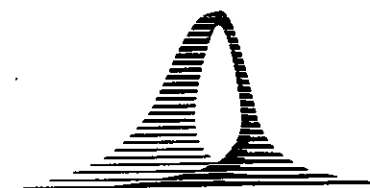


THE SOLID WASTE QUESTION

A Report of the Solid Waste Task Force

APPROVED BY THE BOARD OF DIRECTORS OF CONFLUENCE ST. LOUIS NOVEMBER 28, 1984



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I. INTRODUCTION

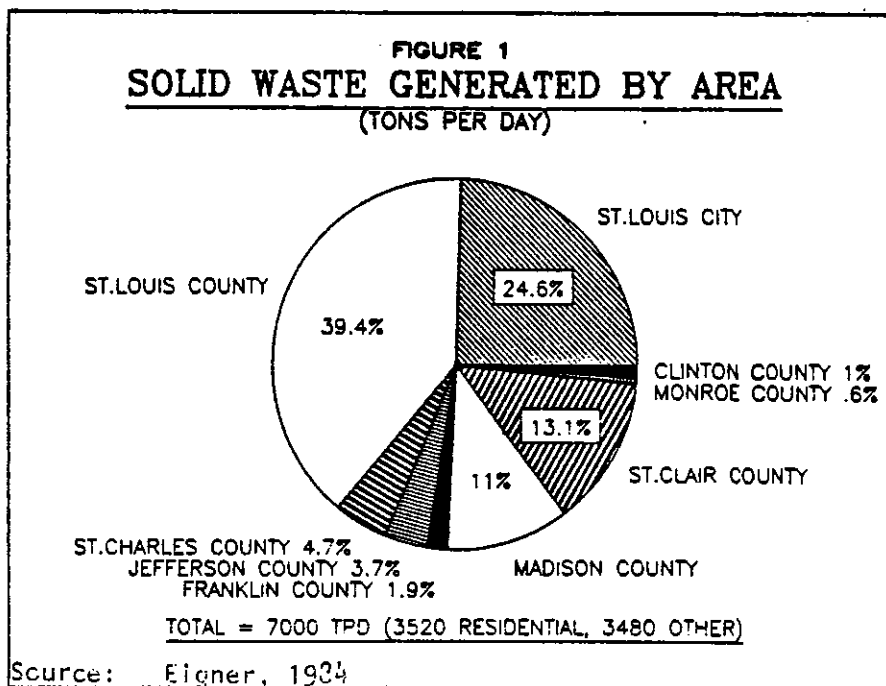
After your trash leaves your curb, who gets it? Where does it go? What happens to it? Many of us have never considered these questions. Someone takes it away, and disposal is their problem.

However, disposal is rapidly becoming our problem. The St. Louis area has relied on landfills for disposal of most of its trash, and this is bringing us near a crisis in two respects: first, landfills are reaching capacity, raising questions about where we will put trash when they are full; second, landfills have harmed our environment.

We have time to reach a solution before the crisis fully explodes. What we are lacking appears to be a widespread awareness of the problem and a partnership among concerned citizens and their governments for working together on the problem. This report is a summary of a Confluence Task Force's study of the facts about waste and its disposal (the findings section), the conclusions they have drawn, and the recommendations they believe are the first steps toward solutions. It is our hope the report will be a catalyst for awakening citizens and encouraging action on the part of governmental units.

II. FINDINGS

The total quantity of solid waste in the St. Louis Metropolitan area¹ is approximately 4,000 to 7,000 tons per day (TPD), or about 2.5 million tons per year.² Solid waste comes from residences, industry, institutions, and commercial establishments. These waste quantities vary on a daily, weekly, and seasonal basis. Waste generation is generally proportional to population, which makes St. Louis County the major generator of waste in the area. (See Figure 1)



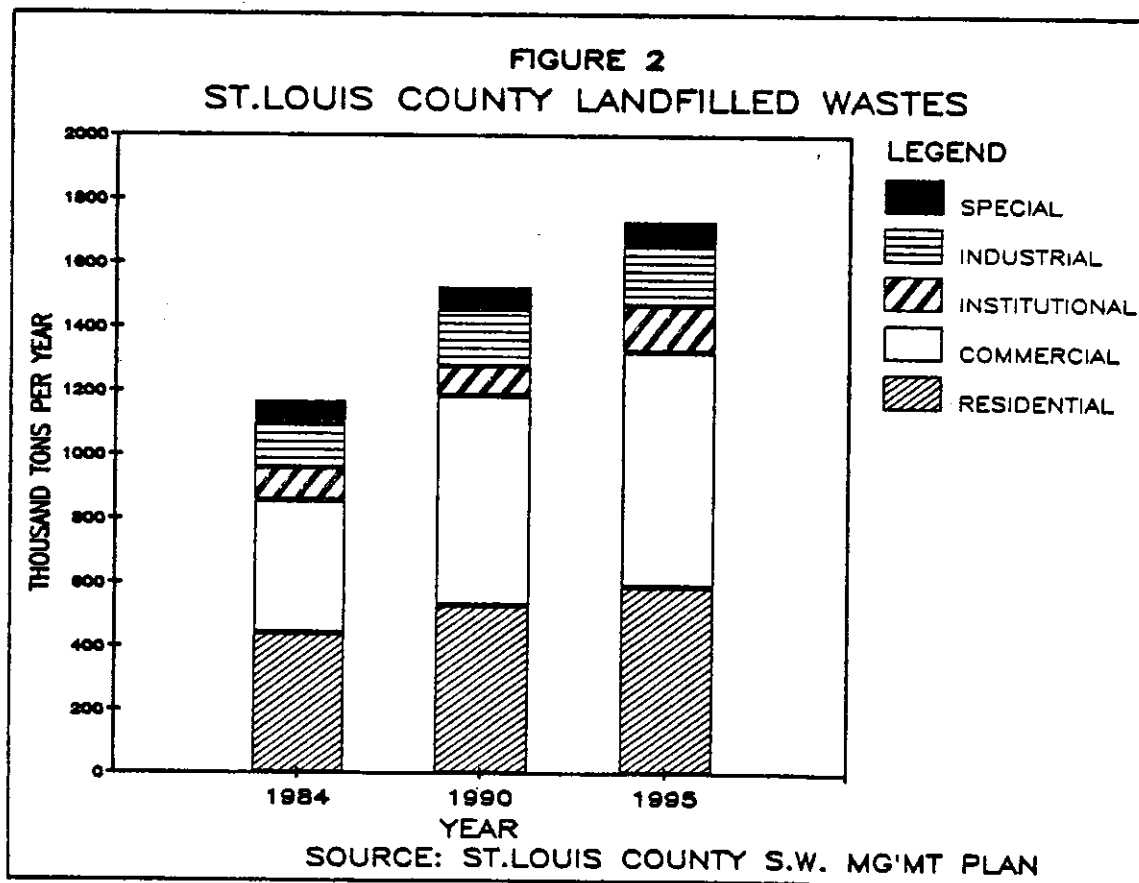
The total waste generated per person today is markedly higher than it was a generation ago. We have become a "throw-away society," with increasing amounts of disposable products and increasing amounts of packaging.

Waste quantities increase as population increases, as business activity increases, and as the amount of waste generated per person increases. This means that unless we take steps to produce less waste, we will have ever-increasing quantities of waste for disposal. For example, current figures and projections indicate a 48% increase in waste by 1995 in St. Louis County alone (See Figure 2.)

The focus of this report will be on non-hazardous solid waste. However, some quantities of hazardous waste are disposed of in the solid waste stream, due to three factors: 1) Almost all households dispose of hazardous waste without being aware of its potential danger, 2) Missouri law does not require companies producing less than 242 pounds of hazardous waste per month to report it or dispose of it in a hazardous waste facility³ and 3) There is no convenient mechanism available for small generators of hazardous waste to dispose of it in an environmentally acceptable manner.

Current Solid Waste Management System

The two major components of the solid waste system are waste collection and waste disposal.



Collection

Collection costs (pick-up and transportation) are the bulk of waste management costs, about 70-80%; the remaining 20-30% is associated with disposal in landfills.⁴ (Other methods of disposal would increase the percentage of costs associated with disposal.) Waste collection is very labor-intensive; about 3/4 of the collection costs are for labor,⁵ although St. Louis City and some other municipalities have reduced their labor costs by converting to mechanized collection systems. The amount charged to consumers for collection, while increasing in dollar amounts, has actually decreased in real terms, as shown in Table 1.

TABLE 1
MONTHLY COLLECTION COST TO CONSUMER
 (ASSUMES TWICE WEEKLY CURB SERVICE)

MUNICIPAL SERVICE			PRIVATE HAULER SERVICE				
CITY	ACTUAL \$		1983 COST IN 1967 \$ c	CITY	ACTUAL \$		1983 COST IN 1967 \$ c
	1987 a	1988 b			1987 a	1988 b	
FERGUSON	4.18	8.00	2.71	BALLWIN	1.75	5.18	1.76
KIRKWOOD	2.80	8.40	1.83	BELLEFONTAINE NEIGHBORS	3.00	6.75	2.28
NORMANDY	3.00	6.74	2.28	BRENTWOOD	1.83	4.23	1.43
UNIV. CITY	0	6.80	2.20	CRESTWOOD	2.50	6.05	2.05
				ELLSVILLE	2.00	3.33	1.13
				ROCK HILL	2.50	6.30	2.14

(a) SOURCE: SURVEY PREPARED FOR CITY OF SHREWSBURY

(b) SOURCE: ST. LOUIS POST DISPATCH, MAY 12, 1983, PAGE 3N.

(c) SOURCE: "CONSUMER PRICE INDEX", U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS.

Residential waste collection is handled differently in different political subdivisions. Many private haulers operate in St. Louis County, each with its own procedures and controls. The City of St. Louis and five municipalities in St. Louis County provide their own residential waste collection service. The other counties in the area also have a mixture of public and private trash haulers, with private haulers providing the majority of the collection.⁶

Some haulers use a transfer station, an intermediate step between collection and disposal. This has two advantages. First, trash is sometimes compacted at the transfer station and therefore fewer trucks and fewer trips are needed for transporting it to the disposal site. Secondly, because transfer stations allow collectors to collect a large load of trash before taking it to the disposal site, collectors can use disposal sites that are some distance away. There are both privately-owned and municipal transfer stations in the St. Louis area.

Disposal

Most of the St. Louis area's solid waste is being disposed of in landfills, many of which are in abandoned quarries that have been converted to landfill use. Haulers bring trash to the landfill location and pay a fee based on the weight or volume of the load (called a "tipping fee") to the landfill operator for the privilege of disposing of trash. Although no figures are available because of private ownership or operation, it appears that the landfill business is a profitable one.

Tipping fees at landfills have been increasing rapidly. Tipping fees have escalated from \$.50/cubic yard in 1973 to \$3.75/cubic yard in 1984.⁷ They have tripled even after inflation has been taken into consideration, as shown in Figure 3.

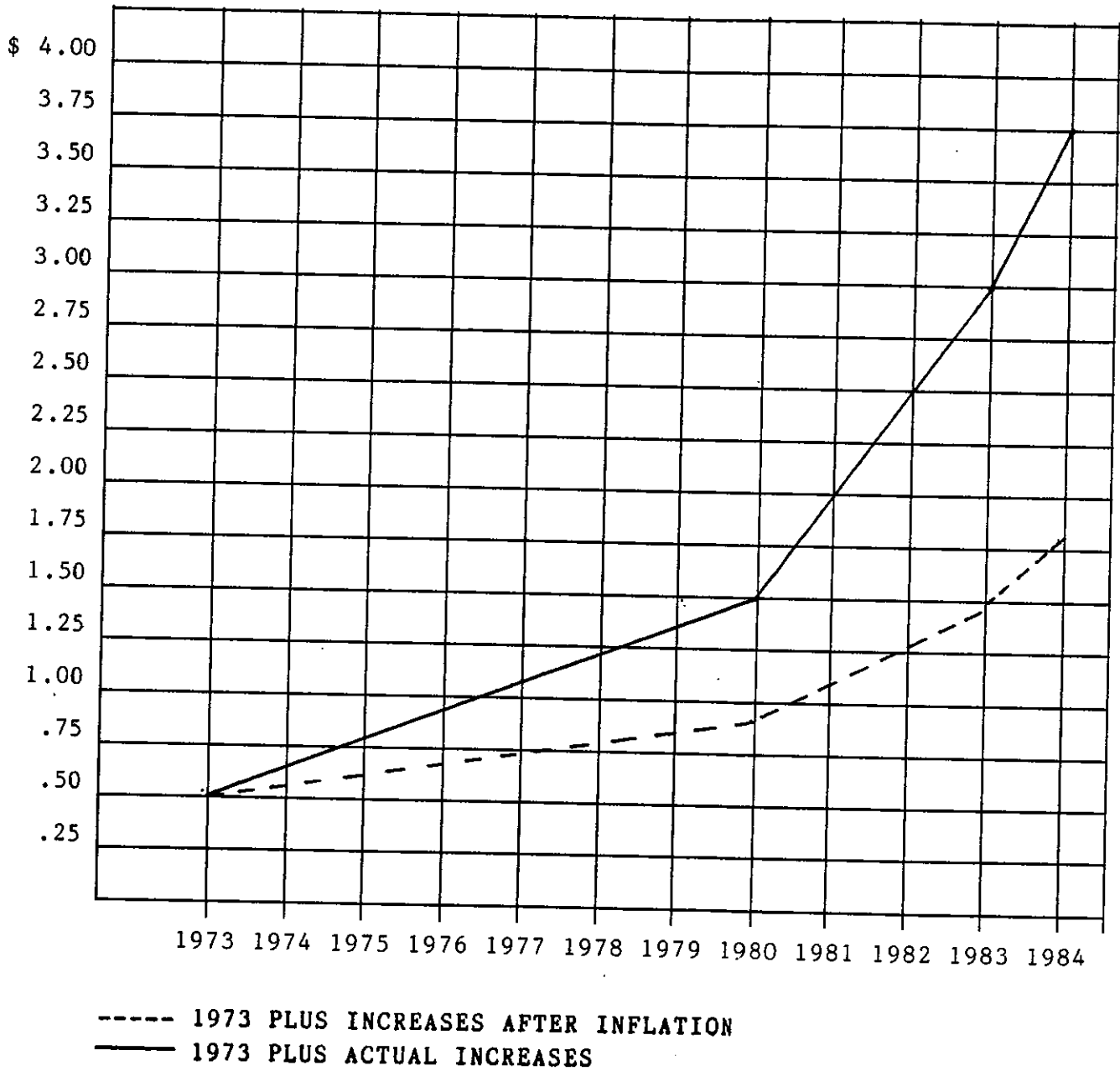
There are six major landfills in the metropolitan area that accept about 90% of the area's waste. An additional eight landfills accept the remaining waste (See Table 2 and Figure 4).

Waste from St. Louis County is currently going to landfills in three areas: 46% goes to the three St. Louis County landfills, 36% goes to Illinois landfill sites and 18% is landfilled in Jefferson County.⁸ St. Charles County has no landfills, so it exports all of its wastes to surrounding counties. Approximately 34% of the refuse received by St. Louis County landfills is generated by St. Charles County.⁹ Almost all Illinois waste is deposited in Illinois landfills.

Waste from St. Louis City is disposed of in two incinerators that do not provide for energy recovery. The incinerators were built in the early 1950's and, now obsolete, are in violation of EPA standards for air pollution. The EPA has been giving the city temporary waivers to give it time to find alternative disposal techniques. The city disposes of bulky trash in demolition landfills, and then burns the rest. The incineration process reduces the waste to about 30% of its original volume.¹⁰ This remaining ash and unburned residue is disposed of in area landfills.

FIGURE 3

Tipping Fees/Cubic Yard



Source: St. Louis County Plan, page 42

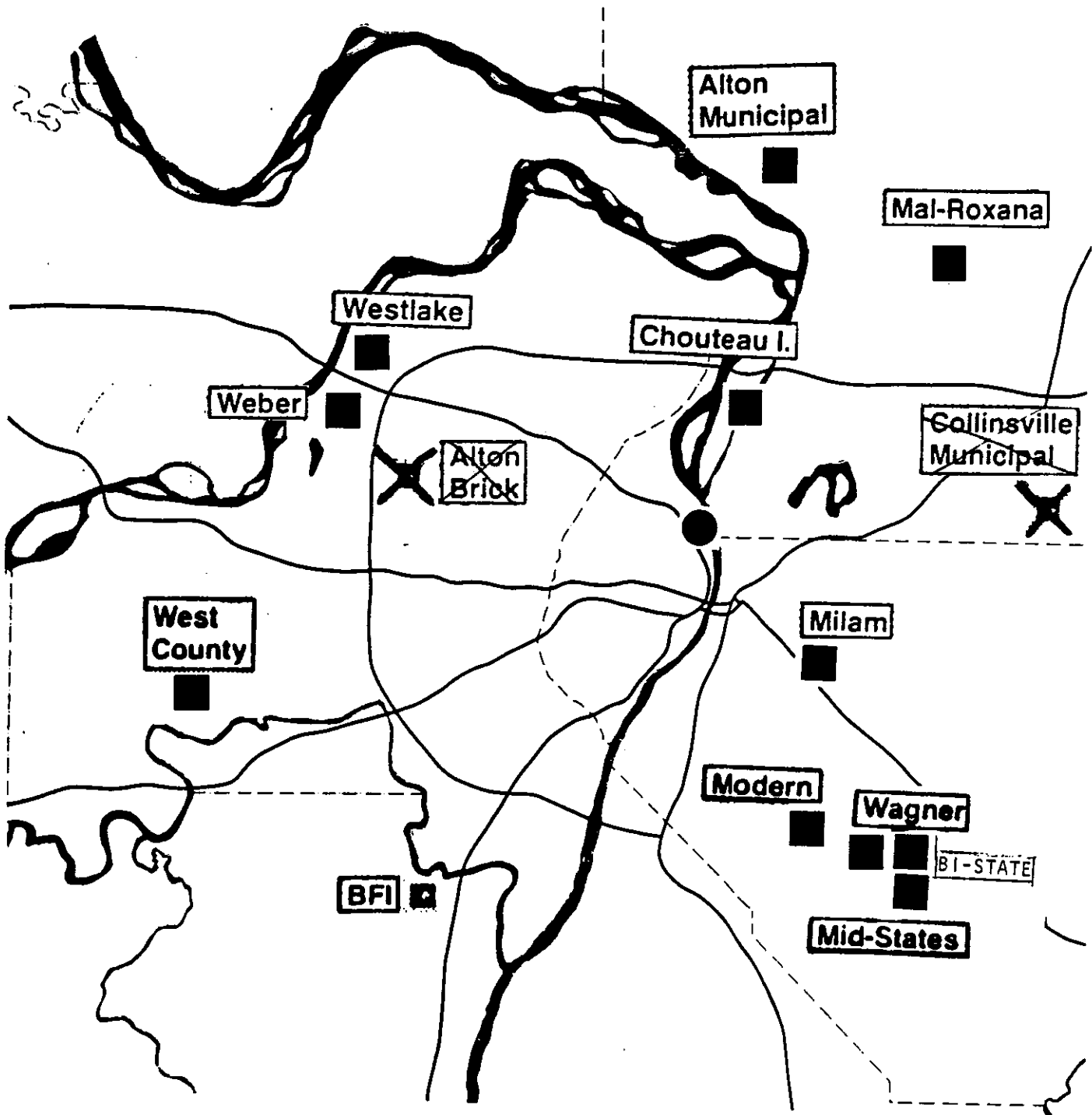
AREA WASTE DISPOSAL METHODS

TABLE 2




MO. LANDFILLS	TPD	TOTAL	PERCENT
WESTLAKE QUARRY	800		
WEBER N. QUARRY	1400		
WEST COUNTY	600		
REDBIRD BFI	700		
TOTAL		3500	50
ILL. LANDFILLS			
MILAM SCA	1500		
CHOUTEAU ISL.	500		
OTHER ILL. LANDFILLS	700		
TOTAL		2700	39
INCINERATORS			
ST. LOUIS CITY (2)	650		
OTHER	50		
TOTAL		700	10
RECYCLING			
	100	100	1
GRAND TOTAL		7000	100

SOURCE: EGENER, 1984

FIGURE 4
REGIONAL WASTE GENERATION AND DISPOSAL



NOTE: Area I represents St. Louis City municipally collected waste disposed of in incinerators. Privately collected waste in the City of St. Louis is disposed in Area III landfills.

-  Incinerators
-  Landfills
-  Closed Landfills

Although most waste is landfilled, some waste, about 100 tons per day, is separated from the stream and is recycled by both for-profit and public recycling centers.¹¹ Recyclable items include aluminum, other metals, glass, and paper. Recycling programs also include a special newspaper collection and recycling program in University City, and composting centers for leaves in several municipalities.

Other waste that is not landfilled includes some commercial and some industrial wastes that are either disposed of on site or are incinerated in private incinerators.

History

The current solid waste system must be put in perspective with its history and with a brief explanation of the regulatory environment to understand it more fully.

Historically, waste disposal was accomplished in open dumps away from centers of population. As these open dumps began to be regulated and required to have daily soil cover, they became "sanitary landfills." Landfills generally were perceived to meet the need until the 1960's when some people began to look for alternatives.

Some efforts toward solving the St. Louis area's solid waste problems have occurred since that time. In 1965, St. Louis County passed a \$5,900,000 bond issue for two incinerators. Only \$3,000,000 of these bonds were sold when the project ran into difficulty. The efforts to site the incinerators were met with substantial local opposition, and concerns for the air quality caused renewed doubts over incineration as an acceptable method of disposal. There remains, then, a fund balance of \$1,111,112 plus \$2,900,000 in unsold bonds that could be utilized for incinerators, if the County should ever decide to move in this direction.¹²

Another possibility for beginning to solve the capacity problem would be to open more landfills. Although several proposals have come before St. Louis County and outlying counties, all of these have been met with strong citizen opposition from those residing near the proposed sites.

A comprehensive "Solid Waste Management Plan" for the St. Louis metropolitan area was prepared by the East-West Gateway Coordinating Council and its consultant, Sverdrup & Parcel, in 1974. It recommended that a Regional Solid Waste Management Agency be created and that the area move toward a waste to energy facility as soon as possible.¹³ CSI Resource Systems, Inc., under the direction of the Bi-State Development Agency, released another regional report in 1980, "Analysis of Resource Recovery Alternatives within the Bi-State Region." This report concluded that resource recovery projects could be economically attractive and should be pursued.¹⁴

All counties in Missouri were required to develop solid waste management plans in 1974.¹⁵ Although these are not as comprehensive as the two regional studies, they still provide important information on the problem of solid waste. The St. Louis County Department of Community Health and Medical Care and the St. Louis County Department of Planning did not file

their own plan until February 1984. This document concluded that a regional cooperative effort is needed in regulating solid waste disposal and that the County should solicit proposals from the private sector for new processing or disposal facilities. It also recommended that a task force be established within the County to coordinate the different departments dealing with waste and to plan an effective strategy for the future.¹⁶

The City of St. Louis and the Bi-State Development Agency developed a proposal to convert much of the city's trash to steam and/or electricity which would then be sold to Union Electric and downtown businesses. When complete, this project could convert 100% of the city's residential refuse to steam. The fate of implementation of this project, originally scheduled for late 1984, is currently in question because of the financing arrangement and pending litigation.¹⁷

Regulatory Environment

Federal legislation in the area of solid waste was first passed in 1965. Illinois followed by establishing its own Environmental Protection Agency through legislation in 1970; the most recent revisions to the Illinois law were in March 1984. Missouri established the Department of Natural Resources (DNR) in 1972, and then enacted legislation requiring counties to develop plans by 1974. Missouri's law, "The Missouri Solid Waste Management Law, Rules and Regulations," was last revised in 1975, and the Missouri Department of Natural Resources (DNR) is currently considering proposing revisions. These laws in Illinois and Missouri specify solid waste rules and regulations concerning sanitary landfills, demolition landfills and processing facilities.

In Missouri, state regulations are rather vague and leave much up to the counties. Some counties have developed ordinances to assist in managing solid waste. St. Louis County's ordinances have not been updated since 1967.

Legislation in some other states gives governments power to control the flow of trash and the ability to tell haulers where they must take the trash. This ability, called "flow control," would be a key component in making possible alternative technologies that require an assured volume of trash. According to its charter passed in 1979, St. Louis County appears to have the authority to regulate and control the transporting and disposal of solid waste.¹⁸ However, implementation of this flow control would be dependent on a vote of the County Council and could be met with major opposition from the private waste haulers and from landfill operators. Residential flow control is currently operating in St. Louis City, (i.e., all residential solid waste is taken to city incinerators), but there are no legal provisions for flow control in other parts of the metropolitan area.

Problems with Current System

The current system of collection and disposal has some major weaknesses. Four serious problem areas are discussed below:

Problem: Landfill Capacity

St. Louis area landfills are rapidly reaching permitted capacity (See Figure 5). By 1987, three of the region's six major landfills will reach capacity (West County in St. Louis County, BFI in Jefferson County, and Milam in St. Clair County). By 1996, the other three major sites will reach capacity.¹⁹ (There have been other projections, but those projections do not account for the fact that after the 1987 closing of the West County, BFI and Milam sites, remaining sites will have to absorb additional wastes.)²⁰

Problem: Environment

Most current sanitary landfills present several environmental problems. The geology of the St. Louis area and the Illinois counties of Madison, St. Clair and Jersey make these areas generally unsuitable landfill sites.²¹ Their rock layers are semi-porous, allowing potential ground water contamination. Rain water can seep through the waste, become contaminated, and enter the water table. Ground water can also rise through the waste and become contaminated if the water table rises. If this contaminated water or leachate seeps out of the landfill site, it can contaminate the ground water in the surrounding area. Some residents of the region are dependent on ground water for their water supply. An additional environmental hazard associated with landfills is that of methane gas, created by decomposition of wastes, which is potentially explosive and an air pollutant.

The incinerators in St. Louis City are creating environmental problems by producing more air pollution than is allowed under EPA standards, and they continue to operate only by continuing EPA waivers.²²

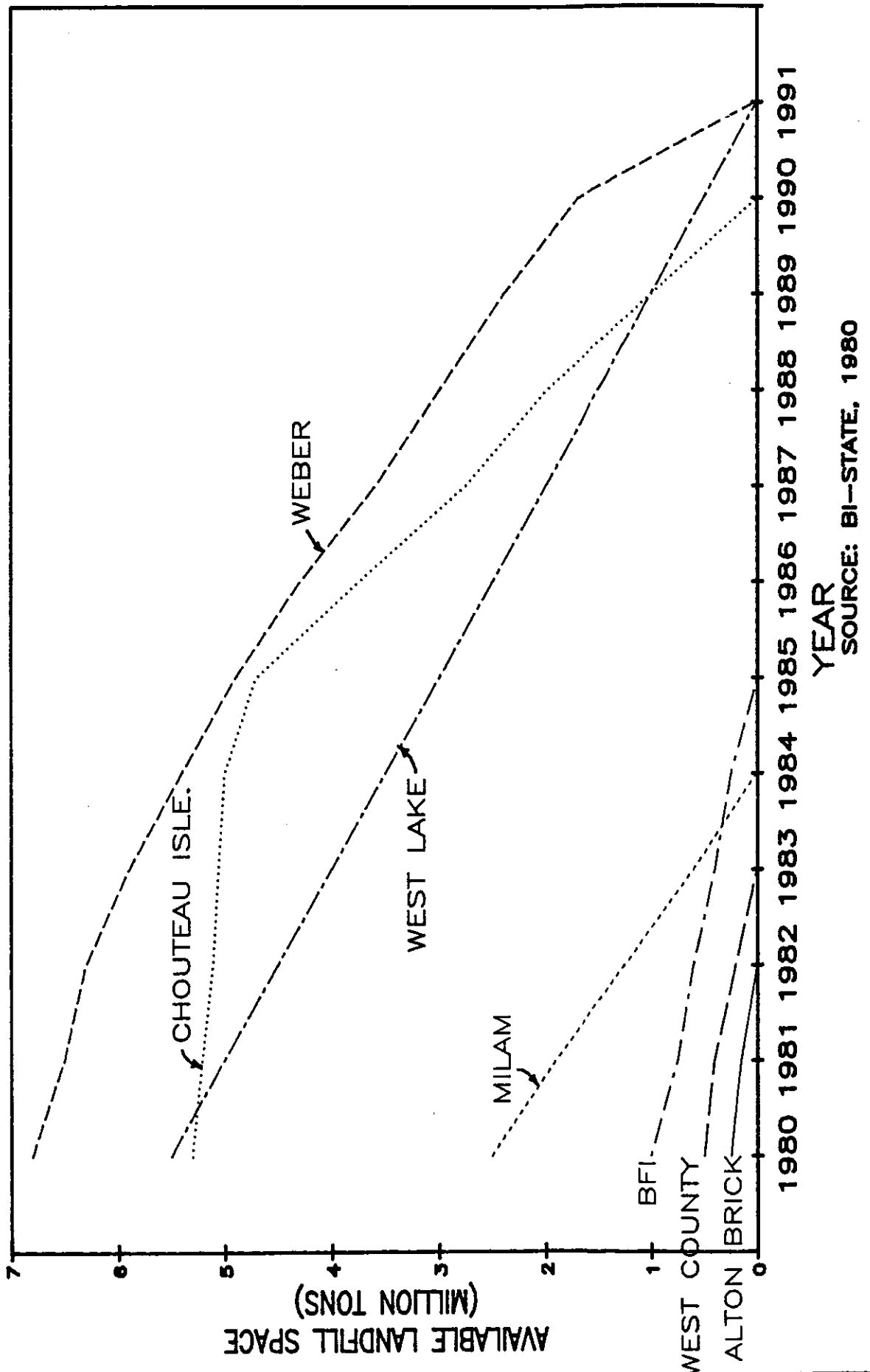
Problem: Inadequate Monitoring

Solid waste control budgets for both the Illinois EPA and the Missouri Department of Natural Resources have been drastically reduced.²³ Funds in both states have been diverted for other programs such as hazardous waste management. Due to these staffing and funding constraints, landfill sites in Missouri and Illinois are inspected less than quarterly by the state, as required.²⁴ The level of compliance with regulations depends on the integrity of private owners and is often linked to the frequency of inspection. Therefore, one can assume that most landfills are not operating as close to the regulations as they would be if inspections were more frequent.

In addition to a lack of monitoring under the current laws and regulations, there are some deficiencies in the existing laws. The operational codes of St. Louis County Department of Community Health and Medical Care have not been updated since 1967. Because considerable technological change has occurred since then, the present code may need to be reviewed. Missouri laws do not make specific provisions for safeguards that are needed now in landfills or for dealing with problems that often result from closed landfills. Other states have developed laws that require landfill owners to contribute to a fund that will be available in case of problems with a

FIGURE 5

ESTIMATED LANDFILL USEFUL LIFE PLANNED EXPANSIONS - NO NEW SITES OR RESOURCE RECOVERY



SOURCE: BI-STATE, 1980

closed landfill, but citizens in Missouri do not have this protection. Additionally, the sanctions Missouri DNR can impose are very limited. For example, it can not fine a landfill, it can only revoke its permit.

Problem: Lack of Coordination

Currently, St. Louis County does not appear to have centralized staff directly responsible for all aspects of solid waste management. Responsibilities for solid waste are divided among several departments, including the Department of Community Health and Medical Care, the Department of Planning, the Department of Public Works, and to a lesser extent, the Highways and Traffic, Police, and Parks and Recreation Departments. The St. Louis County Solid Waste Management Plan recognized this as an impediment in achieving inter-departmental coordination.²⁵

There appears to be little coordination in planning for solid waste disposal among St. Louis City, St. Louis County, and the other Illinois and Missouri counties in the metropolitan area, even though decisions made in one county may have significant effects in the area. Some citizens have looked to St. Louis County for leadership in planning for solid waste coordination in the area since the County is the major generator. St. Louis County, however, has not approached the problem from a regional perspective nor has it led in the coordination. In fact, it did not even complete the Solid Waste Management Plan required in 1974 until 1984.²⁶

Major Alternative Waste Management Methods

Because the current disposal system is faced with real problems, the area needs to look at other alternatives for solid waste disposal. The methods discussed here are not mutually exclusive and should be used in combination.

Sanitary Landfills

Landfills have been the preferred method of disposal in the St. Louis area. Many landfills are simply abandoned quarries or other holes in the ground. Haulers bring to the landfill loads of trash which are either weighed or measured, then deposited in the landfill. The trash is compacted with bulldozer-type equipment and covered daily with soil.

This disposal method has one basic advantage, cost. Initial costs in opening a sanitary landfill are fairly low, especially if a large hole in the ground already exists. Operating costs are also low. Landfills do not require as much technical skill or sophisticated equipment as some other disposal methods. Basically one needs a hole, earth-moving equipment, a source of cover material and a permit to operate.

As they are presently operated, sanitary landfills have several disadvantages. Already mentioned are the potential environmental problems of leachate contaminating the ground water and of hazardous materials within the landfill.

Local residents often oppose landfill site requests for these environmental reasons. In addition they may have concerns about odor, vermin, wind-blown

trash, wear and tear on their roads or streets caused by increased truck traffic, and the effect of the landfill on their property values.

An additional potential disadvantage is that valuable land that could serve some other purpose may be used for the landfill complex.

The advantage of the cost of disposing of waste in sanitary landfills would be diminished by reviewing the real costs of landfilling. If landfills were designed and operated to adequately protect the ground water and address other environmental concerns, the cost would increase substantially. In addition, if landfills were inspected monthly or quarterly instead of semi-annually, and if current regulations were stringently enforced, the cost of landfilling would increase further. A final increase would occur if landfill operators were required to be bonded for closure, post-closure monitoring and problem-solving.

High Technology Landfills

Several methods for improving the environmental quality of landfills exist. Technology is available to line landfills with an impervious material to keep leachate from seeping into the ground. Underdrains can be added to collect the leachate so that it can be treated before disposing of it. Vents are necessary for the methane gas. There have been limited applications of some of these technologies in area landfills.

Other possibilities are to build above-ground landfills so that drainage systems are easily available for repair and inspection. Provisions for closure, post-closure leachate monitoring, and bonding could be added. The cost of these methods, while substantially higher than sanitary landfills, is still likely to be less than waste to energy or composting facilities.

Many of the problems with sanitary landfills are lessened by these techniques. However, citizens opposition to siting continues because of concerns of traffic conditions, odor, and the possibility that liners have not yet proved themselves. Additional regulations and monitoring will continue to be needed. A major disadvantage is that some hazardous wastes may still be placed in landfills, creating potential problems if containment fails. The use of increasingly valuable land for this purpose would continue to be a factor.

Incineration

Incineration is the method currently used by St. Louis City. Large incinerators burn the trash, leaving ash that is about 30% of the original volume.²⁷ This ash must then be disposed of in landfills. Technology is available for removing some materials after shredding the waste or after burning it; neither method is currently used in St. Louis City.

The major advantage of this method is that it reduces the volume of waste that must be disposed of in landfills. Disadvantages of this alternative include air pollution as a potential problem and citizen protest over siting. In addition, incinerators have high capital and operating costs. Since tipping fees and the sale of material recovered after incineration are the only sources of income to offset these costs, incinerators usually

require subsidies and/or flow control by a governing body to be economically sound. Incinerators may also cause traffic, odor, or vermin problems.

Waste to Energy

Similar to incinerators are waste to energy plants, which produce steam or electricity from the waste heat of the incineration process (see Figure 6). This steam can be used to provide heat for nearby users, to provide industrial process steam, or to produce electricity. This technology is widely used in Europe and is beginning to be used in the United States. A noted example is a plant in Saugus, Massachusetts, which serves a portion of the Boston area. The privately owned and operated plant has been in operation since 1975 and is now said to be operating profitably.²⁸

One major advantage to this alternative is that a useful product (energy) is produced from waste, which promotes conservation of natural resources and offsets some of the capital and operating costs. Waste-to-energy plants have fewer of the potential problems associated with landfills and are generally more acceptable environmentally.

Major disadvantages include the high capital cost needed to build the plant. (The Saugus plant's capitalization totalled more than \$50 million ten years ago.) Tipping fees need to be high enough, therefore, to cover these extensive capital costs. If tipping fees are higher than at surrounding landfills, some type of flow control is needed to ensure that there is an adequate supply of trash at the facility. An additional potential problem is boiler damage due to the corrosive nature of the off-gas. Odor, vermin, and traffic are other potential problems.

Waste to energy plants need a consistent, demonstrated market for the end product, whether that be steam or electricity. Union Electric can be expected to pay no more than the variable cost required to produce electricity in a conventional power plant, which may not be high enough to cover the cost of producing energy in the trash to energy facility. Major users of steam need to be identified and contracts negotiated, making the lead time required longer than other alternatives. Contingency plans are necessary in case a major purchaser cancels a contract. An alternate approach is to develop an energy park (similar to an industrial park) with steam from the trash to energy plant readily available to the other businesses located there.

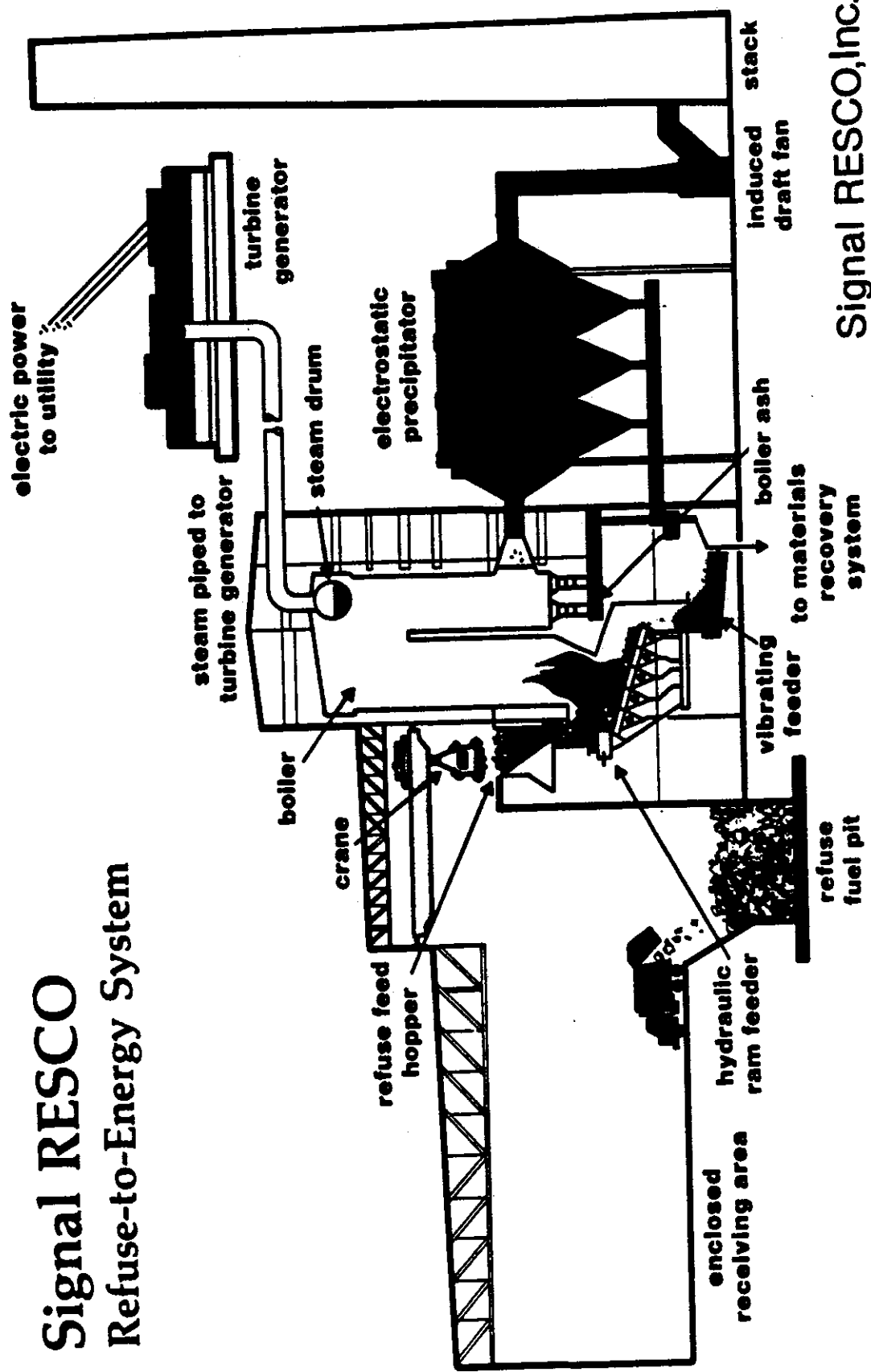
Composting

Composting is the microbiological breakdown of solid waste supplemented with water/sewer sludge. The conversion of waste into compost takes about 6 days with additional curing time and is aided mechanically by grinders and shredders. Heavy metals, plastic, rubber, ferrous materials and known contaminants must be removed manually before and after processing to produce a salable product. This product is useful as a soil conditioner, not as a fertilizer.

The advantage of this method is that it converts waste to a usable product. The process involved can be as environmentally acceptable as other

Signal RESCO Refuse-to-Energy System

FIGURE 6



Signal RESCO, Inc.

mechanical processes, and the product can be bacteriologically safe if properly processed.

Disadvantages exist. Composting plants have high capital costs, and therefore the tipping fee may be higher than at landfills, requiring flow control to assure a consistent source of trash. Manual separation also adds cost and the possibility of human error into the process. In addition, the chemical nature of the product limits its storage to a maximum of two weeks, creating further problems.

This alternative, like the trash-to-energy alternative, requires a consistent, demonstrated need for the end product. Proponents argue that compost has agricultural uses as a soil conditioner and/or for erosion control and that the highway department could be a major customer. Others are not convinced and view this as only a small part of the solution because the market for compost is not nearly large enough to absorb the product which would be generated by using composting as a major disposal alternative.

Recycling and Source Separation

Recycling and source separation currently taking place in the St. Louis area keeps about 100 tons per day out of the waste stream being disposed. Recyclable materials include various paper products, glass, and some metals. Table 3 shows the amount of materials that could be recycled in the metropolitan area. Newspapers and aluminum cans are the major items

TABLE 3

MAJOR SOURCE SEPARABLE MATERIALS IN THE BI-STATE REGION
(TONS PER DAY)

AREA	NEWS-PAPER	BOOKS & MAGAZINES	CORRUGATED	OFFICE PAPER	GLASS	STEEL	ALUMINUM
JEFFERSON COUNTY	10.57	3.75	15.00	6.00	15.00	6.00	0.50
MADISON COUNTY	31.00	11.00	45.00	18.50	45.00	20.00	1.70
ST. CHARLES COUNTY	9.50	3.50	13.50	5.00	13.50	6.00	0.50
ST. LOUIS COUNTY	132.00	47.00	187.00	77.00	187.00	81.00	7.80
CITY OF ST. LOUIS	116.50	41.00	165.50	68.50	165.50	71.50	6.80
ST. CLAIR COUNTY	40.00	14.00	57.50	28.50	57.50	24.50	2.00
TOTALS	399.60	130.00	484.50	209.60	493.50	209.00	19.30

SOURCE: BI-STATE 1980

that households presently recycle; the other items are possible, but the payoff is much lower.

Separation can occur at three points in the system, either by households, at the transfer station, or at the disposal site. Few households are active recyclers because many perceive the inconvenience involved as not worth the benefits. Separation at the transfer station or disposal site is more difficult. Magnets can comb the trash for ferrous metals, but little other separation can be accomplished without substantial amounts of labor or expensive equipment.

Recycling of waste is the one option that actually improves our environment. It eliminates some materials from the waste stream that otherwise would go to a landfill or other processing site. It extends the life of our natural resources.

One disadvantage of recycling is that its usefulness is currently tied to market demand. Thus, only items for which there is a market will be recycled. Another disadvantage is that recycling depends on the separation of wastes. If separation is not done at the source by the resident, institution or business, an additional step is added to the process of disposal, adding more costs. Recycling by the source is seen as inconvenient by many; it would require a substantial educational effort to have an impact.

Waste Reduction

The optimum method of reducing disposal problems is to produce less waste initially. This would require an intensive educational/communication effort both to change consumer wants and needs and for these revised consumer habits to be reflected in manufacturer's marketing strategies and packaging designs.

Comparison of Alternatives

It is very difficult to identify the precise costs of these alternatives. However, relative statements can be made, and these comparisons, as well as comparisons on other evaluation factors, are presented in Table 4.

III. CONCLUSIONS

Impending Crisis

Although a regional crisis in solid waste management appears inevitable, the public does not perceive a potential threat. An opportunity exists to intervene before the solid waste situation becomes unmanageable. Citizens need to be more informed about the quantity and composition of wastes, landfill operations and capacity, and waste stream reduction opportunities. They need to understand the various disposal options, including the costs, necessary regulations, and the environmental impacts associated with those options. To make better choices in solid waste management, citizens need to be educated on the subject and alerted to the potential crisis. Our current methods of disposing of trash need to be altered because existing landfills are nearing capacity and have caused environmental problems.²⁹

TABLE 4
COMPARISON OF SIX DISPOSAL METHODS

Evaluation Factor	Disposal Method					
	Sanitary Landfill	Hi tech Landfill	Incinerator	Waste to Energy	Composting	Recycling & Resource Recov. (a)
Capital Cost	2	3	4	5	3	1
Operation Costs	1	2-3	4	5	3	4
Land Area Required	5	5	1	1	3	2
Potential for Ground Water Pollution	5	3	1	1	2	1
Potential for Air Pollution	Yes	No	Yes	Yes	Yes	No
Potential Vector Problems	Yes	Yes	Yes	Yes	Yes	Yes
Traffic Problems	Yes	Yes	Yes	Yes	Yes	No
Odor Problems	Yes	Yes	Yes	Yes	Yes	Yes
Residual Volume	100%	100%	30%	30%	40% (b)	75% (c)
Requires Daily Waste Stream	No	No	No	Yes	No	No
By Products	Methane	Methane	Heat	Steam Electricity	Humus	Paper, Metals Glass
Requires Constant Need for End Product	No	No	No	Yes	Yes	Yes

Ratings: (1) lowest, (2), (3) medium, (4), (5) highest.

Footnotes:

(a) Based on these units being small dispersed facilities as currently exist in the St. Louis area.

(b) Percent of volume not biodegradable such as glass, metal, and some plastics.

(c) Percent of volume not salvagable such as garbage, mixed unsortable papers, etc. Basically that waste other than salvagable paper, metals and glass.

The above represents the consensus of Task Force opinion, based on presentations by resources.

The twin crises of capacity and environment are complicated by a lack of strong leadership by public officials and governmental agencies in overseeing aggressive management of solid wastes. The combination of a generally uninformed citizenry and a lack of public leadership creates a situation which is not conducive to change.

Studies alone will not contribute to a solution. Regional studies and recommendations have been made, but the weak links appear to be in the specificity of the recommendations and in the area of implementation. There has been a lack of constructive action taken by the public leadership involved.

Goals of System

The overriding goals of solid waste disposal need to be delineated so that appropriate choices can be made. We believe:

- 1) The ultimate goal is the health and welfare of the people. This includes a concern for the environment and its short-term and long-term effects on people.
- 2) A solid waste management plan should stress the maximum recovery of usable materials and energy. Because the earth's resources are finite, any possibilities for recovering resources should be implemented.
- 3) Reduction of the stream is needed to complement any disposal strategy. Consumer awareness, conservation, recycling, and changes in packaging are desirable. Although it will probably not be easy to change societal values from ones that encourage disposables to ones that encourage saving, reuse, and rejection of packaging, stopping waste at the source should be stressed and incentives provided where appropriate. Every reduction of the disposal stream lengthens the life of disposal processes and saves money.
- 4) Cost effectiveness is a final objective. Both private and public investors are concerned with the economic feasibility of solid waste disposal alternatives. However, the cost of acquisition and preparation, operation, maintenance, inspection, and closure of disposal sites should be balanced against the longer-range cost to the community of delay or inaction. These include deterioration of the environment, depletion of natural resources, and a decline in our economic health and quality of life.

Description of System

The system for solid waste disposal in the St. Louis metropolitan area is characterized by fragmentation, a lack of leadership, and a multitude of players who are not coordinating with one another. We believe a rational system of disposal would include these factors:

Role of Private Sector

Waste handling and disposal facilities should be self-sufficient and involve the private sector as much as possible. Local or state government will not accept a large financial burden related to waste disposal unless the citizenry agrees to increased taxes or a shift in budgetary priorities.

Governmental Entities Involved

Illinois has sufficient landfill capacity at this time to handle its own waste. The crisis appears to be in the disposal of waste generated in Missouri. Therefore, although the problem is a regional one, Missouri appears to be more ready to acknowledge the problem and thus may be more ready to implement steps toward a regional solution. This is not meant to suggest that Illinois does not have a problem, only to point out that it is facing less of an immediate crisis. In any system that is developed for the region, better mechanisms for coordinating state, county and municipal entities will need to be implemented.

Alternative Disposal Methods

It is not practical at this time to consider only one type of facility for the disposal of solid waste. This is due to concerns about the following:

- a) Logistics. Getting all the waste to a single plant creates transportation problems.
- b) The environment. Different alternatives affect the environment in different ways.
- c) Economics. Plants over (as well as under) a certain size are not economically efficient.
- d) Politics. Elected officials may be more likely to support a plan that does not "put all its eggs in one basket."

Role of Recycling

Although recycling is a desirable practice for conserving resources, it can never be the major means of disposal. The maximum amount it can divert from disposal is not likely to be more than 25%.

Role of Landfills

While landfilling may not be the preferred long-term disposal method, properly operated and controlled landfills must be included in a regional solid waste management plan.

Even with alternative disposal methods in place, landfills will be needed for these purposes:

- a) to accept ash and/or residue that results from the use of other disposal alternatives,
- b) to accept bulky wastes and rubble that may not be appropriate for other disposal alternatives, and

- c) to act as back-up sites if other disposal alternatives have extended periods of down time.

IV. RECOMMENDATIONS

As a result of our study, we make the following recommendations:

Moratorium on New Permits

We recommend all counties in the metropolitan area and the state agencies involved declare an immediate moratorium on new landfills. The moratorium would be in effect until:

- Adequate regulations have been enacted at both the state and county levels to ensure that deposited wastes will not harm the environment.
- Enforcement of regulations is adequate.
- Every municipality and county for which a solid waste management plan is required has submitted a plan.

This moratorium would draw attention to the problem and would ensure that we do not rely on "solutions" that are only short-term.

Stricter Regulations

The Missouri Department of Natural Resources and the Illinois EPA need to establish additional regulations that decrease landfills' detrimental impacts on the environment. These should include:

- requirements for closure and post-closure monitoring for all landfills,
- bonds posted by landfill owners to cover post-closure costs,
- impervious liners on new landfill cells,
- leachate collection and testing systems on new landfill cells,
- methane gas collection and disposal systems,
- ground water monitoring including establishing a data base for ground water quality around all landfill sites,
- requirement for scales at landfill sites, and
- certification of landfill operators and training of disposal site employees.

These regulations would make landfills a safer disposal method and narrow the artificial cost disparity between sanitary landfills and competing technologies. As long as landfills remain a part of our disposal system, we recommend they be made as environmentally safe as possible.

Additional regulations or legislation is needed in the areas of:

- imposing sanctions on counties that do not develop or implement solid waste management plans for their own jurisdiction or that fail to engage in cooperative plans with surrounding districts,
- giving the Department of Natural Resources ability to fine or levy other sanctions against waste disposal sites,
- allowing any county to institute flow control, and

- instituting a surcharge on the tipping fee that will be earmarked for enforcement of regulations.

Of course, adding new regulations is meaningless unless they are enforced. We recommend increased emphasis on solid waste by Missouri DNR and Illinois EPA with budget increases specifically targeted to landfill site inspections and solid waste management.

Educational Program

Public understanding is essential to the solution of the impending crisis in solid waste disposal. **A first step toward solutions should be a comprehensive public communication and education program.** Citizens should be informed about:

- the amount and cumulative effects of the waste generated,
- ways for individuals to reduce solid waste generation,
- the advantages of recycling,
- the need for separating recyclable materials so that recovery is maximized,
- the environmental problems associated with landfills, including specific citations against area landfills,
- the landfill capacity problem in the area,
- possible solutions to the environmental and capacity problems, including alternatives to landfills and their advantages,
- identification of hazardous wastes commonly used by households, institutions, businesses, industrial and agricultural producers, and ways to dispose of these wastes,
- the role of landfills in a disposal system, and
- the long-range consequences of inaction.

The objectives behind this recommendation are:

- to increase the public's awareness of ways they contribute to the problem, and
- to encourage the public to influence action on the part of governments and the private sector.

Waste Reduction

Incentives for reducing waste should be developed. Examples could include:

- requiring deposits on cans and bottles,
- developing incentives for source separation by both businesses and residences (e.g. cash bonuses paid through recycling centers or perhaps tax deductions for recycling),
- developing policies that reward households and/or businesses for developing less waste,
- adding a waste generation tax, and
- developing state and/or local tax incentives for developing and operating disposal methods that have an end product that is usable.

Area-Wide Planning Process

We recommend representatives of county and municipal governments in the

metropolitan area begin working together to develop a comprehensive area-wide waste management plan. This would encourage dialogue and coordination among counties that are not now addressing the regional nature of the problem. Counties working together would have much more power to get a plan implemented than if they work independently. We recommend St. Louis County take a leadership role in this effort.

Less Dependence on Landfills

We recommend that St. Louis County, in cooperation with other counties and municipal governments, begin planning for the region by soliciting proposals on waste disposal and resource recovery. Proposals should include a description of the type of technology that would be employed and should outline what would be needed in terms of regular trash volumes, siting assistance, and the amount of any subsidy needed. Proposals should include a financing plan, marketing analysis, plans for the sale of any recoverable products, a plan for residue disposal, a site for residual waste, contingency plans for handling the waste if the system should become inoperative, and a statement on disposal fees.

These proposals would establish exactly how much subsidy, if any, would be required for alternative disposal techniques. Informed decisions could then be made on whether or not to pursue a particular disposal technology. The financing needs would be clear, and alternative methods of obtaining the financing could be developed.

Since some of the proposals might include high-technology solutions, one way to solicit them would be to work through the St. Louis Hi-Tech Center and the state of Missouri and their efforts toward encouraging entrepreneurs.

Additional Recommendations for Specific Counties

We recommend St. Louis County reorganize so that solid waste management responsibilities are consolidated into a single coordinating department. This department would have responsibility for coordinating the efforts of the departments involved, and would take responsibility for answering any questions on solid waste. This would increase the County's efficiency and effectiveness in solid waste management and allow it to respond more quickly to problems. It would provide a single number that concerned citizens could call for information. It would also be symbolically important as a part of recognizing the importance of solid waste disposal.

St. Louis County has a \$4 million dollar potential fund for incinerators composed of \$2,900,000 in unsold bonds and a fund balance of \$1,111,112. It should immediately determine if that money would be available for other waste disposal purposes, e.g., toward a waste to energy plant or other waste recovery alternatives. If this money is available, the next steps would be to solicit proposals and to get the County Council to vote for flow control to assure a reliable source of trash.

St. Charles County, the fastest growing county in Missouri, has no landfill sites. We recommend that it update its solid waste management plan (last revised in 1974) and develop a strategy for waste disposal that is consistent with the plans of surrounding counties.

We recommend the City of St. Louis continue to make a commitment to the success of the Bi-State Agency proposal to produce steam and electricity from wastes generated within the City. If the Bi-State proposal shows indication of failing, the City should take whatever steps it can to encourage the Bi-State effort. It should also immediately explore alternate means of waste disposal, including methods of producing steam.

Each of the other counties in the area (Franklin and Jefferson in Missouri, and Madison, Monroe, and St. Clair in Illinois) should develop a solid waste plan that:

- is compatible with the environmental conditions of the county,
- addresses ground water protection,
- reduces dependence on landfills,
- increases use of alternative technologies, and
- is consistent with the regional planning process.

V. FOOTNOTES

1. The metropolitan area is defined in this report as containing the Missouri Counties of St. Louis, Franklin, Jefferson, St. Charles and St. Louis City, and the Illinois Counties of Madison, St. Clair, Monroe, and Clinton. However, sometimes information on outlying counties was not available, so was not included in those areas of the report.
2. Presentation by Joe Eigner to the Missouri Waste Control Coalition Spring Conference, March 7, 1984.
3. Missouri Department of Natural Resources 10CSR25 - 3.010 RsMo (Revised Supp. 1983).
4. Presentation by Carol Blohm, St. Louis Metropolitan Sanitation Haulers' Association, to Task Force, February 23, 1984.
5. East-West Gateway Coordinating Council. Solid Waste Management Plan for the St. Louis Metropolitan Area. Prepared by Sverdrup & Parcel and Associates, 1974, p. 93.
6. Bi-State Development Agency. Analysis of Resource Recovery Alternatives Within the Bi-State Region. Prepared by CSI Resource Systems, Inc., 1980, p. 54.
7. St. Louis County Solid Waste Management Plan 1984-1994, Draft. February 1, 1984, p. 42.
8. St. Louis County, p. 34.
9. Ibid.
10. Presentation by Nick Yung, Refuse Commissioner, City of St. Louis, to Task Force, February 9, 1984.
11. Presentation by Joe Eigner.
12. From St. Louis County Status of Capital Project Fund Balances -- Budgetary Basis, December 31, 1983.
13. East-West Gateway Coordinating Council, p. vi.
14. Bi-State Development Agency, p. 1.
15. Missouri Solid Waste Management Law, 260.220.
16. St. Louis County, p. 64-65.
17. Eubanks, Ben. "Court Proceedings Hold Up Sale of Ashley Steam Plant," St. Louis Business Journal, October 8, 1984, p. 6B.
18. St. Louis County Charter, November 6, 1979, Section 2.180 (11).
19. Presentation by Joe Eigner. His figures update the 1980 Bi-State capacity figures (Bi-State Development Agency, p. 6.)

20. See, for example, East-West Gateway Coordinating Council, p. 89.
21. Presentation by Dr. Bruce Stinchcomb, Geologist, Florissant Valley Community College, to Task Force, May 24, 1984. Also St. Louis County, p. 3.
22. Presentation by Nick Yung.
23. Presentation by Ken Mensing, Division of Land Pollution Control, Illinois EPA, to Task Force, March 8, 1984 and Statement by Mike Duvall, Missouri Department of Natural Resources to Task Force, February 9, 1984.
24. Statement by Mike Duvall.
25. St. Louis County, p. 50.
26. St. Louis County did inform DNR that it adopted the East-West Gateway study as its plan in 1974. It assumed then that it had met its obligation under the law.
27. Presentation by Nick Yung.
28. Saugus: A Case Study of Economic Development and Resource Recovery, United States Conference of Mayors, March 1980, p. 3.
29. See, for example, Memorandum Number 18 to Fred C. Douglas from Goulias Associates, August 10, 1983.

VI. GLOSSARY AND ACRONYMS

BULKY WASTE-Refuse which, due to its volume or weight characteristics, cannot be handled by ordinary collection practices. Examples: water heaters, sofas, etc.

CELLS-Discrete portions within landfill sites.

COMPOSTING-Process of using natural biological decomposition of wastes to produce an end product that can be used as a soil conditioner.

DNR (DEPARTMENT OF NATURAL RESOURCES)-The department within the state of Missouri responsible for regulating solid waste.

FLOW CONTROL-Legal or economic mechanism dictating the disposal site and/or disposal method for a portion or all of an area's waste stream.

IEPA-ILLINOIS ENVIRONMENTAL PROTECTION AGENCY-The Illinois agency responsible for regulating solid waste.

INCINERATION-Disposal technology involving the mass burning of wastes for purposes of reducing waste volume. The remaining ash is landfilled.

LANDFILL (DEMOLITION)-Landfill site where inorganic wastes are deposited. Such materials include bricks, rocks, concrete, etc.

LANDFILL (HIGH-TECHNOLOGY)-Landfill that uses various methods to mitigate its environmental impact (e.g. liners, underdrains, leachate collection systems, venting systems, above ground systems).

LANDFILL (SANITARY)-A licensed solid waste disposal site where refuse is deposited and buried in or on the ground.

LEACHATE-Solution/substance formed when liquid drains through decomposing wastes buried in a landfill.

MECHANIZED COLLECTION SYSTEM-Waste collection methods that use mechanical devices to replace some labor (e.g., trucks that engage and tip "dumpsters.")

RDF-Refuse-Derived Fuel, fuel that comes from the burning of refuse.

RESOURCE RECOVERY-Policy or technology which extracts or uses all or parts of the waste stream to salvage selected materials or generate energy.

REUSE/RECYCLE-Disposal strategy that decreases the waste stream by removing certain items such as newspapers and aluminium cans, diverting their disposal from land-fill sites and processing these items to allow for their reuse.

SOURCE SEPARATION-Method of recovering usable materials from the waste stream by sorting recyclable or potentially dangerous materials at the residential, commercial, agricultural and/or institutional site.

TIPPING FEE-Fee imposed by disposal site operator for privilege of

depositing refuse at the site. This fee is based on volume or weight.

TPD-Tons per day

TRANSFER STATION-Intermediate collection facility for the short term storage of solid wastes. Potential location for separation and recycling.

VECTOR-A carrier that is capable of transmitting a pathogen from one organism to another, e.g., mosquitoes, flies, rats, etc.

WASTE TO ENERGY-Any waste disposal technology which converts trash to a useful, salable product such as steam, fuel, electricity or other energy source. Also known as "trash to energy" and "resource recovery".

WASTE STREAM-Total waste generated.

VII. WORK OF THE TASK FORCE

Task Force Study Approach

Recognizing the need for a regional assessment of the solid waste issue, the Board of Directors felt it would be appropriate for a task force of volunteer citizens to examine the situation and make recommendations for positive action. In November of 1983, the following charge was formulated to be pursued by the Solid Waste Task Force:

- A) propose within a month for approval by the Executive Committee of the Board an appropriate definition of "region" for the purpose of this study ("region" might be defined as broadly as the St. Louis SMSA or as narrowly as St. Louis, St. Louis County, Madison County, and St. Clair County);
- B) research projections of solid waste generation and capacity of existing or approved disposal facilities;
- C) outline alternative strategies for reconciling any gap projected in (B);
- D) recommend one or more of the strategies in (C);
- E) recommend a politically feasible action plan for implementing one or more of the strategies in (D);
- F) submit a final report not later than September 1, 1984.

The Task Force subsequently requested that it delay its report until November 1, 1984. The request was approved by the Board.

Task Force Membership

Members of Confluence specifically interested in the solid waste study were invited to participate on the Task Force. Initially, 26 members volunteered for committee assignment. A total of 14 participated in the deliberations. These are:

**Erwin Breihan, Stanley Dolecki, Lee Fox, Kitty Hoblitzelle,
Guy Jester, Donald McKay, Leanna Mullins, Mort Mullins,
Richard Niemann, Donna Smith, Paige Vemer, and Ed Wisely.**

Those members especially active were: Dolecki, Fox, Hoblitzelle, McKay, L. Mullins, M. Mullins, Niemann, Smith, and Wisely. Serving as Chair for the study was James Brasfield. Gary Koenig served as Vice Chair.

The Task Force was assisted by Lauren Markow and Dan Meyer of the Confluence staff. In addition, Greg Jones, a student at Southern Illinois University-Edwardsville, assisted with the research.

Task Force Activity

The Task Force met from January 26, 1984 to November 1, 1984. All twenty-one meetings were open to the public. Detailed minutes of the meetings were recorded and distributed to members of the Task Force and members of the Issue Selection Committee. Additional minutes were distributed to resource people and to individuals who were identified as playing a future role in the implementation of the committee's recommendations.

The following is a list of resource persons who volunteered their time and expertise. The Task Force gratefully acknowledges their assistance in this study.

Speakers and Resources

Arthur Beckman, Vice President--Katy Seghers, Inc. (Waste to Energy)
Carol Blohm, St. Louis Metropolitan Sanitation Haulers Association
James Boyland, SCA Services (Landfills)
Frank Bernhart, Carbonization, Inc. (Pyrolysis)
Al Dieckgraefe, Director of Public Works--University City
Mike Duvall, Missouri DNR
Tom Dunne, President--Fred Weber, Inc. (Landfills)
Joe Eigner, President--Missouri Waste Coalition
Leon Golfin, St. Louis County Department of Community Health and Medical Care
Roger Grow, Chief of Comprehensive Planning--St. Louis County
Jim Holton, President--Real Earth of Missouri, Inc. (Composting)
Eva Kirkpatrick, Teacher--Fox C-6 School District (Jefferson County situation)
Lenore Loeb, First Vice President--League of Women Voters of Missouri
Don Maddox, Missouri DNR
Ken Mensing, Division of Land Pollution Control--Illinois EPA
Paul Mydler, Director of Special Projects--Bi-State Development Agency
Bill Powell, Vice President--Fred Weber, Inc (Landfills)
Mike Savone, Waste Operations and Marketing Director--St. Louis University Hospitals
Dr. Bruce Stinchcomb, Geologist--Florissant Valley Community College
Lilly Trimble, Missouri Coalition for the Environment, Kansas City
Nick Yung, Refuse Commissioner--City of St. Louis

