collection	10.13
Hours For Transport	2.85
Work Day Length	12.98

Costs In 1989 Dollars Per Ton

Collection Costs	
Overhead	$8.41
Depreciation	$2.20
Operation/Maintenance	$5.23
Labor	$25.44
Subtotal	$41.28
Transport Cost	
Overhead	$2.36
Depreciation	$0.62
Operation/Maintenance	$8.55
Labor	$5.95
Subtotal	$17.48
Tipping Fee	$10.53
Total	$69.28

APPENDIX THREE

Local Procurement and Recycling Resolutions and Ordinances

COUNCIL BILL NO. 89 - 361

A RESOLUTION

ESTABLISHING COUNCIL POLICY REGARDING THE
PURCHASING OF RECYCLED MATERIALS AND CODIFYING SUCH POLICY

WHEREAS, recycling has been an important civic activity in Champaign County since 1970; and

WHEREAS, the Cities of Champaign and Urbana have been active in their support of recycling and sound solid waste management since the mid-1970's as evidenced by the following:

1. Lease by the City of Champaign of its former Public Works Center to the Community Recycling Center;

2. Participation in the annual Christmas Tree Chip project;

3. Joint participation in the Champaign-Urbana Solid Waste Disposal System;

4. Public funding for recycling activities drawn from a 25-cent-per-ton surcharge imposed at the CUSWDS landfill.

5. Establishment of the Intergovernmental Solid Waste Task Force, now Association, in which the Cities have been joined by Champaign County; and

WHEREAS, Champaign County has established its own Hometown Recycling Program in the smaller towns of the County; and

WHEREAS, the success of all recycling programs depend upon the presence of markets for products made from secondary materials; and

WHEREAS, following the logic above, the Congress of the United States, in 1976, mandated the establishment of procurements standards by the Federal Government (as yet unpromulgated) preferential to products, containing secondary materials; and

WHEREAS, local governments must do their part in the conservation of the nation's energy and material resources; and

WHEREAS, the use of non-degradable, non-returnable and on-recyclable products must be reduced as the two main processes used to dispose of these items, landfilling and incineration are environmentally harmful; and

WHEREAS, Section 2-81 of the Champaign Municipal Code, 1985, establishes a procedure for the adoption of Council policies.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF CHAMPAIGN as follows:

Section 1. That City officials will implement the following procurement standards for materials which can be made from materials currently collected in recycling programs in place within Champaign County:

1. All letterhead paper and #10, standard business envelopes will be on 100% post-consumer recycled paper, if available, and identified as such on the bottom of each sheet.

2. Copy paper will contain at least 70% post-consumer recycled fiber if it is available, is of acceptable quality, and does not exceed 10% above the price charged for comparable paper from virgin fiber.

3. Engine oil will be of 100% recycled oil if it is available, is of acceptable quality, and does not exceed 10% above the price charged for comparable engine oil made from non-recycled feedstocks.

4. Products containing ChloroFluoroCarbons (CFC's) will not be used unless no other product is available.

5. Other products not mentioned above, which are available now or become available in the future, and which can be made from post-

consumer recycled materials of the type collected in Champaign County will be preferred if they pass the quality test and fall within the 10% price differential.

Section 2. That the City Clerk is hereby directed to send a copy of this Resolution to all Departments within the City.

COUNCIL BILL NO. 89 - 361

PASSED: JANUARY 16, 1990

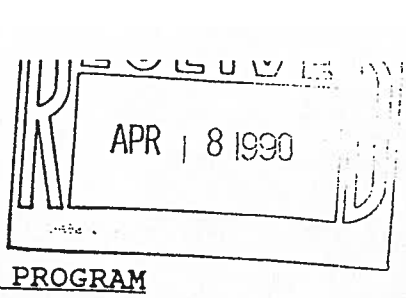
APPROVED: Daniel McCollum
Mayor

ATTEST: Deborah Fluke
Deputy City Clerk

APPROVED AS TO FORM:

Frederick C Stavins
City Attorney

PASSED April 17, 1990



ORDINANCE NO. _____

AN ORDINANCE ESTABLISHING RECYCLING PROGRAM

WHEREAS, recycling has been an important civic activity in Champaign County for several decades; and

WHEREAS, the Cities of Champaign and Urbana have been active in their support of recycling and sound solid waste management since the mid-1970's; and

WHEREAS, recycling and procurement programs will enhance national, state and local markets for products made from secondary materials wherever possible; and

WHEREAS, the Congress of the United States mandated the establishment of procurement standards by the Federal Government in the Resource Conservation and Recovery Act in 1976, preferential to products containing secondary materials; and

WHEREAS, local and state governments, representing approximately twelve percent of the Gross National Product, must do their part in the conservation of the nation's rapidly depleting energy and primary material resources and should set an example by having officially defined programs.

NOW, THEREFORE, BE IT ORDAINED BY THE URBANA CITY COUNCIL, that the City of Urbana shall implement the following recycling and material procurement policies, programs and standards:

SECTION 1: RECYCLING PROGRAM

A) A recycling program will be conducted within the operations and buildings of the municipality designed to maximize the

reclamation of materials used by the municipality. Said recycling program is to reclaim materials such as paper, glass, metals, tires, and motor vehicle oil if markets for their purchase exist.

B) All yard and landscape waste generated by the municipality will be reused on-site or disposed of at the Urbana Yard Waste Reclamation Site, or its successor facility.

C) Potentially hazardous materials, such as paints, solvents and pesticides, will be disposed of in accordance to state and federal regulations affecting the municipality at properly permitted facilities.

D) An annual report shall be prepared concerning the aforementioned municipal recycling activities which at a minimum summarizes:

1) quantities of recyclables recovered
2) percentage of waste stream reclaimed
3) quantities of products purchased pursuant to Section 2
4) costs of program
5) goals and additional solid waste reduction activities, to include a solid waste audit.

SECTION 2: PURCHASE OF PRODUCTS MADE OF RECYCLED MATERIAL

A. Products utilized by the municipality or its contractors shall be made from recycled materials if such products are reasonably available, are of acceptable quality and their purchase price does not exceed or provided fifteen percent of the purchase price of comparable products not made from recycled materials.

B) The definition of recycled materials shall be consistent with United States Environmental Protection Agency Guidelines for Federal Procurement of Materials made from recycled and recovered materials.

This Ordinance is hereby passed by the affirmative vote, the "ayes" and "nays" being called of a majority of the Members of the Council of the City of Urbana, Illinois, at a regular meeting of said Council on the ____ day of _____, 1990.

PASSED by the City Council this ____ day of _____, 1990.

_____
Ruth S. Brookens, City Clerk

APPROVED by the Mayor this ____ day of _____, 1990.

_____
Jeffrey T. Markland, Mayor

APPENDIX FOUR

Problems and Prospects for Commercial Sector Recycling: A Pilot Study in Champaign County

PROBLEMS AND PROSPECTS FOR COMMERCIAL SECTOR RECYCLING: A PILOT STUDY IN CHAMPAIGN COUNTY

A Report Submitted to the
Intergovernmental Solid Waste Disposal Association
Champaign County
City of Champaign
City of Urbana

by

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March 1989

The opinions expressed in this report are solely those of the author and do not necessarily reflect the views of the Intergovernmental Solid Waste Disposal Association or the Illinois Environmental Protection Agency.

TABLE OF CONTENTS

I. THE NATURE OF THIS PILOT STUDY

A. The Problem

1. Why Be Concerned about Recycling in the Commercial Sector?

The private commercial sector in Champaign County provides most of the municipal solid waste that goes to landfills. A 1987-88 study by Franklin Associates of Kansas found that 57% of the municipal solid waste (commercial plus residential) going to the Urbana landfill during two sampled weeks, one in November 1987 and one in January 1987, came from commercial establishments in Champaign County. Of all waste going to the Urbana landfill, including yard waste and construction debris, 25% by weight and 32% by volume came from commercial establishments.[1]

It is not known what portion of Champaign-Urbana's commercial waste is recyclable, but a national average for "all commercial waste" is that roughly two-thirds consists of materials of the types that are readily recyclable (i.e., corrugated cardboard, aluminum cans, other metal cans, glass bottles, newspaper, plastic jugs or bottles, motor and similar oil, office paper, cooking grease, ferrous metal, and yard waste).

Recycling programs have emerged principally to serve the residential sector, while the commercial sector retains waste disposal practices that date from the 1950s and earlier. Despite their prominence in waste stream generation, stores and shops remain largely unengaged in the waste reduction, waste diversion, and resource conservation efforts associated with modern recycling.

There are many unanswered questions about commercial sector recycling. Why has the sector that produces the most waste not been, from the start, a major focus for recycling programs? Are they generally less ready and willing to recycle than are residences? Do they have special concerns

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[1] Brown, Vence & Associates, Franklin Associates, and R. W. Beck & Associates, Solid Waste Management Feasibility Analysis for Champaign County, City of Champaign, and City of Urbana, A Report to the Intergovernmental Solid Waste Disposal Association of Champaign County, May 9, 1988, Appendix D, p. 8.

about the costs and effort involved in recycling? How much recyclable waste do they have, and of what kinds? Do they have enough in common to be able to set up a single program for the commercial sector? What kind of conditions create special needs? How can their needs and interests in recycling become better known to decision makers?

2. Lack of Information on the Commercial Sector

Explanations for private sector noninvolvement are speculative because little in fact has been known about the problems and prospects for recycling among stores and shops. Nor has there been any body of knowledge explaining why the commercial sector should not be more extensively offered recycling programs. Information about the commercial sector is especially weak with regard to the differences in waste management practices or problems among the variety of types of establishments.

More fundamentally, little is known about how to find out what businessmen do or are willing to do with their trash. What kind of questions make sense, provide useful information, and can be answered? Typically, data collection from businessmen regarding waste disposal and recycling has not been conducted with adequate professional care, resulting in low response rates, ambiguous questions and responses, and uninformative results.

B. Objectives of This Pilot Study

This study was designed to serve two objectives. The primary goal is to do a methodological pilot study of a small sample of businesses in order to assess the feasibility of a major commercial sector survey, to try out question wordings, to gain experience in surveying business managers on waste disposal and recycling, and to develop an appropriate draft questionnaire that could be used in a major survey. The secondary objective is to report whatever is found of a substantive nature from the pilot study interviews.

1. Methodological Goals

The methodological objective is to determine how to collect valid and reliable information from business managers in the commercial sector. This goal called for a small sample size with intensive interviews that encourage store managers to provide considerable freely volunteered observations and opinions expressed in their own words as well as feedback about questionnaire content. This experience led to a sharpening of the language used in the survey questionnaire, incorporating issues and wordings that reflect concerns of store managers. The evaluation of the feasibility of a

general commercial sector survey, reported below in Chapter II, is generally positive.

2. Substantive Goals

The substantive objective is to provide a qualitative, store-by-store summary
regarding what was learned from the store managers about commercial waste disposal and recycling. These will of necessity be limited to very general comments, both to avoid over-analyzing the small sample and to protect the anonymity of the respondents in this small sample.

Among the substantive questions that were addressed were the following:

- How much recycling of what types of materials do you do now? How is recycling now done? Who is involved? Why do businesses recycle these materials?
- How much is put in the trash (landfill-bound)? How much of this is recyclable? How is trash-bound material handled? By whom?
- What is the importance of disposal and recycling costs in decisions about waste disposal and recycling?
- What is the manager's receptivity to recycling? What kind of recycling collection service would be most appropriate for different businesses?
- What value do managers see in being involved in recycling?
- Do store managers who recycle at home have a greater interest in recycling at work?

C. The Stores and Shops Included in the Pilot Study

A total of 17 store and shop managers were phoned for interviews. All 17 were reached, agreed to be interviewed, and were interviewed. There was no reluctance to participate in this type of survey.

The 17 store and shop managers were assured anonymity. Five of these 17 managers explicitly volunteered a comment to the effect that anonymity was not important to them. Seven said nothing in response to assurance of confidentiality. Four responded with ambiguous comments.

One business manager explicitly indicated that this assurance was important. Since the assurance was given without qualification, and since it cannot be dismissed in part without being violated in total, it is being respected in this write-up and in all other reports on this research.

The 17 commercial establishments included in the pilot study were selected non-randomly from among the leading or best known establishments in ten different categories or types of stores or shops. Included were three representatives from of each of three types of establishments, for a total of nine, permitting some assessment of variation among specific establishments within each of the three types. Also included were single representatives from each of eight types of establishments, for a total of eight, permitting assessment of the variation among a wide range of types of commercial establishments.

The specific establishments are described below, listed by type, beginning with the types having several representatives in the sample. The sequence number for each store, shop, or business is used to identify establishments in subsequent discussions.

- Three record stores. Record stores were selected as an example of medium to low volume retail establishments having a specialty product that is sold in small packages.

    1. A record store in townhouse-type building in the campus area, locally owned.

    2. A record store in part of a free standing building in the campus area, regional chain.

    3. A record store in a shopping mall, national chain.

- Three restaurants. Restaurants vary widely in types of service and products, especially with regard to packaging and presence or absence of alcoholic beverages. Several types of restaurants were selected.

    4. A free standing fast food restaurant located in a shopping center area; locally owned franchise of a trans-national chain.

    5. A free standing restaurant with an upscale image, serves alcohol, bar integrated into restaurant, part of small national chain.

    6. A restaurant structurally and managerially integrated with a motel, no alcohol, part of a trans-national chain.

- Three vehicle service stations. Service stations vary in the range of services that they provide. Some of that range is represented in these three selections.

    7. A locally owned agent of a national chain, has significant repair and maintenance service, towing, rustproofing.

    8. A locally owned agent of a semi-national chain, has significant repair and maintenance service, no towing.

    9. A locally owned agent of a multi-state regional chain, has significant repair and maintenance service, towing.

- Eight different types of establishments. One establishment from each of eight different types of businesses were included. These cover a very wide range of commercial establishments, from small low volume specialty shops to high volume liquor stores to large high volume department stores and a mall management office. If a questionnaire works with this wide range, it should work with any retail or service business.

    10. A specialty shoe store, physically integrated with a small unenclosed shopping mall, independent and locally owned.

    11. A liquor store, locally owned, free standing, part of local chain; anything applying to this store would generally apply, with some qualifications, to other local stores in the chain.

    12. A copying shop, for photocopying, part of a national chain, located in campus area, in a shop that is wall-to-wall along side other stores.

    13. A motel, local franchise of trans-national chain, medium sized.

    14. A convenience store, campus area, wall-to-wall along side other stores, local ownership of franchise from national chain; anything applying to this store would, with qualification, apply to several other local stores in the chain.

    15. A free-standing multi-department store, specializing in hardware, farm and lawn supplies, vehicle repair and service, and work clothes.

16. A mall management office with responsibility for a major local shopping mall.

17. A super market for groceries, etc., part of a locally owned chain.

II. METHODOLOGICAL FINDINGS

A. How to Ask Questions

The draft questionnaires went through several revisions in the course of the pilot study. Each revision made the questionnaire more flexible and comprehensive so that it could be used with quite different types of businesses. A final version, based on a comprehensive evaluation of the entire pilot study, is included as an appendix to this report. This final version is a draft that is ready for pretesting and use in a large sample survey of a heterogeneous mix of business establishments.

The early versions of the questionnaire were always easy to administer. Business managers almost invariably seemed pleased to be involved in the survey. No questions were ever flatly objected to, although there were suggestions for improvements or comments that went beyond the requested information. In general, the business managers were willing respondents who seemed to understand that the survey questionnaire would have to be designed for a wide range of businesses and that not all questions would therefore necessarily apply to them.

It appears that a methodologically sound, large sample survey of a wide range of businesses, yielding a high response rate from managers, is entirely feasible.

B. Survey Design

The original plan for this pilot study was to conduct 12 face-to-face interviews on the assumption that business managers generally prefer to conduct business face-to-face. This was done for 13 interviews, but in the course of setting up the interview appointments it became obvious that some of the 17 business managers who were contacted had work schedules that made precise appointments difficult. Typically, if the manager also regularly works in retail sales or otherwise must be on call at all times, he or she must be ready to respond to the presence of customers or clients at any moment.

For these reasons, four additional interviews were conducted by telephone. These telephone interviews involved an easy adaptation of a

questionnaire prepared for face-to-face interviewing and were very successful. It appears that telephone interviewing of business managers, with its considerable cost efficiencies, would be an effective means of data collection for this type of survey. It may be desirable to use an approach that maximizes telephone interviewing, but shifts to face-to-face in given instances if that is the only apparent way to obtain the interview.

Mailed questionnaires were not attempted. Mail surveys tend to yield far lower response rates than do telephone or face-to-face surveys, especially if the topic of the survey does not directly relate to some common interest among those being surveyed. Mail surveys also tend to have a response bias that involves overrepresentation of those who have the greatest interest in the subject and an underrepresentation of those who have little or no interest in it. For a survey of waste disposal practices and attitudes among business managers, a mail survey is a very unpromising method.

III. SUBSTANTIVE FINDINGS

The interviews were conducted in November and December 1988 and January 1989. Findings pertain to the situation at the time of the interviews. The findings do not necessarily indicate what would be found if we had conducted a random sample survey of all businesses. The sample is intentionally skewed to include some of the better known or larger establishments of each type and was in any event not randomly selected. Estimates of sampling error are meaningless in this context.

A. Extent of Commercial Sector Recycling

Nine of the 17 stores or shops participated in some recycling. These include the liquor store (#11; glass and aluminum, collected by employees for their own income), all three restaurants (#'s 4, 5, & 6; cooking grease), all three service stations (#'s 7, 8, & 9; motor oil; tires; batteries; in two stations, junk iron picked up by a local small-time salvage operator; and in one station aluminum cans collected by employees for their own income), the multi-department store (#15; corrugated cardboard, baled and sold; motor oil; ; tires; batteries; small engine and pump parts; and aluminum cans collected by employees for their own income), and the super market (# 17; corrugated cardboard, baled and sold).

Motives behind this degree of recycling varied by type of material recycled. The aluminum cans brought a small income to workers who, in at least one store, used it to buy a TV for the employee's lounge. Where cardboard was recycled, it was clearly in large part an economic benefit to the store in that it significantly cut waste disposal costs. Motor oil and cooking grease recycling represented the most feasible available option for disposal of these materials, while providing a small income. One service station burned some of its motor oil to heat its shop, providing a considerable savings on the heating bill.

In all instances, recycling is an activity of the employees, not of the customers. This employee activity is either built into their regular work routines by managers or, in the case of "employees doing it on their own" with aluminum cans, a procedure is devised by employees themselves and fit into their regular work routines.

B. Recyclable Materials Sent to Landfills and Prospects for Recycling

All 17 stores or shops put some recyclable materials in dumpsters to be sent to a landfill. Specifics are given below store by store:

Record stores (#'s 1, 2, & 3). These record stores dispose of one to two 4-cubic-yard dumpsters full of trash each week. This rate is highest (2 or more) during Christmas shopping season in at least one of the stores, but in all stores there is some cyclical pattern depending on customer flow, on sales, and especially on the occurrence of shipments. All three stores reuse some of their cardboard for return shipments.

Of the material put in the dumpsters by record stores, 75% to 90% consists of corrugated cardboard. Two of the stores would welcome having a second trash bin or dumpster for this cardboard, or perhaps using the existing main dumpster for cardboard and having a smaller second one for other material. Concern was expressed by one store that the service be reliable, on a regular schedule, so that the recyclables do not accumulate to the point where they must be reclassified as trash and disposed of. The store in the mall has no independent authority to contract for a separate bin or dumpster for cardboard, but would use one if the mall provided it in the area where the present compactor is located.

Most of the rest of the waste (10% to 25% of the total) from these stores consists of paper or plastics used for wrappings or packing material. Several times a year, wood, plastic, wire, or heavy card-stock shelving or display material will also be disposed of. All three stores indicated willingness to call for special pickups of wood or metal shelving waste, if such a service were available.

Restaurants (#'s 4, 5, & 6). The total quantity of waste disposed of by the restaurants varied widely from four 4-cubic-yard dumpsters per week at the lowest volume restaurant to six to twelve 4-cubic-yard dumpsters per week at the fast food store to twelve 12-cubic-yard dumpsters per week at the highest volume restaurant.

At each restaurant, it was estimated that 25% to 40% of the total waste consists of corrugated cardboard. This would represent one to five dumpsters full of cardboard per week per restaurant. All three restaurant managers thought that cardboard separation by workers would be manageable by employees if a separate dumpster were designated for cardboard and if separate collection of this material were provided. One store thought that their would be a space limitation on adding another dumpster to the enclosed trash area, but would welcome the service if the necessary dumpsters could be

made to fit. (Inspection of the trash area confirmed that there would be room.)

The fast food store manager reported no other significant quantities of recyclable material, with the possible exception of food waste (estimated at 5% of the total waste).

The smaller volume restaurant manager estimated that 5-10% of the total restaurant waste was aluminum or tin cans, another 5-10% was plastic bottles, 5% newspaper, 40% "other paper," and 15% other plastics, styrofoam, and food waste. Recycling procedures for the cans, bottles, and newspapers were considered to be feasible from a point of view of getting workers to do it, but implementation may depend on being convinced that it is cost effective. This manager was personally engaged in recycling at home (unlike the other two restaurant managers) and indicated a personal presumption that it would indeed be cost effective to recycle, but would like to look into it further.

The high volume restaurant manager reported that about 30% of the total waste was glass bottles (mainly wine, liquor, and beer bottles) from the serving area, about 10% tin cans from the kitchen, and about 10% plastic bottles from the kitchen. The remainder (about 10%) consisted of other paper, styrofoam, plastics, and food waste.

Recycling of the glass, "tin," or plastic bottles was not considered feasible by the manager of the high volume restaurant. Kitchen employees, waiters and waitresses, and barkeepers have very high turnover, work at a very high pace, must therefore be trained to focus only on the minimal essentials of the job. Given that the restaurant was not designed to have space for collecting recyclables (either in the serving area, around the bar, or in the kitchen), the burden of making space and training workers to use it would be excessive and unacceptable. Specific questioning and on-site inspection revealed that the kitchen has seven 30 gallon trash cans that could potentially be labeled for different materials, but this does not solve the perceived problem of employee training. Similarly, the trash receiving stations in the serving area come in sets of two or more, so they too could be designated to some degree for different materials, but again there remains the perceived problem of employee training and performance.

Recycling of glass, cans, and plastic in high volume restaurants, especially those with a bar, may not be easily attainable without providing educational material or on-site programs for employee orientation and training.

Service Stations (#'s 7, 8, & 9). Among the three service stations, one disposes of one 6-cubic-yard dumpster full of trash per week, another disposes of two 4-cubic-yard dumpsters full per week, and the third disposes of three 4-

cubic-yard dumpsters full per week. Tires and motor oil are totally excluded from this waste at all stations.

The service stations report that 45% to 70% of their waste consists of corrugated cardboard. All three would welcome separate pickup of cardboard and see no problem in keeping the cardboard separate. All three stations already break down most of their cardboard boxes. All would be able to locate another dumpster on their property, if that was required, although appearance would be a concern at one of the stations.

The service stations report that 20% to 50% of their waste consists of plastic bottles, mainly from motor oil. All would welcome separate collection containers for these and see no problem in keeping them separate for recycling.

Two service stations report that some aluminum cans enter their waste stream from the soda machines and from customers cleaning out their car trash. (The third station has "private initiative" can recycling by employees doing it on their own.) These two stations would welcome a specially marked container for customers to put their aluminum cans in for recycling.

One service station reported having an annual office clean up that produces a filing cabinet full of office paper, much of it card stock. If a separate pickup could be arranged for this material by calling for it, the store manager would welcome it.

All of the service station managers mentioned reliability of recycling pickup as a concern of theirs.

Shoe Store (# 10). The manager reported that not much is disposed of, although this turns out to be approximately one half of a 4-cubic-yard dumpster each week for most weeks and somewhat more, perhaps as much as a dumpster full per week, during the 4-6 times each year when major shipments arrive. Smaller shipments are nearly continuous. Virtually all (80-90%) of the waste is corrugated cardboard. The dumpster is shared with smaller volume waste producers in the small mall containing the shoe store. Separation of the cardboard would be welcomed by the shoe store manager, but would have to be approved by the mall owner. The shoe store manager reported that there appeared to be space for a second dumpster.

Liquor Store (# 11). The liquor store was producing an annual average of six 12-cubic-foot dumpsters of waste per week at the time of the interview. Over 85% of this waste was said by the manager to consist of corrugated cardboard. Since glass and cans were being pulled by employees in a little recycling enterprise of their own, that left only a small amount of other trash consisting of a few plastic bottles, a small amount of packaging or record

keeping paper, and some plastic or card-stock display material. The store manager had already welcomed a new cardboard recycling service that was about to begin. The store employees routinely broke down boxes before having cardboard recycling, and will continue to do so at little or no additional labor cost. The manager reported that the key to success of the recycling program is not the economic savings or cost of the program, but the reliability and consistency of the recycling pickup.

Copying Shop (# 12). The copy shop uses 42 gallon trash barrels for its waste, filling (with human-weight compacting) 7-8 per day. Approximately 25% of this waste is said to be corrugated cardboard, a small quantity (1-3%) of plastic bottles, and about half (or 50%) is estimated to be office or copying paper. Other paper (mainly the packaging paper used for reams of paper) is about 25% of the volume. Recycling of the cardboard or copy paper was said by the manager to be a good idea ("we are running out of trees"), but there was "no room" for separate containers for these materials inside the store. Employees fill in-store waste cans with mixed waste and dump them in the outside barrels. The manager felt that barrels of the three main waste products (25% cardboard, 50% copy paper, and 25% other paper) would have to be pickup up with their contents mixed.

Motel (# 13). With nothing being recycled out of the motel, the 18 cubic yards of waste per week that is generated at the motel contains various kinds and amounts of recyclables. An estimated 5-10% of the total waste is corrugated cardboard, mainly from motel maintenance staff; another 5% is glass bottles, mainly from guest rooms and hallway trash containers; another 10-15% is aluminum or "tin" cans, primarily the former, again mainly from guest rooms and hallway trash containers; another 5-10% is office and computer paper, mainly from office and guest room management; and approximately 20% is newspaper, mainly from guest rooms and hallway trash containers. The remaining 40-55% is estimated to consist of other paper, plastics, packaging, and food waste. There is willingness by the manager to have employees include separate bags on room cleaning carts for cans, glass, and newspaper, especially if there is a way of locating separate waste baskets in room or hallways for these recyclables. The procedure must be cost effective and self-implementing among workers and guests, because there would be no resources for monitoring such a system. It is undesirable to ask workers to sort through guest's personal waste.

Convenience Store (# 14). The store nearly fills a small dumpster (two cubic yards) six times a week. The trash contains an estimated 75% or more corrugated cardboard, along with very small quantities (estimated at less than 5% each) of glass bottles, aluminum cans, plastic bottles, and food waste. Perhaps 15% is "other paper." The store manager already has employees flatten cardboard boxes "to get maximum mileage" out of the small dumpster. Recycling via a second container for the cardboard, or pickup of a loose pile of

cardboard, would be welcomed. Recycling of other materials from this store would be too costly and time consuming. A deposit on beverage containers is preferred.

Multi-Department Store (# 16). After pulling virtually all cardboard, aluminum cans, tires, batteries, and motor oil for recycling, this store produces nearly six 6-cubic-foot dumpsters of waste each week. In this waste, corrugated cardboard is still present in small quantities (5%), some glass bottles (2%), plastic bottles (5-10%), office and computer paper (15-20%), "other paper" (35%), and wood, display material, and other plastics (20%). One of the six dumpsters each week is filled with metal waste, mainly ferrous metal, that the store manager would like to have someone come by to pick up for recycling. No salvage operator for this ferrous metal has been found, however, so it is sent to the landfill. All of the recycling done by this store involves the store doing its own dropoff. Only for ferrous metal is it looking for a pickup service. The store would consider recycling its office paper on a special pickup basis, if that could be arranged.

Mall Management Office (# 16). The mall management office is responsible for the trash compactors at several truck delivery and trash collection alcoves around the mall. In addition, the anchor department stores have responsibility for their own leased trash compactors, under a contract with the mall management. Mall management believes that the present compactors serving the non-anchor stores consume all the space that is available for waste collection containers in the alcoves. Although it is estimated that most of the material going into these compactors is corrugated cardboard, the material is said to be "contaminated" in most alcoves with food waste from the restaurants. Mall management does not expect restaurant management to be accommodating to sorting food waste from cardboard. Hence, if there is to be a cardboard collection compactor, it would have to replace an existing multi-material compactor in the one alcove that does not serve a restaurant. Asked if there would be room for two or more smaller compactors in each alcove so as to collect cardboard in each area, it was said that there may be room - this would have to be assessed carefully and negotiated to assure adequate space for the delivery activities.

Super Market (# 17). This supermarket promotes recycling to the general public, provides space for community recycling dropoff bins, and has an effective corrugated cardboard compacting, baling, and recycling activity of its own. The remainder of the waste consists mainly of "other paper," a little glass and cans, assorted plastics, a substantial amount of display material, coated corrugated cardboard, wood boxes, and a small amount of food waste. None of these other materials are currently being sorted for or directed into recycling. The store manager said that it may be feasible to implement recycling for some of these other materials, if procedures that did not introduce hazards in the store could be devised. As a publicly visible

promoter of recycling, this store manager would like to be recognized for what it is doing, nor for what remains to be done, although the latter is an area open to exploration.

C. Incentives for Recycling

Almost without exception, the economic value of recycling was not the major factor for store managers in their assessment of the prospects for getting their stores involved in recycling. Those who did not already recycle did not expect to experience a major savings in trash disposal costs by recycling. Those who did already recycle reported with considerable enthusiasm that they were in fact experiencing some cost savings or economic return from recycling, but it was consistently said that these were not the major reasons for doing it. The economic benefits were secondary even though, for those already recycling, they were also very real and of significant size.

Also with few exceptions, the store managers wanted to be assured that there would not be a major economic cost to them for being involved or more involved in recycling. Blanket commitments to make every effort to recycle were not made. Interest in exploring how to implement procedures suitable to their business was almost universally expressed. Most felt confident already that some simple arrangements could be easily implemented at little or no cost. A few were in need of fairly concrete assurances that there would be no great cost. In general, it seems that those establishments that employ skilled workers or experienced sales personnel anticipate less problem with recycling implementation than do those establishments that depend heavily on unskilled, temporary, or part-time employees.

For these reasons, the key to extending recycling to businesses that now view it with some skepticism may be development of employee orientation, sensitizing, or training materials. A part of this effort might be making available to store managers someone who has acquired special competence in designing in-store recycling procedures.

The most prevalent motivations for commercial sector involvement in recycling appears to be nontangible ones. Clearly, one important motivation is simply personal commitment, as evidenced in the fact that 14 of the 17 managers recycled at home, and all of these were among those most committed to doing so at work as well. Another important nontangible motivation derives from the perception that recycling is a socially responsible act. Several business managers commented that they often came to work with a sense of frustration or dismay that so much of their waste from work was recyclable but ended up consuming space in our shrinking supply of

landfills. Several others interjected comments such as, "we are running out of trees," "it is such a waste to throw all that stuff away," or "we should do our share." In a community like Champaign-Urbana, where recycling has been very nearly institutionalized as a socially desirable act, the public relations value of business involvement in recycling may be higher than in communities where recycling is still only an occasional event in the annual program of a club or group of volunteers or where it has motivated few beyond an activist core.

The very real interest in recycling among business managers should be more fully appreciated by those who plan recycling programs, as should the need for business managers to have services that are workable by their employees, not eyesores or intrusive inconveniences for their customers, and of no significant cost or at least of manageable cost, if not of some economic advantage.

Finally, the most frequently specified precondition for expanding or implementing recycling in commercial establishments was that the pickup service be consistent and reliable. By this is meant that it occur on a regular and predictable basis.

APPENDIX 5

Addendum

TABLE 8

Costs For Residential Recyclable Collection In Champaign-Urbana, 1990

	Champaign	Urbana
Total Tons Collected (1990)	**1300**	**788**
Expenditures		
Curbside	$752,000.00	$79,394.00
CRC (Processing)(1)	$80,000.00	$80,000.00
Promotion	$14,000.00	$4,830.00
Subtotal	**$346,000.00**	**$164,227.00**
Cost Per Ton	**$266.15**	**$208.40**
Deductions		
Material Revenues	($14,000.00)	($10,172.00)
Avoided Cost ($74 Per Ton)(2)	($96,200.00)	($58,460.00)
Excess Processing Payment(3)	($30,600.00)	($50,056.00)
Avoided Post-Closure Care(4)	($29,900.00)	($18,124.00)
Total Program Costs	**$175,300.00**	**$27,415.00**
Cost Per Ton	**$134.85**	**$34.79**

(1) CRC payments are $80,000 per year.

(2) Includes collection, transportation and disposal at landfill only; does not include post-closure care cost.

(3) Represents the savings each city would gain if they only paid processing costs for the actual tonnage generated through curbside programs. CRC annual report states $38.00 as average processing cost. ($80,000 subtract 1990 tonnage for each municipal program multiplied by $38.00).

(4) Represents the post-closure care cost for tonnage in a landfill. CRC's 1988 Annual Report used $1.15 per year as the cost of post-closure care. Figure is cost of monitoring the material in a landfill for 20 years. (Total tonnage diverted multiplied by $1.15 per ton per year multiplied by 20 years).