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EPA

Report to Congress on Flow Control and Municipal Solid Waste

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EXECUTIVE SUMMARY

WHAT DID CONGRESS ASK EPA TO DO?

In September 1992, Congress directed the Environmental Protection Agency (EPA) to develop and submit a Report to Congress on flow controls as a means of municipal solid waste (MSW) management. Congress asked EPA to:

- present a comparative review of States with and without flow control authority;
- identify the impact of flow control ordinances on protection of human health and the environment; and
- identify the impact of flow control on the development of State and local waste management capacity and on the achievement of State and local goals for source reduction, reuse and recycling.

WHAT ARE FLOW CONTROLS?

Flow controls are legal authorities used by State and local governments to designate where MSW must be taken for processing, treatment or disposal. This waste management approach requires waste to be delivered to specific facilities such as waste-to-energy (WTE) facilities, materials recovery facilities (MRFs), composting facilities, transfer stations and/or landfills. The facilities can be either publicly or privately owned. One of the direct effects of flow control is that designated facilities are assured of receiving a guaranteed amount of MSW and/or recyclable materials. If the designated facilities charge a "tipping fee" for receipt of the MSW/recyclables, flow control assures a source of revenue to meet their capital and operating costs.

WHAT FACTORS ENCOURAGE USE OF FLOW CONTROLS?

Use of flow controls took hold in the late 1970s. State and local governments began using flow controls primarily to support the development of new MSW capacity, particularly if it required large capital investment (e.g., financing of WTE facilities). Flow controls assisted State and local governments in financing these facilities by ensuring long-term receipt of enough waste to generate sufficient revenues to pay facility debt service and other costs.

Also influencing use of flow controls were State goals and mandates for increased recycling or diversion of specific wastes (e.g., yard trimmings) from landfills. Flow control was one mechanism used by local governments to generate needed revenues to pay for programs and to direct waste to recycling/composting facilities. This enabled them to respond to State recycling goals and mandates.

As local governments expanded waste management services, flow controls were utilized as a mechanism to ensure funding for various components of their solid waste management systems such as source reduction programs, household hazardous waste collection, and public education. These services typically do not lend themselves to collection of revenues as do facility-based components (e.g., tipping fees at transfer stations, WTE facilities and landfills). The most frequent rationale for adopting flow control is to assure the financial viability of waste management facilities by providing a reliable, long-term supply of waste. This assurance can be instrumental in securing capital to finance the construction of a facility.

Flow control also may facilitate solid waste planning and management. State and local governments can plan for the appropriate type, number, and size of facilities to handle the long-term generation of waste within a specific area.

HOW DID EPA APPROACH THE CONGRESSIONAL REQUEST?

In an effort to analyze the issues posed by Congress, EPA

- held public meetings to obtain information from interested stakeholders;
- examined States' solid waste management laws to compare flow control authorities across the United States; and
- performed a market analysis of the four primary MSW management segments (i.e., composting, recycling, combustion and landfills) to assess the role of flow control in ensuring MSW management capacity and in attaining goals for source reduction, reuse and recycling.

The approach provided EPA with a *national* view of the need for flow controls. The Agency recognizes that local circumstances may differ substantially from the national perspective. Each State and local government needs to consider local conditions and alternatives when determining the need

for flow control. If a State or local government has relied on flow control to achieve certain ends, sudden elimination of flow control may disrupt ongoing solid waste practices.

WHAT ARE THE FINDINGS?

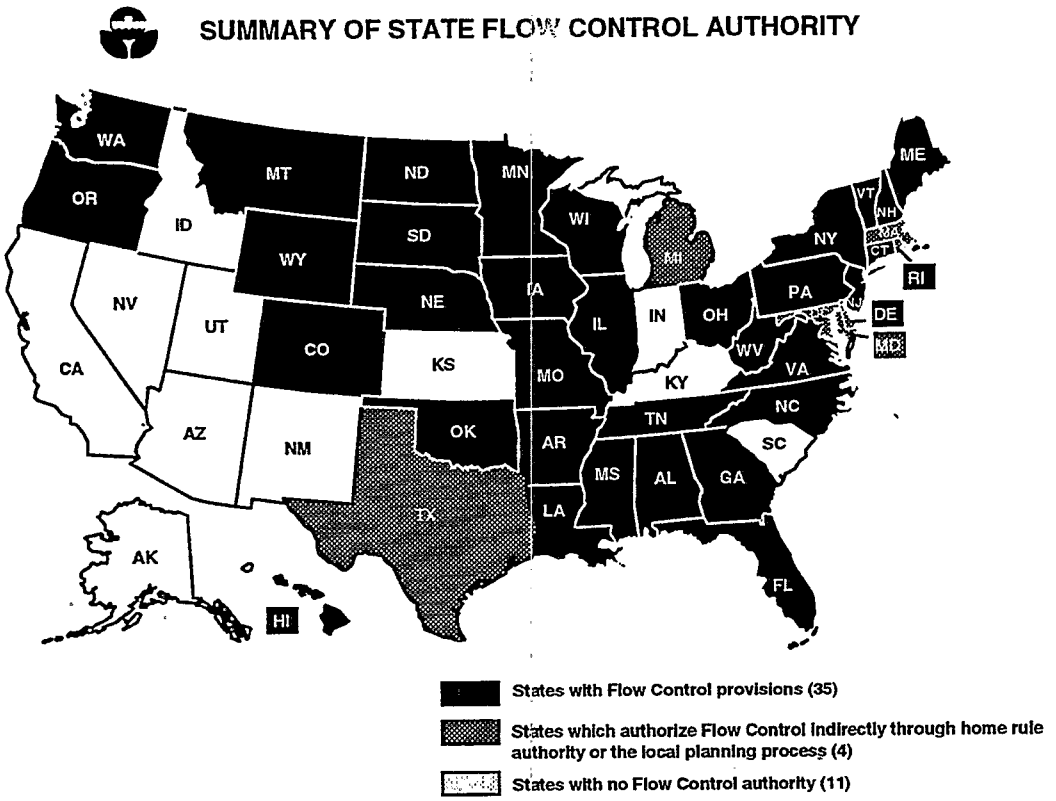
Congressional Question:	***Present a comparative review of States with and without flow control authority.***
Finding:	***Thirty-five States, the District of Columbia, and the Virgin Islands authorize flow control directly; four additional States authorize flow control indirectly through mechanisms such as local solid waste management plans and home rule authority; eleven States have no flow control authority.***

Discussion: No primary source of information was available which identified States with and without flow control authority or those local governments implementing flow control within the States. Developing a complete picture of the nationwide scope of flow control laws would be an extremely complex task due to the differences among State laws, the dynamics of the solid waste industry, and the variability of infrastructures among local governments across the nation. EPA determined that a comparative review of State flow control authorities could be presented by (1) reviewing State statutes and regulations, and (2) developing case studies to illustrate how local MSW programs are implemented with and without flow controls.

As shown in Exhibit ES-1, 35 States, the District of Columbia, and the Virgin Islands explicitly authorize flow control. However, not all jurisdictions exercise this authority. For example, Illinois has authority to implement flow control, but there is no evidence that local governments within the State currently use it. Also, a number of States impose administrative requirements which must be met before local governments can implement flow control, such as demonstrating a need for flow control, holding public hearings, and/or first attempting to negotiate contracts with the private sector. Of the 35 States which authorize flow control, 23 (and the District of Columbia) limit some or all recyclable materials from coverage under flow control.

Four States authorize flow control indirectly through mechanisms such as home rule (MA, MD) or the State/local solid waste management planning process (MI, TX). In a home rule State, municipalities may exercise power over local issues to the extent not prohibited or regulated by the State. Using home rule authority, municipalities may establish flow controls over their solid waste. In

EXHIBIT ES-1



Michigan and Texas, municipal solid waste planning documents determine capacity needs and can authorize flow control as part of the plans' requirements.

Eleven States (AK, AZ, CA, ID, IN, KY, KS, NV, NM, SC, UT) have no flow control authority.

Congressional Question: ***Identify the impact of flow control ordinances on protection of human health and the environment.***

Finding: ***Protection of human health and the environment is directly related to the implementation and enforcement of federal, State, and local environmental regulations. Regardless of whether State or local governments administer flow control programs, States are required to implement and enforce federally approved regulations that fully protect human health and the environment. Accordingly, there are no empirical data showing that flow control provides more or less protection.***

Discussion: In the United States, approximately 80 percent of MSW is managed in landfills and combustors. Landfills and municipal waste combustors are controlled by State and federal regulations which are implemented through facility permitting and compliance assurance programs. These programs are designed for the express purpose of protecting human health and the environment and require the same level of control whether or not the waste is subject to flow controls.

In recent years, States have begun regulating composting and recycling facilities to protect human health and the environment, without regard to whether the materials are subject to flow controls. Further, our market analysis shows that only a small percentage of recovered materials managed by the composting and recycling segments is affected by flow control ordinances. Also, many States that authorize flow control explicitly exclude certain recyclables from flow control restrictions.

Congressional Question: ***Identify the impact of flow control on the development of State and local waste management capacity and on the achievement of State and local goals for source reduction, reuse, and recycling.***

Finding: ***Flow controls play a limited role in the solid waste market as a whole. Flow controls are not typically utilized by landfills or composting facilities. Less than 3 percent of the recycling market is subject to flow controls; however, approximately 19 percent of the materials handled by existing MRF-based recycling programs are supported by flow controls. Flow controls play the largest role in the waste-to-energy market where at least 58 percent of the throughput is supported by flow controls.***

Although flow controls have provided an administratively efficient mechanism for local governments to plan for and fund their solid waste management systems, there are alternatives. Implementation of these alternatives by communities currently relying on flow controls could be disruptive and take time.

Accordingly, there are no data showing that flow controls are essential either for the development of new solid waste capacity or for the long term achievement of State and local goals for source reduction, reuse and recycling.

Discussion: EPA conducted a market analysis to determine whether market intervention in the form of flow controls is needed to ensure adequate capacity or to achieve State and local recycling goals. Our analysis addressed discrete market segments (i.e., composting, recycling, combustion, and landfills) that both work together and compete to perform the complete job of solid waste management

in communities. The analysis uses a number of indicators to assess market conditions and the prevalence of flow controls for these segments. The indicators include growth trends, ownership patterns, cost competitiveness, and capital requirements. These indicators are rough measures that enable an assessment of the role of flow controls in ensuring MSW management capacity and in attaining State and local goals. However, they cannot capture the realities of every specific MSW market. Due to data limitations, the report does not analyze price-cost relationships in jurisdictions with and without flow control. Appendix I-A presents a summary of public comments, some of which discuss the economic impacts of flow control.

Following is a summary of the analysis of each of the four market segments, as well as a discussion of integrated solid waste management (ISWM) systems.

COMPOSTING

The two subsegments reviewed included yard trimmings composting and mixed-waste composting. Yard trimmings composting accounts for 96 percent of this segment. **From a national perspective, flow controls generally have not been an important factor in the compost segment. However, in some communities, higher tipping fees at flow control facilities have provided a funding mechanism to subsidize compost facilities.**

Market Growth

The composting market segment grew from 0.5 million tons of recovered material in 1988 to over 9.2 million tons in 1992. In addition, the number of yard trimmings composting facilities increased by 361 percent between 1989 and 1993, going from 651 to 3,000 facilities. Enactment by 27 States (and the District of Columbia) of bans on landfilling of yard trimmings has fostered the rapid expansion of the composting market segment.

The trend is for continued growth in the number of yard trimmings composting facilities; such growth in the mixed waste composting sector is not as likely. Based on the following factors, the composting market segment should be capable of ensuring additional capacity independent of flow control:

- recent growth;
- an expanding number of States with bans on landfilling of yard trimmings;
- an ample supply of compostable materials and expanding end-markets especially in the agricultural sector; and
- the increasing number of governmental agencies which are establishing procurement policies that favor the purchase of compost for public spaces and parks.

Impact of Flow Controls

Although flow controls are used to guarantee waste for some of the 21 mixed waste composting facilities, EPA found no evidence that they are used widely to guarantee waste flows for yard trimmings composting facilities. However, local jurisdictions will sometimes subsidize composting facilities with part of the revenue received from the higher tipping fees at flow control facilities.

RECYCLING

The recycling market subsegments reviewed included materials recovery facilities (MRFs) and other recycling operations (i.e., independent recovered paper and paperboard dealers, industry-sponsored buy-back programs and drop-off centers, and mixed waste processing facilities). **For the recycling segment, flow control has been an important factor for MRFs, particularly MRFs that require substantial capital investments. Thirty-two (32) percent of waste handled by "high technology" MRFs is supported by flow controls. An additional 50 percent of high technology MRFs have waste guaranteed through contractual arrangements, some of which may be supported by flow control.**

Market Growth

Between 1985 and 1992, there was a 150 percent increase in the recycling market going from 16 million tons of recycled materials in 1985 to over 40 million tons in 1992. The growth in the recycling market is demonstrated by the following factors:

- Curbside collection programs grew from 1,000 programs in 1988 to over 6,600 programs in 1993 (568 percent increase);
- Recycling or waste reduction goals have been established in 43 States and the District of Columbia; some of these States also have banned the landfilling of recoverable items such as batteries and tires;
- The number of MRFs increased from 13 facilities in 1985 to 198 in 1992, with a 100 percent increase between 1990 and 1992.

A continuing expansion of end-market facilities that use recycled materials (e.g., paper mill de-inking facilities) indicates that the recycling segment will continue to account for an increasing share of the MSW management market.

Impact of Flow Controls

EPA estimates that only 2.7 percent of the 40 million tons of recyclable materials is subject to flow controls. The analysis indicates that flow controls are not used for paper packers and buy-back/drop-off programs, which represent 85 percent of the recycling market. Conversely, flow controls do play a role in the MRF segment of the recycling market. In 1992, 13 percent of MRFs (26 facilities), with 19 percent (1.1 million tons) of the throughput, received waste guaranteed by flow control. In addition to MRFs supported by flow control, a significant amount of MRF throughput is guaranteed by contractual arrangement: 41 percent of MRF (82 facilities), with 44 percent (2.5 million tons) of total throughput. Local government may use flow control to ensure that enough waste is delivered to meet the terms of the contract.

Flow controls have been more important for high-technology MRFs than for low-technology MRFs. Flow controls direct 32 percent of the throughput at high technology MRFs (17 facilities), compared to only seven percent of throughput in low-technology MRFs (9 facilities). Another 24 MRFs were planned to be operational after 1992; these will be predominately (i.e., 17 out of 24) high-technology MRFs. Six of the high tech MRFs, with 18 percent of the throughput, are expected to be supported by flow controls. For the seven low-technology MRFs that are planned to be operational after 1992, only one is expected to be supported by flow controls. The difference in use of flow controls by high-technology and low-technology MRFs reflects the greater capital costs of the former ($4.8 million on average) compared to the latter ($1.9 million on average).

Flow control support of MRFs is largely regional. Of the 26 MRFs supported by flow control, 20 are located in the Northeast. The throughput of these MRFs (928,000 tons/year) represents 86 percent of the total MRF throughput nationwide that is supported by flow controls.

COMBUSTION

MSW is burned in (1) waste-to-energy (WTE) facilities that recover heat from the combustion of waste to produce either steam or electricity, and (2) incinerators that combust waste without energy recovery. Of the 32 million tons of MSW that were combusted in 1992, WTE facilities accounted for 31 million tons, and incinerators accounted for 1 million tons. **Flow controls have played a significant role in the waste-to-energy market segment, with at least 58 percent of the waste throughput supported by flow control.**

Market Growth

There was a ten-fold increase in the number of WTE facilities operating between 1980 and 1990. However, only a modest gain in the amount of waste managed by the WTE sector is expected in the future for the following reasons:

- significant slow down in the planning and construction of new WTE facilities in recent years;
- higher capital requirements due to the cost of land and pollution control measures;
- increased emphasis on recycling and waste reduction strategies;
- public opposition; and
- State moratoria.

Impact of Flow Controls

Flow controls have played a significant role in the WTE market segment. Of the 145 existing WTE facilities, 61 have waste guaranteed by flow control ordinances, representing 58 percent of total WTE throughput. One reason for this high percentage is the substantial capital investment required to construct WTE facilities, which typically are financed over long time periods. WTE facility owners

and operators need to ensure adequate, long-term supplies of waste and operate at sufficient levels of capacity in order to generate revenues to meet debt payments.

An additional 40 facilities receive waste guaranteed by contracts, representing 31 percent of the total WTE throughput. The contractual arrangements may, but need not, be supported by some form of municipal control over waste disposition: the municipality may collect the waste itself, use contracts or franchises to control the ultimate destination of waste collected, and/or enact a flow control ordinance. For example, a local government may use a flow control ordinance to ensure that enough waste is delivered to meet the terms of its contract with the facility. As a result, some of the facilities with contracts also may be backed by local governments' use of flow controls. However, data are not available currently to assess how often this situation occurs.

LANDFILLS

Historically, landfills have received the majority of solid waste generated in the United States. Landfills will continue to be important elements of ISWM systems. **The Agency could find no evidence that flow controls have played a significant role in financing new landfills or landfill expansions.**

Market Growth

The number of MSW landfills has declined rapidly since 1988, but this does not appear to have significantly affected total landfill capacity. Very small landfills appear to account for most landfill closings, and large, regional landfill openings and expansions have offset this lost capacity.

Anticipated growth in the composting and recycling segments, combined with source reduction efforts, likely will result in a continuing decline in the amount of waste received at MSW landfills in the future.

Impact of Flow Controls

Flow controls do not appear to have played a significant role in financing new landfills or landfill expansions. Private landfill firms have demonstrated their ability to raise substantial capital from publicly-issued equity offerings, indicating that investors are willing to provide capital for the

expansion of landfills without flow control guarantees, in response to a perceived market demand for this segment.

INTEGRATED SOLID WASTE MANAGEMENT

State and local government officials indicated at the flow controls meetings that revenues generated by flow controls are used by some local governments to support various elements of integrated solid waste management (ISWM) systems. In addition to the facilities discussed above, flow controls are used to support waste collection services such as curbside collection for recycling. Flow controls also are used to support solid waste services and practices that generally do not lend themselves to generation of their own revenues (e.g., household hazardous waste collection, source reduction programs, solid waste planning, public awareness programs, and, in limited instances, corrective action for past practices).

Where this is done, the costs of the various facility and service elements of the system are built into the tipping fee of the WTE or other facilities to which wastes are directed through flow controls. These tipping fees often are higher than the market level. Flow controls ensure that the waste goes to these facilities, rather than to facilities with lower tipping fees. The additional revenues generated by the flow control-derived tipping fees are used to fund other elements of the waste management system such as those noted above.

IN-STATE CAPACITY

Flow control is one mechanism that State and local governments can use to foster development of in-State capacity to manage municipal solid waste. Flow controls can foster local capacity by making it easier to adequately size and finance waste management facilities. Controlling the disposition of locally-generated MSW allows planners to determine more accurately how much waste must be managed. Similarly, control of the waste ensures that waste management facilities will be fully utilized, which should result in cost-efficient operations.

This Report does not assess the relative importance of flow controls, compared to other available mechanisms, for achieving in-State capacity goals. Nor was this Report designed to determine how many State and local governments consider in-State capacity to be an important goal or how much additional waste management costs (if any) would be incurred in pursuit of such a goal.

ARE ALTERNATIVES AVAILABLE OTHER THAN FLOW CONTROL?

Approaches other than flow control which are used to produce revenues for constructing and operating solid waste management facilities can be categorized as organizational and financial alternatives.

Organizational Alternatives

By using various organizational arrangements, municipalities can direct waste to specific facilities, similar to what is accomplished through flow control. One approach is for a local government to own and operate its waste collection system, delivering the waste to the facility of its choice. Another approach is for the local government to employ the private sector, through contract or franchise arrangements, for collection services. Contract or franchise agreements can incorporate specific requirements such as the frequency of collection, inclusion of recyclables, and designation of facilities to which the collected waste is to be delivered.

Special purpose districts or utilities also can be established to manage municipal solid waste. The special district or utility then would be able to provide services directly or use a contract or franchise arrangement with the private sector for services.

Financial Alternatives

Whichever organizational alternative is chosen, the question of how to pay for the system also must be addressed. The local jurisdiction can use property taxes or other general taxes as a source of funds. User fees (either uniform or variable to reflect the amount of waste thrown away) specifically designated for MSW services can be levied on the generator by the jurisdiction or the private sector provider. Finally, market-based tip fees can be charged which take into account the facility's cost and the prices charged at competing facilities.

Taxes and user fees imposed on generators provide a reliable source of revenue. Taxes may be politically unpopular, but they are relatively easy to administer and serve as the basis for issuing general obligation bonds. User fees may be seen as equitable, especially if they vary with the amount of waste thrown away, but they involve relatively greater administrative effort. Even when administered by private service providers, user fees can provide local governments with necessary

assurance of financial support when combined with long-term contracts to deliver waste to a given solid waste management facility.

Some MSW activities, such as planning and household hazardous waste collection programs, do not readily lend themselves to user charges. For example, the purpose of household hazardous waste collection programs would be defeated if user fees discouraged participation. Funding to correct environmental problems that exist at a waste management facility also may be needed. Market-based tip fees may not be able to include amounts to account for the extra costs associated with other service elements of ISWM and remain competitive. As alternatives, taxes and user fees imposed on generators are possible sources of funding for these activities.

CHAPTER I
INTRODUCTION

In September 1992, Congress directed the United States Environmental Protection Agency (EPA) to submit a Report to Congress on flow control as a means of municipal solid waste (MSW) management. The Report is to review States with and without flow control authority and describe the impact of flow control on:

- protection of human health and the environment; and
- development of State and local waste management capacity and the achievement of State and local goals for source reduction, reuse, and recycling.

Flow controls, as defined in this Report, are legal provisions that allow State and local governments to designate where MSW must be taken for processing, treatment, or disposal. Due to flow controls, designated management facilities have a local monopoly on MSW and/or recyclable materials.

Flow controls have become a heavily debated issue among State and local governments, the waste management industry, recyclers, and environmental groups. Financial institutions have been a part of the discussion because of the relationship between flow controls and financing of waste management facilities. These interested parties hold differing views on the environmental, planning, and economic benefits of flow controls. (Appendix I-A summarizes the positions of interested parties.) During the 1990s, several court decisions ruled against the use of flow controls. Notably, in May 1994, the United States Supreme Court in *C &.A Carbone, Inc. v. Town of Clarkstown*[1] decided that the use of flow control can discriminate against interstate commerce and, therefore, can violate the commerce clause of the United States Constitution. (Appendix I-B summarizes the relevant litigation.) Legislation was introduced during the 103rd Congress to clarify the legal status of flow controls. A consensus bill was passed by the House of Representatives late in the session; the Senate did not act and the legislation died with this Congress. Similar legislation has been introduced in the 104th Congress.

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[1] 114 S.Ct. 1677, 128 L.Ed.2d 399 (1994).

A. RCRA AND FLOW CONTROLS

The Resource Conservation and Recovery Act (RCRA), as amended, is the primary federal statute governing solid waste management.[2] The principal objectives of RCRA are far-reaching and complementary:

- promote the protection of human health and the environment from potential adverse effects of improper solid waste management;
- conserve material and energy resources through source reduction and recycling;
- assist in the development of solid waste management plans;
- improve solid waste management practices; and
- promote the demonstration, construction, and application of solid waste management, resource recovery, and resource conservation systems which preserve and enhance the quality of air, water, and land resources.[3]

RCRA does not directly address the role of flow controls in accomplishing these objectives.

RCRA identifies State and local governments as the historic and appropriate leads for managing solid waste. The federal government's role primarily is to facilitate implementation of State and local solid waste management by developing national standards, providing technical assistance, and promoting a national research and development program. Subtitle D of RCRA directs States to prepare comprehensive solid waste management plans. Subtitle D places great emphasis on State, regional, and local planning and contains numerous provisions concerning the scope and content of State plans. Among the RCRA criteria for approval of State solid waste plans are the following minimum requirements:

- provision that no State or local government shall be prohibited from entering into long-term contracts for the supply of solid waste to resource recovery facilities or from entering into long-term contracts for the operation of such facilities; and

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[2] 42 U.S.C. §§ 6901 to 6992K.

[3] 42 U.S.C. § 6902(a).

- provision for recycling and for the disposal of solid waste in a manner that is environmentally sound.[4]

State plans must provide for adequate recycling and disposal capacity and must address facility planning and development. RCRA is silent on the place of flow controls in State solid waste management plans.

Congress recognized in RCRA the importance of regional solutions and directed States to ". . . identif[y] the boundaries of each area . . . which, as a result of urban concentrations, geographic conditions, markets, and other factors, is appropriate for carrying out regional solid waste management."[5] Congress further contemplated that the identification of regions with common solid waste management problems could encompass two or more States.[6]

Congress directed EPA to prepare guidelines to assist States in the development and implementation of solid waste management plans. EPA's *Guidelines for Development and Implementation of State Solid Waste Management Plans* contain recommendations for complying with RCRA requirements.[7] One recommendation is to assess "current and projected movement of solid and hazardous waste across State and local boundaries."[8] The recommendations further specify that "[t]he State plan should provide for substate [local government or regional solid waste management district] cooperation and policies for free and unrestricted movement of solid and hazardous waste across State and local boundaries."[9]

B. FACTORS ENCOURAGING THE USE OF FLOW CONTROLS

Use of flow controls took hold in the late 1970s. State and local governments began using flow controls to support the development of new waste management facilities, particularly those

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[4] 42 U.S.C. § 6943(a) (4), (5), and (6).

[5] 42 U.S.C. § 6946(a).

[6] 42 U.S.C. § 6946(c).

[7] 40 CFR § 256.41.

[8] 40 CFR § 256.41(a)(3).

[9] 40 CFR § 256.42(h).

requiring relatively large capital investments such as waste-to-energy (WTE) facilities and high-technology materials recovery facilities (MRFs). Flow controls were one mechanism State and local governments could use to help finance these costly facilities. To construct these facilities, local governments often issued revenue bonds, which were to be repaid out of the revenues (tipping fees) the facilities generated. Flow controls ensured receipt of enough waste or recyclable materials to generate sufficient revenue to pay facility debt service and other fixed costs.

Also influencing use of flow controls were State goals and mandates for increased recycling or diversion of specific wastes (e.g., yard trimmings) from landfills. Flow control was one mechanism used by local governments to generate needed revenues and to direct waste in responding to these goals and mandates.

Some State and local government officials indicated during the public meetings that, as State laws spurred local governments to expand waste management services, flow control was a useful mechanism to raise funds for local integrated solid waste management (ISWM) systems including programs such as source reduction, curbside recycling, household hazardous waste collection, education and outreach, and, in limited instances, Superfund cleanups. These services typically do not lend themselves to collection of revenues as do other components (e.g., tipping fees from landfills) of ISWM systems. Flow controls have been used to support these other waste management programs through the revenues generated by tipping fees, which can be set at rates higher than prevailing market prices.

In some cases, flow control may facilitate local government planning. Local governments may find flow control to be an expeditious tool to plan for solid waste capacity necessary to manage an area's solid waste.

The most common reason for adopting flow control is to assure the financial viability of waste management facilities by providing a reliable, long-term supply of waste. This assurance can be instrumental in securing capital to finance the construction of a facility.

C. INTERESTED PARTIES' POSITIONS ON KEY FLOW CONTROL ISSUES

EPA held three public meetings[10] during August and September 1993 to provide interested parties with opportunities to present information and their views on flow controls.[11] In addition to asking for comments on the three flow control issues raised by Congress (i.e., impact of flow controls on human health and environment, waste management capacity, and source reduction and recycling), the Agency asked for input on the following issues:

- What materials are/should be covered by flow control laws?
- How can local governments implement integrated solid waste management plans without flow controls?
- What alternatives to flow controls exist that achieve the same public policy goals?

Over 100 people commented during the public meetings. In total, 179 commenters submitted written materials to the RCRA docket. The commenters included representatives from State and local governments (74), the waste management industry (60), the recycling industry (29), financial institutions (2), and environmental groups and individuals (14). See Appendix I-A for a synopsis of the public comments. The information provided was anecdotal; comments offered no empirical data on the key issues the Agency was to address on flow control.

D. ORGANIZATION OF REPORT

The remainder of this Report to Congress is organized as follows:

- **Chapter II** provides a comparative review of State flow control authorities across all 50 States, the District of Columbia, and the Virgin Islands, including the materials covered by existing flow controls. Chapter II also

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[10] EPA held public meetings in Arlington, Virginia; San Francisco, California; and Chicago, Illinois.

[11] Comments from the public hearings distinguished legal flow controls from "economic" flow controls. Economic flow controls occur when a State or local government subsidizes a designated solid waste management facility. The subsidy reduces the tipping fee (i.e., service charge) to a level competitive with other management options in the area, thereby ensuring a steady supply of waste. Similar to legal flow controls, economic flow controls result in the delivery of waste and/or materials to specific waste management facilities.

discusses EPA's finding on the human health and environmental need for flow controls in light of existing federal and State laws.

- **Chapter III** analyzes composting, recycling, waste-to-energy, and land disposal markets to assess the impact of flow controls on ensuring adequate waste management capacity and promoting State and local goals for source reduction, reuse, and recycling. Chapter III also summarizes organizational and financial alternatives for supporting integrated waste management programs, including financing the capital costs of facilities and funding the operating expenses of MSW programs.

- **Appendix I** includes a summary of public comments received by EPA on flow controls, analyzes the litigation over flow controls, and provides synopses of key legal decisions on flow controls.

- **Appendix II** summarizes State flow control authorities, recycling goals, and planning responsibilities for all 50 States, the District of Columbia, and the Virgin Islands. The Appendix also presents 4 case studies that examine solid waste management in municipalities where flow controls are or are not used.

- **Appendix III** consists of supporting technical analyses for the market analysis component (Chapter III) of this Report.

CHAPTER II

STATE FLOW CONTROL AUTHORITIES AND IMPACT ON HUMAN HEALTH AND THE ENVIRONMENT

As directed by Congress, EPA conducted a review of States with and without flow control authority and investigated the impact of flow control ordinances on protection of human health and the environment. This chapter discusses the methodology and summarizes the findings for both the State review and impact on human health and the environment. Appendix II-B describes four case studies of how local governments implement MSW programs with and without flow controls.

A. METHODOLOGY

EPA initially considered administering a survey of all the States to obtain comprehensive information. However, EPA concluded that a comparative State review of flow control authorities could be conducted through performing the following two tasks: (1) reviewing published State statutes and regulations; and, (2) developing case studies to provide examples of how local governments implement MSW programs with and without flow controls.

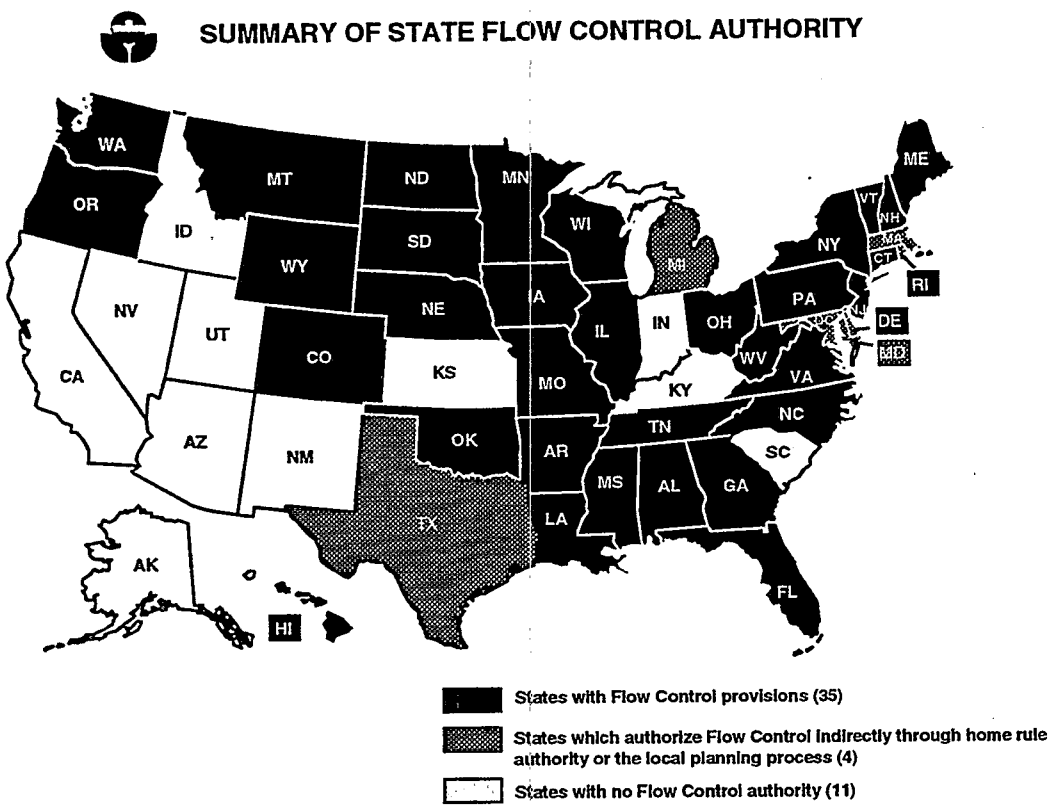
After collecting the relevant data from published State environmental statutes and regulations, EPA developed a summary matrix on flow controls and solid waste management planning. Federal, State, and local government officials familiar with the flow control issue verified the accuracy of the matrix.

B. STATE AUTHORITIES

Finding: ***Thirty-five States, the District of Columbia, and the Virgin Islands authorize flow control directly; four additional States authorize flow control indirectly through mechanisms such as local solid waste management plans or home rule authority; eleven States have no flow control authority.***

EPA researched published State environmental laws and developed a State-by-State summary of statutory and regulatory authorities to manage municipal solid waste (see Appendix II-A). EPA found that State flow control laws vary in the degree of authority and discretion given to local governments to manage and control the flow of MSW within their political jurisdictions. Based on the review, EPA classified States into three categories as follows: (1) States that explicitly authorize the use of flow controls, (2) States that authorize flow controls indirectly through granting municipalities powers such as home rule,[1] and (3) States that do not authorize flow controls. Exhibit II-1 presents a map of the States showing their flow control authorities, if any.

EXHIBIT II-1



Based on review of this data, key findings concerning flow controls and municipal solid waste management include the following:

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[1] Municipalities that have home rule authority may exercise power over local issues to the extent not prohibited or regulated by the State. Using home rule authority, municipalities may establish flow controls over their solid waste.

- **Thirty five (35) States, the District of Columbia, and the Virgin Islands explicitly authorize the use of flow controls.** These States and territories specifically allow local governments to use flow controls, to designate facilities where waste must be managed, and to require mandatory participation in municipal solid waste management services. Exhibit II-2 lists these States. Although they have the authority to use flow control, some States and territories (e.g., Illinois, South Dakota, and the District of Columbia) do not use it in practice.

Exhibit II-2

STATES WITH FLOW CONTROL AUTHORITIES

- Alabama
- Arkansas
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Hawaii
- Illinois
- Iowa
- Louisiana
- Maine
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- New Hampshire
- New Jersey
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Dakota
- Tennessee
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming
- District of Columbia
- Virgin Islands

- **Four other States authorize flow controls indirectly through mechanisms such as home rule authority or the local solid waste management planning process.** These mechanisms allow local governments to adopt flow control ordinances. These States can be grouped as follows:

  -- **Maryland and Massachusetts are home rule States.** In a home rule State, municipalities have autonomy over local issues and may exercise this power in areas not prohibited by the State. For example, although Maryland does not have a State statute authorizing the use of flow controls, Prince George's County, under home rule authority, established a flow control ordinance to designate where MSW must be managed.

  -- **Michigan and Texas allow local governments to designate where MSW must be managed as part of their local planning authority.** In Michigan, a municipality's MSW planning document determines capacity needs and can authorize flow control as part of the plan's requirements. In Texas, cities and counties may impose flow controls as part of local MSW management planning.

- **Eleven States have no flow control provisions.** Indiana is a special case: By State law, Indianapolis, Indiana has flow control authority. In the rest of Indiana, a solid waste management district is not authorized to use flow controls unless a local government within the district already used flow controls at the time the district was formed; this exception allows

STATES WITH NO FLOW CONTROL AUTHORITY

- Alaska
- Arizona
- California
- Idaho
- Indiana
- Kansas
- Kentucky
- Nevada
- New Mexico
- South Carolina
- Utah

some districts to renew any flow control contracts, although the use of flow controls generally is restricted.

- **Scope of materials covered by flow controls varies among the 35 States that explicitly authorize flow controls.** Twelve (12) States (and the Virgin Islands) authorize flow controls without restrictions on what types of materials may be controlled.[2] These States allow flow control ordinances to direct solid waste and recyclable materials to designated management facilities. Illinois authorizes local governments to decide what materials can be subject to flow controls.[3] New York explicitly states that flow controls may cover even source separated recyclable materials.[4].

  The remaining 23 States (and the District of Columbia) that allow flow controls, limit the recyclable materials or MSW that may be controlled.[5] For example, Mississippi, North Carolina, and New Jersey do not authorize flow controls for source separated recyclable materials. Other States (e.g., Louisiana, Ohio, and Rhode Island) allow flow controls only for source separated materials that have been discarded, abandoned, disposed, or left at the curb. Two States, Maine and Missouri, exclude only specifically designated recyclable materials from flow controls, while 2 others, Connecticut and Delaware, allow flow controls for only designated recyclable materials. Florida and Washington exclude commercial source separated recyclables from their flow control regulations. In addition, Vermont authorizes the control of recyclables only when flow controls do not adversely affect existing recycling centers.

- **Local governments in some States must address administrative hurdles prior to implementing flow controls.** Mississippi and Tennessee require a solid waste management authority to demonstrate the necessity of mandatory flow controls (e.g., after considering the use of existing facilities and examining other alternatives, a jurisdiction must demonstrate that flow controls are essential). In Colorado, a county or municipality must hold a public hearing prior to establishing flow controls. Wisconsin requires a municipality to attempt to develop a contractual agreement with persons who would be subject to a flow control ordinance. Minnesota requires a municipality or

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[2] The States include: Alabama, Arkansas, Colorado, Iowa, Louisiana, Nebraska, New Hampshire, New York, North Dakota, Oregon, West Virginia, and Wyoming. In these States and the Virgin Islands, flow controls can cover all MSW. See the matrix in Appendix II-A for details.

[3] Currently, no local government has implemented flow control in Illinois.

[4] Source separated materials are defined as specific materials that are segregated at the point of generation for separate collection. For example, individual households may separate certain recyclable materials, such as newspapers, from MSW prior to placing the materials at the curb for pick-up.

[5] The 23 States are: Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Maine, Minnesota, Mississippi, Missouri, Montana, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Tennessee, Vermont, Virginia, Washington, and Wisconsin.

district, prior to establishing flow controls, to comply with both of the administrative requirements described above and also to demonstrate the need for flow controls. New York requires counties or public authorities to seek State legislative authorization for individual flow control ordinances.

- **In the majority of States, local governments or solid waste management districts have responsibility for MSW planning.** Most States require municipalities or solid waste management districts to develop MSW management plans. A few States (e.g., Arizona and Georgia) require coordination with local governments in developing State plans. In the District of Columbia and the Virgin Islands, the Mayor and the Virgin Islands Department of Public Works, respectively, must develop solid waste management plans. Alaska places some responsibility for MSW planning on individuals who own or manage facilities open to the public (e.g., restaurants, shopping centers, campgrounds).

- **Forty-three (43) States and the District of Columbia have established recycling or waste reduction goals.**[6] These goals range from Maryland's 20 percent recycling goal (for counties over 100,000) to Rhode Island's 70 percent recycling goal.[7] State and local government representatives claim that flow controls provide a means to help achieve State recycling goals. (See Appendix I-A, Municipal Solid Waste Flow Control: Summary of Public Comments.)

C. HUMAN HEALTH AND THE ENVIRONMENT

Finding: ***Protection of human health and the environment is directly related to the implementation and enforcement of federal, State, and local environmental regulations. Regardless of whether State or local governments administer flow control programs, States are required to implement and enforce federally approved regulations that fully protect human health and the environment. Accordingly, there are no empirical data showing that flow control provides more or less protection.***

Discussion: The landfill and combustion segments represent approximately 80 percent of the MSW managed in the United States. These two segments are controlled by extensive and stringent

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[6] Robert Steuteville, "The State of Garbage in America: Part II "*Biocycle*, May 1994, pp. 30-36. Of the 43 States, 36 States specifically adopted statutes with recycling and/or source reduction goals. The other 7 States adopted goals through different means, such as executive orders by State governors.

[7] States differ as to what materials count when assessing recycling rates.

State and federal regulations that are implemented through facility permitting and compliance assurance programs. These programs are designed for the express purpose of protecting human health and the environment and require the same level of control whether or not the waste is subject to flow control. Regardless of whether a State or local government requires flow control, each regulated facility is required to adhere to a minimum level of federal regulation that is deemed to be protective of human health and the environment as well as to State regulations that may be more stringent. There is no evidence that flow control either positively or negatively impacts the statutorily assured level of environmental protection, because the underlying regulatory requirements are controlling.

In recent years, States have begun regulating composting and recycling facilities to protect human health and the environment independent of flow controls. Further, the market analysis shows that only a small percentage of MSW managed by the composting and recycling segments is affected by flow control. Also, many States that authorize flow control explicitly exclude certain recyclables from flow control restrictions.

CHAPTER III
MARKET ANALYSIS OF FLOW CONTROLS

INTRODUCTION

The purpose of this Chapter is to present the research and analysis EPA conducted on solid waste management capacity and recycling and their relationship to flow controls. There are many variables and confounding factors that must be taken into account when answering the questions posed by Congress. The Chapter starts with a discussion of why EPA chose a market analysis approach and the methodology EPA applied. This market analysis highlights current market conditions and dynamics in order to assess whether flow controls appear necessary to ensure adequate waste management capacity and to promote recycling efforts. The Chapter also reviews other organizational and financial mechanisms that communities can use to meet these same objectives.

To report to Congress in a systematic and comprehensive way on the impact of flow controls on State and local capacity and recycling/source reduction would require answers to questions such as the following:

> *Are **States** and **local governments** that authorize flow controls more likely to have adequate waste management capacity than **States** and **local governments** that do not authorize flow controls?*
>
> *Are **States** and **local governments** that authorize flow controls more likely to achieve **State** and/or **local goals** for source reduction, reuse, and recycling than **States** and **local governments** that do not authorize flow controls?*

Answering these questions would require substantial data -- much of it not readily available -- and the development of new analytical and performance measurement methodologies. Each question poses distinct analytical challenges. For example, although available data indicate which States authorize flow controls, there is no systematic data on which of over 3,000 counties and 19,000 municipalities actually employ flow controls. Collecting such data would entail a major research effort to determine which communities impose flow controls, whether those flow controls cover mixed waste only or include recyclables, and whether there are exemptions for established recycling programs, construction and demolition debris (C&D) wastes, or other special scenarios. A comparative analysis of communities with and without flow controls also would require data on all involved parties

including waste haulers, waste management facilities, State and local governments, and residential, commercial, institutional, and industrial generators of MSW. The analysis of how flow controls affect waste management capacity would need to consider and adjust for differences in quantities and types of waste generated as well as in the underlying financial resources of States and local governments, which can affect how they arrange for capacity.

Similarly, an empirical analysis of how flow controls impact progress towards goals for source reduction, reuse, and recycling must consider not only (1) State and local waste generation and financial resources, which can strongly affect levels of program activities to encourage source reduction, reuse, and recycling but also (2) how the goals are defined and what targets are chosen. Some States and local governments have set more ambitious goals than others. Achievement of the goals may be more a matter of variables such as demographics, the local economy, and how high the goals are set than a reflection of the use of flow controls.

Another complicating factor is that State and local governments have alternative ways of accomplishing the same results as flow controls can produce. These include the following:

- providing collection services, either directly by local government employees or through contractors, to deliver the wastes and materials to designated facilities;
- awarding collection and hauling franchises that require waste to be taken to designated facilities;
- subsidizing the tipping fees at selected facilities to attract sufficient waste; and
- supporting solid waste programs using funds raised through taxes, issuance of bonds, and/or user fees, such as variable rate charges, imposed on generators.

Thus, flow controls may be unnecessary for jurisdictions that directly perform or contract for waste collection and hauling themselves. The existence and use of alternatives to flow controls that achieve the same goals substantially complicates the analysis, making it more difficult to isolate the effects of flow controls.

Even a case study approach, which would not attempt to answer the above questions for every State and locality, would require a sophisticated sampling methodology for selecting cases (i.e., jurisdictions with flow controls) and controls (i.e., jurisdictions without flow controls) for unbiased analysis, given the potentially confounding factors described above.

Because the findings could differ across States and localities (e.g., flow controls may help some States and local governments, but not others), EPA would need to develop a methodology for weighting the findings across States and local governments and testing the statistical significance of the results.

The data and methodological challenges are accentuated by the rapid pace of change in this area. Not only do the amounts of waste generated change, but so do the technologies, programs, and goals for managing and recycling the waste. State and local governments vary in the types of programs they pursue and the pace of program evolution. This dynamic context and lack of data call for a different type of analysis.

After considering the requirements of a data-intensive "bottom-up" micro-level analysis, EPA evaluated an alternative approach: a "top-down" macro-level analysis of the waste management market. The focus of this type of analysis is to assess whether market forces overall appear capable of providing an adequate and environmentally sound infrastructure for solid waste management or whether market intervention in the form of flow controls is needed to ensure adequate capacity or achieve recycling goals. EPA chose to conduct this type of market analysis.

THE MARKET ANALYSIS

This study recognizes discrete market segments that both work together and compete to perform the complete job of solid waste management in communities. These segments include:

- composting (i.e., yard trimmings composting, mixed waste composting);
- recycling (i.e., materials recovery facilities (MRFs) for commingled recyclables, mixed waste processing facilities (MWPFs) that extract recyclables from mixed waste, paper packers and buy-back/drop-off centers for recyclables);
- combustion (i.e., waste-to-energy (WTE) conversion, incineration without energy recovery); and
- landfills.

The study uses several indicators to assess market conditions and the prevalence of flow controls for these segments:

- growth trends
- ownership patterns
- cost competitiveness, and
- capital requirements

Because these indicators are used throughout this chapter, each one is briefly described in the following paragraphs and related back to the central topics of this Report to Congress.

Growth Trends. Growth in any waste management market serves as an indicator of its viability. Growth suggests that there is an ample supply of waste input and that facilities may not need flow controls to guarantee an adequate waste supply. This indicator works particularly well for composting and recycling markets, both of which have grown significantly, largely without depending on flow control; their growth also reflects State intervention in the form of establishing recycling goals and landfill bans. On the other hand, the growth of the combustion (WTE) market largely reflects the use of flow controls or comparable waste guarantee arrangements to ensure sufficient revenues to cover debt service.

Ownership Patterns. The relative share of public and private ownership of waste management facilities also can serve as an indicator of how well markets are working. Initially, the risks and uncertainties of new waste management methods may discourage private sector participation; as a result, so-called "infant industry" may need special support, such as flow controls. Once a new industry is demonstrated and established, private sector entrepreneurs may view the risk-reward ratio as more attractive. Thus, private sector ownership of waste management facilities can serve as an indicator of market development. This indicator works well for composting, recycling, and landfilling as a measure of the ability of the marketplace to provide adequate capacity and help achieve recycling goals. This indicator does not work as well for WTE facilities; although many are privately owned, a large portion are supported by flow controls or may qualify as public-private partnerships where the public sector guarantees a supply of waste sufficient to meet high utilization rates.

Cost Competitiveness. One way that government can support a desirable industry or facility is through subsidies or other mechanisms (e.g., minority or small business set-asides, protection from competition) that enable it to prosper in the marketplace. Such support may be required for the foreseeable future (e.g., domestic shipbuilding) or only until the industry or facility attains competitiveness. Once the industry becomes cost-competitive, the need for special support may

diminish or vanish. In the waste management sector, cost-competitiveness is a good indicator that further government support may not be needed.

Capital Requirements. Capital-intensive industries have what are called "high barriers to entry." Even if the industry can compete in the marketplace in terms of its operating costs, the private sector may be deterred by the necessity to raise or finance the capital costs needed at the start. Both magnitude and timing of capital requirements, therefore, can serve together as an indicator of the ability of the marketplace to meet MSW needs without special government support. This indicator works very well for most segments of the MSW management market; capital requirements correlate well with use of flow controls. For example, low-technology composting and recycling have the lowest capital requirements and the least need for flow controls; high-technology MRFs have greater up-front capital needs and make greater use of flow controls. WTE has the largest capital requirements and the greatest reliance on flow controls; the larger the facility, the more likely it is supported by flow controls. Landfills can spread much of their capital requirements over time by opening cells on an as-needed basis, thus reducing the need for flow controls.

LIMITS OF THE MARKET ANALYSIS

The above indicators have their limitations. But together the indicators serve to help describe the key segments of the MSW market, their degree of flow control use, and their ability to provide adequate capacity. They are rough measures that cannot capture the realities of every local MSW market but can provide a national overview to enable an assessment of the role of flow controls in ensuring MSW management capacity and in attaining goals for source reduction, reuse, and recycling. The market analysis provides a dynamic assessment of the competitive forces nationwide that affect MSW management capacity and recycling rates over time. The role of flow controls is assessed in the context of these broad market dynamics. Data limitations for the individual market segments are specified in greater detail at the beginning of Sections B, C, D, and E.

Source reduction as a market segment is not considered, because flow controls direct waste flows after waste generation (i.e., after the potential for source reduction). This Report recognizes, however, that source reduction or waste prevention can help alleviate the need for additional disposal capacity in the future, much as the growth of recycling and composting does. Source reduction practices include eliminating and minimizing packaging, efficient use and reuse of products and supplies, and procurement of products and packaging which result in less waste.

METHODOLOGY

EPA conducted its market analysis in three steps:

1. **Characterize the overall demand for MSW management services.** As a first step in the market analysis, EPA characterized waste generation that is relevant to the analysis of flow controls. Waste generation creates the demand for waste management services and defines the relevant market size for the analysis. The market size estimate provides a basis for determining the percentage "market share" attributable to each waste management service segment.

2. **Evaluate the supply of waste management services provided by the waste management industry (both public and private).** After estimating the size of the relevant waste stream, EPA examined the role of four major market segments in managing this waste: composting, recycling, waste-to-energy (WTE), and landfills. EPA's analysis of each major market segment has four components:

   -- Overview of Growth Trends. The analysis of each market segment begins with a description of recent growth trends.

   -- Market Subsegments. This subsection describes the subsegments and their market shares.

   -- Market Segment Competitive Structure. This subsection examines the competitive factors that affect capacity and recycling rates. Key factors that compel or restrain market segment growth include competitive economics (cost comparison with other management options), capital requirements and required scale of operations, the influence of flow controls and other government initiatives (e.g., curbside recycling, yard trimmings landfill bans), and the extent of the public/private infrastructure available to support market segment expansion.

   -- Market Segment Potential. Finally, each market section ends with a discussion of the potential for that segment to provide additional waste management capacity, based on recent trends and the segment's competitive structure. With respect to recycling goals, the analysis of composting and recycling potential also examines the important role of end-markets for compost and recycled materials.

3. **Analyze current waste management market dynamics and recent market developments to evaluate impacts of flow controls.** As a final step, EPA used the findings of the market segment evaluations together with basic economic and financial principles to assess the impact of flow controls and the

need for the use of flow controls to ensure adequate capacity and/or to achieve recycling goals.

OUTLINE OF REMAINDER OF CHAPTER

- **Section A** estimates the size of the waste stream managed at MSW facilities and defines these facilities. Supporting technical analyses and background information appear in Appendix III-A.
- **Sections B, C, D, and E** discuss the role of the composting, recycling, WTE, and landfill market segments, respectively, in managing the waste stream described in Section A. Each section examines the growth of the market segment over recent years, the subsegments that make up each market segment, the competitive structure of the market segment and its subsegments, and the potential growth of the market segment. Supporting technical analyses and background information comprise Appendices III-B, III-C, III-D, and III-E, respectively.
- **Section F** assesses the results of the market segment analysis to address Congress' questions concerning the impact of flow controls on ensuring adequate waste management capacity and promoting recycling goals.
- **Section G** reviews organizational and financial alternatives to the use of flow controls.

A. THE DEMAND FOR WASTE MANAGEMENT SERVICES

> The central issue of this market analysis is whether market forces are capable of providing an adequate and environmentally sound infrastructure for solid waste management, or whether market intervention in the form of flow controls is needed to ensure adequate capacity or achieve recycling goals.

Waste generation is a critical element in assessing the adequacy of waste management capacity and in calculating recycling rates. Therefore, an appropriate definition and quantification of the relevant waste stream are essential foundations for the market analysis of flow controls. This section uses available data sources to estimate the size of the waste stream managed in MSW facilities. Appendix III-A contains the results of technical analyses used to prepare this section.

A.1 AVAILABLE DATA ON WASTE STREAM

Two frequently cited data sources contain estimates of the relevant waste streams:

(1) ***Characterization of Municipal Solid Waste in the United States.*** This is a biennial series of EPA reports that characterize MSW generation in the United States. The version used for this Report is the 1992 Update, which estimates 1990 waste generation.

(2) ***The State of Garbage in America.*** This is an annual (since 1991) article published in *BioCycle* that compiles waste stream estimates collected from a survey of the 50 States and the District of Columbia. This Report uses the May 1993 article, which compiles 1992 waste stream estimates, as well as the 1991 article, which compiles data for 1990.

These two sources present different estimates of the size of the waste stream. *BioCycle's* 1990 waste stream estimate is approximately 294 million tons, while EPA's 1990 estimate is approximately 196 million tons, a difference of 98 million tons. The difference appears to reflect the fact that the amount of MSW *generated*, which EPA estimates, is less than the total amount of waste *handled* at MSW facilities, which *BioCycle* estimates.

A.2 METHODOLOGY USED TO ESTIMATE MARKET SIZE

Market Definition

In order to assess the need for flow controls to ensure adequate MSW management capacity and recycling, this analysis defines the MSW management market to include (1) all facilities receiving MSW ("MSW facilities") and (2) all non-MSW (defined below) that is managed at MSW facilities, since this non-MSW competes for available MSW management capacity. This definition does not include facilities, such as industrial waste landfills, that receive only specific types of waste excluded from EPA's definition of MSW.

Using three steps, EPA analyzed available data to determine the best estimate of total MSW and non-MSW managed at MSW facilities:

1. **Examine the different estimation methodologies used by *BioCycle* and by EPA's *Characterization of Municipal Solid Waste in the United States*.** This examination indicates that non-MSW wastes account for most of the difference in waste estimates.

2. **Compare EPA and *BioCycle* 1990 estimates by market segment.** This comparison indicates that the landfill market segment accounts for virtually all of the difference between these two estimates.

3. **Compare *BioCycle* landfill estimates with available State data.** This comparison confirms that the *BioCycle* waste estimates generally include non-MSW wastes managed at MSW landfills and exclude non-MSW wastes managed at separate non-MSW landfills, which is consistent with the approach used in this Report.

Examination of Methodologies

EPA's Estimation Methodology. EPA's biennial update uses a materials flow methodology to estimate MSW generation nationwide. This methodology is based on production data (by weight) as provided by the U.S. Department of Commerce and trade associations, where available, for materials and products that end up in the municipal waste stream. EPA adjusts these production data to account for imports and exports, for diversions from the MSW waste stream (e.g., for building materials made of paperboard that eventually become construction and demolition waste), and for the lifetimes of products. Finally, EPA uses waste sampling data to develop estimates for food wastes, yard trimmings, and other wastes for which production data are unavailable. EPA adjusts the sampling data to take into account moisture transferred from food and yard trimmings to other materials in the waste stream. The result is a material-by-material and product-by-product estimate of MSW generation nationwide. EPA's estimate is useful to this market analysis of flow controls in two ways:

1. **Estimates MSW generation only.** EPA defines MSW to include "wastes such as durable goods, nondurable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources. Examples of waste from these categories include appliances, newspapers, clothing, boxes, disposable tableware, office and classroom paper, wood pallets, and cafeteria wastes. MSW does not include wastes from other sources, such as construction and demolition (C&D) waste, municipal sludges, combustion ash, and industrial process wastes that might also be disposed of in municipal waste landfills or incinerators."[1] EPA's estimate of waste generation is an estimate of the

[1] "Characterization of Municipal Solid Waste in the United States: 1992 Update," EPA, July 1992, p. ES-2.

generation of EPA-defined MSW only. Wastes excluded from EPA's definition of MSW are referred to as "non-MSW" in this Report.

2. **Facilitates calculations of recycling rates and assessments of the waste management infrastructure.** EPA's estimates of MSW generation, which are developed by material type (paper, glass, etc.) with additional detail within each material type (e.g., containers versus durables, different grades of paper and paperboard), can facilitate the calculation of recycling rates by product and material types. Understanding MSW generation by material type also can be important when assessing the adequacy of the waste management infrastructure, because different materials and products may be handled more easily and/or economically by different types of facilities.

With respect to this market analysis, however, EPA's estimate does not include non-MSW that is co-managed with MSW in MSW facilities, such as sanitary landfills.

BioCycle's Estimation Methodology. In preparing its annual survey, *BioCycle* asks each State to (1) estimate the amount of MSW generation in the State; (2) divide this estimate into commercial, residential, and industrial segments; and (3) describe the source of the data.[2] In practice, however, *BioCycle* finds that States do not always provide an estimate of MSW generation only. Rather, States may include non-MSW in their generation estimates and/or report the total amount of waste (MSW and non-MSW) received at MSW facilities, instead of the amount of MSW generated.[3] *BioCycle* footnotes confirm that many States include substantial amounts of non-MSW in their reported waste totals. However, not all States distinguish between MSW and non-MSW when reporting to *BioCycle*, and some States do not appear to make this distinction on a consistent basis from year to year.[4]

Because of this approach, the *BioCycle* methodology covers more waste than is included in EPA's definition of MSW. Nevertheless, the *BioCycle* approach benefits this analysis of flow controls by measuring additional non-MSW that may affect State MSW management capacity.

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[2] Conversation with Mr. Bob Steuteville, *BioCycle*, May 4, 1994.

[3] "The State of Garbage in America," *BioCycle*, May 1993, page 42 and telephone conversation with Robert Steuteville, May 4, 1994.

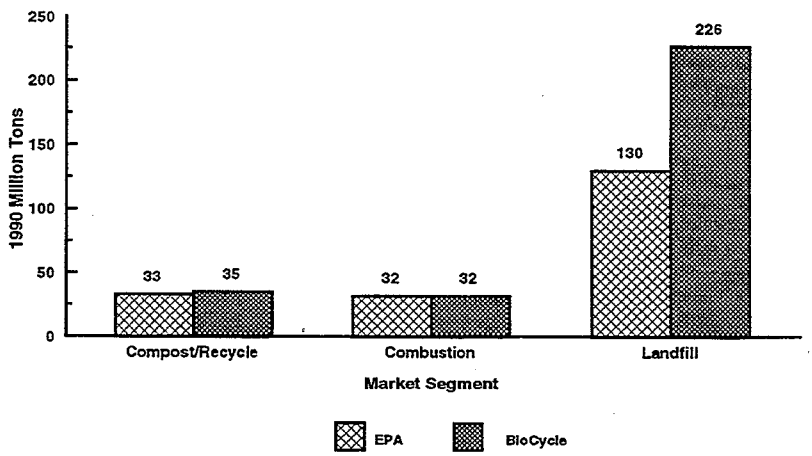
[4] This inconsistency is illustrated by waste generation estimates for the State of Alabama from 1990 to 1992. In 1990, the State reported a waste generation amount of 4.4 million tons, which *BioCycle* noted included "some [C&D] and industrial waste." In 1991, Alabama reported waste generation of 4.5 million tons, which *BioCycle* noted to include "C&D, industrial, and sewage sludge." In 1992, Alabama reported waste generation of 5.2 million tons, but *BioCycle* noted no non-MSW inclusions. Based on the 1990 and 1991 data, however, it appears that non-MSW also was included in the 1992 estimate, because Alabama reported a substantial increase in waste generation in 1992 (relative to 1991), and the 1991 estimate included non-MSW wastes.

Comparison of EPA and *BioCycle* 1990 Estimates by Market Segment

Exhibit III-1 compares EPA and *BioCycle* 1990 waste estimates by management method (i.e., recycling/composting, landfill, and combustion) to illustrate which market segments account for the difference in waste estimates provided by the two data sources. As this exhibit shows, the landfill market segment accounts for almost the entire difference between the two estimates.

EXHIBIT III-1

EPA and *BioCycle* 1990 Waste Estimates by Management Method



BioCycle reported that 226 million tons of waste were landfilled in 1990, while EPA estimated 130 million tons of MSW landfilled. The difference in these estimates (96 million tons) is nearly equal to the difference (98 million tons) in the total size of the waste stream reported by the two data sources in 1990. This suggests that many States provide *BioCycle* with estimates of the total amount of waste received at MSW landfills, not just the amount of MSW received. In contrast, both data sources present similar estimates for the amount of waste composted/recycled and combusted;[5] such facilities do not typically receive much non-MSW.

[5] The difference in estimates for composting/recycling (35 million for *BioCycle* and 33 million for EPA) could be due to rounding error.

Comparison of *BioCycle* Landfill Estimates with Available State Data

Because non-MSW managed at MSW facilities affects remaining MSW management capacity, EPA contacted each of the 50 States to request available data on waste generation and MSW management methods to confirm whether non-MSW reported in *BioCycle* was managed at MSW facilities or at non-MSW facilities (e.g., C&D landfills). The results of this analysis appear in Exhibit III-A.1 in Appendix A. Although most States were unable to provide necessary data, a limited number of States supplied data EPA could use. Based on this data, EPA determined that the amount of waste reported to *BioCycle* as landfilled is very close to the actual amount of waste received at MSW landfills. Therefore, EPA concluded that the *BioCycle* data provides the best available estimate of MSW and non-MSW received at MSW landfills nationwide.

A.3 1992 Estimate of Waste Received at MSW Facilities

BioCycle reports that MSW facilities in 1992 received approximately 292 million tons of MSW and non-MSW.[6] For comparability, Exhibit III-2 adjusts EPA's 1990 MSW estimate of 196 million tons, a per capita generation rate of 4.3 pounds per day, by the percent change in population to arrive at a tonnage estimate for 1992.[7] In total, EPA's population-adjusted 1992 MSW generation estimate equals approximately 200 million tons. As discussed above, EPA believes that the difference between the EPA and *BioCycle* estimates is non-MSW that is managed in MSW landfills.

A.4 1992 Estimate by Waste Management Method

Exhibit III-3 shows how the 292 million tons of waste were managed in 1992 by the four management methods: composting, recycling, waste-to-energy, and landfill. (Appendices III-B, III-C, III-D, and III-E detail the bases for these estimates.) As the exhibit indicates, EPA believes that all the waste that was composted, recycled, and combusted in WTE facilities was primarily EPA-defined MSW, while nearly one-half of the waste landfilled was non-MSW.

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[6] *BioCycle's* 1994 annual survey (reporting 1993 data) was not available at the time this analysis was prepared.

[7] EPA's 1994 Update of MSW in the U.S. (with 1993 data) was not available in time for this Report. Exhibit III-2 lists the 1990 per capita generation rates by material type and uses a 1992 population of 255,082,000. This population-adjusted amount does not consider changes in per capita generation rates, only changes in population.

EXHIBIT III-2

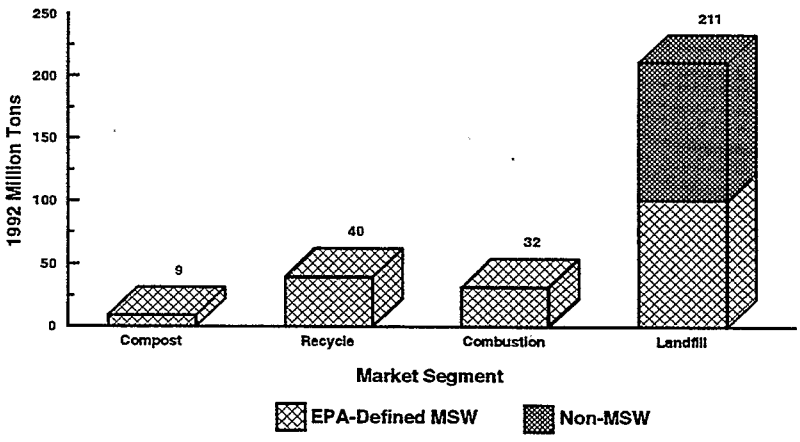
EPA Estimate of Municipal Solid Waste (MSW) Generation in 1992 by Material Type

EPA MSW Material Type	EPA-Reported Tons Per Capita (1990)	Population-Adjusted Estimate (1992, million tons)
Paper and Paperboard	0.295	75.3
Glass	0.053	13.5
Metals	0.065	16.6
Plastics	0.065	16.6
Rubber and Leather	0.018	4.6
Textiles	0.023	5.9
Wood Waste	0.049	12.5
Food Waste	0.053	13.5
Yard Trimmings	0.141	36.0
Other Waste[a]	0.025	6.4
Total EPA-Defined MSW Generation	**0.787**	**200.0[b]**

[a] "Other Waste" includes the EPA MSW categories of "other products" and "miscellaneous inorganics."
[b] Numbers do not add to 200 due to rounding.

EXHIBIT III-3

Management of 1992 Waste Stream by Market Segment



To summarize, EPA estimates that in 1992, 292 million tons of waste were managed in MSW facilities. Of this amount, 9 million tons were composted, 40 million tons were recycled, and 32 million tons were combusted. EPA further estimates that virtually all of the waste managed in these three market segments was EPA-defined MSW. The remaining waste, 211 million tons, of which 92 million tons were non-MSW, was disposed in MSW landfills. The next four sections discuss the dynamics of each of these four market segments.

B. COMPOSTING MARKET SEGMENT

Key Findings

- Composting has expanded rapidly over recent years to become a significant MSW market segment, accounting for approximately 9 million tons of waste received at MSW management facilities in 1992.
- Yard trimmings composting accounts for approximately 96 percent of the 9 million tons of waste managed by the compost market segment, with mixed waste composting accounting for the remaining 4 percent of this market segment.
- Yard trimmings landfill bans, adopted by 27 States as of July 1993, have played a significant role in accelerating the growth of yard trimmings composting.[8]
- In some communities, the cost of yard trimmings collection and composting is competitive with the cost of mixed waste collection and disposal in landfills and WTEs; mixed waste composting, on the other hand, entails significantly higher costs that may make this market subsegment less competitive with landfill disposal.
- Limited data on public sector versus private sector composting indicate that a variety of private firms are playing a significant and expanding role in this market segment; these firms can provide an infrastructure of technical and managerial resources for communities that do not wish to own and/or operate composting facilities.
- The use of flow controls to direct yard trimmings to specific composting facilities has not been found to be a common practice or a significant factor affecting the growth of this market segment.

[8] "Yard Waste Legislation: Disposal Bans and Similar Passed Bills as of July, 1993" (Composting Council Fact Sheet).

- The compost market segment should be capable of ensuring additional MSW management capacity based on recent growth, an expanding number of States with yard trimmings landfill bans, and an ample supply of compostable waste.

Data Limitations

Appendix III-B presents available data on the amount of waste managed by the compost segment. Although detailed data are available for mixed waste composting facilities, data are limited on the amount of waste managed by yard trimmings composting facilities. EPA's estimate of yard trimmings composting in 1992 is based on an analysis of available State data on the throughput of yard trimmings composting facilities and *BioCycle's* data on the total number of such facilities.

EPA has identified no compilation of data on use of flow controls by composting facilities. Although anecdotal data confirm that flow controls are used to guarantee waste flows for at least some mixed waste composting facilities, EPA has found no evidence that flow controls are used widely for yard trimmings composting facilities. Many States that authorize flow controls for mixed waste explicitly exclude recyclables such as yard trimmings from flow controls.

B.1 Overview of Growth Trends

Over the past several years, composting facilities have expanded from a negligible role in MSW management to a significant market segment. The composting market segment managed approximately 9 million tons of waste in 1992 (as explained in Appendix III-B). In EPA's *Characterization of Municipal Solid Waste in the United States: 1990 Update*, the Agency estimated that only 0.5 million tons of MSW were composted in 1988. In the Agency's *1992 Update*, EPA estimated that 4 million tons of MSW were composted in 1990 and projected that the amount of MSW composted would reach approximately 11 million tons by 1995. Exhibit III-4 shows this trend line, together with this Report's estimate of 9 million tons for 1992.

The main impetus for this growth in composting has been the substantial increase in the number of States that have adopted yard trimming landfill bans. This has led to significant growth in the number of yard trimmings composting facilities, which account for approximately 96 percent of all MSW composted. Exhibit III-5 shows that the number of yard trimmings composting facilities in the U.S., as reported by *BioCycle*, has increased nearly five-fold from 651 in 1989 to 3,100 in 1993.

EXHIBIT III-4

Estimated Growth in Composting Market Segment

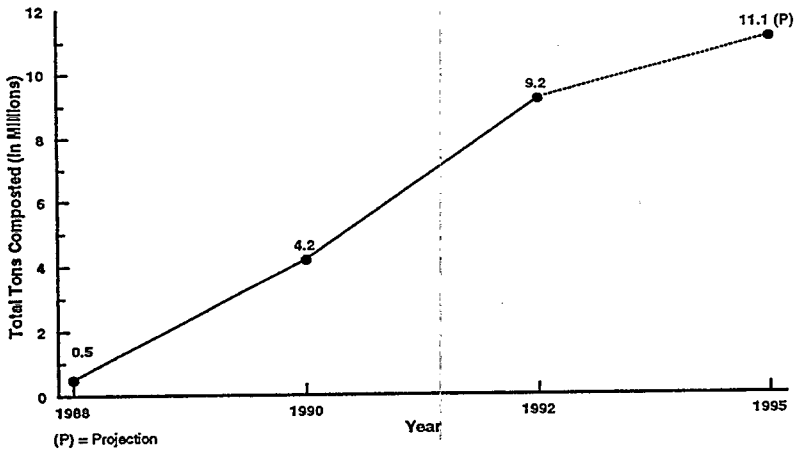
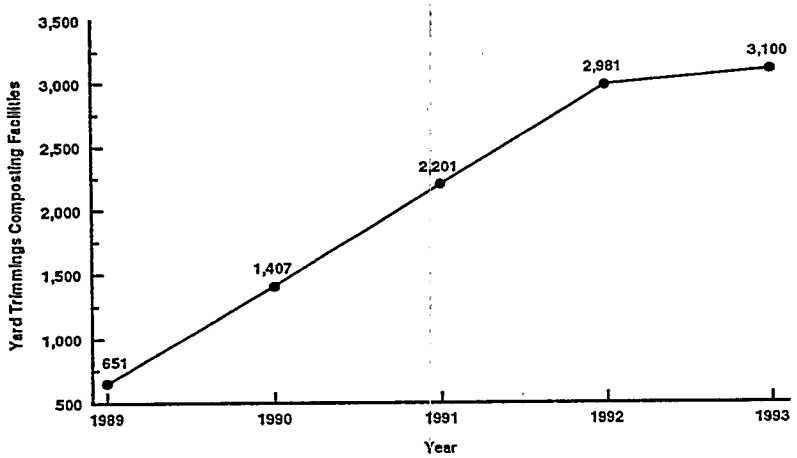


EXHIBIT III-5

Growth in Number of Yard Trimmings Composting Facilities (1989 to 1993)

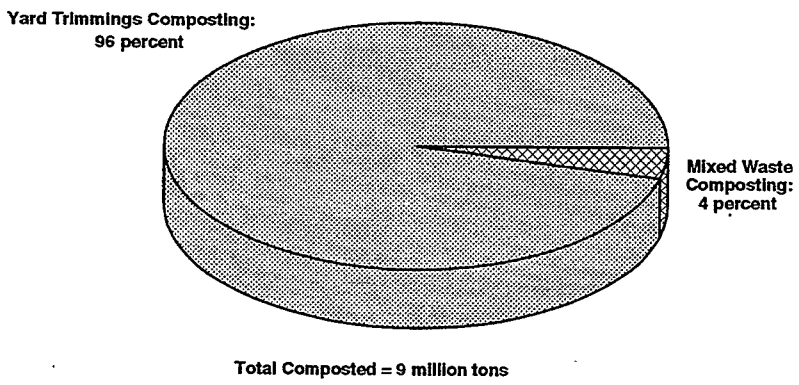


B.2 MARKET SUBSEGMENTS

Exhibit III-6 divides the composting market segment into the following two market subsegments:

EXHIBIT III-6

Composting Market Subsegments
(1992)



- **Yard Trimmings Composting.** As of 1992, *BioCycle* reported 2,981 yard trimmings composting facilities in operation in the U.S. Together these facilities managed 96 percent of the 9 million tons of MSW composted in 1992. (See Appendix III-B for estimates.) For 1993, *BioCycle* reported 3,100 composting facilities.

- **Mixed Waste Composting.** As of 1992, 21 mixed waste composting facilities were operational, although several were temporarily shut down for repairs or other problems. Together these facilities managed approximately 4 percent of the 9 million tons of MSW managed by the composting market segment in 1992 (see Appendix III-B for estimates).[9]

[9] The estimate for mixed-waste composting includes two facilities that actually receive a source-separated feedstock of food waste, soiled paper, corrugated cardboard, and other commingled compostables, as opposed to completely mixed solid waste (requiring the separation and removal of non-compostables). The waste processed by source-separated organics composting appears to have been negligible in 1992, but this type of composting may constitute another distinct and significant market subsegment in future years. The potential for source-separated organics composting is being assessed by a number of pilot plants and demonstration projects

B.3 MARKET SEGMENT COMPETITIVE STRUCTURE

The explosive growth in the composting market segment is driven by at least four separate factors:

1. A large and increasing number of States and the District of Columbia have banned the landfill disposal of yard trimmings (27 States by 1993).[10]

2. Even in the absence of landfill bans, yard trimmings composting is an economical alternative to landfill disposal and combustion in some communities.

3. Yard trimmings composting can effectively employ existing waste management equipment (e.g., packer trucks) and can operate efficiently on a relatively small scale, allowing for the incremental expansion of composting activity without the risk of substantial capital investments for new facilities.

4. There is an expanding universe of private firms providing compost facility design, operation, and management services for local governments, which may facilitate composting activities in communities that do not wish to own and/or operate their own composting facilities.

Flow controls have not been identified as a significant factor for composting facilities, as discussed below.

Yard Trimmings Landfill and Combustion Bans

Twenty-seven (27) States had adopted bans on the landfill disposal of yard trimmings as of July, 1993,[11] and many of these States also banned yard trimmings from combustion in WTE facilities and incinerators.[12] Such bans may be described as "flow constraints," because they constrain the extent to which yard trimmings composting facilities must compete with other MSW

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underway, sponsored by organizations as diverse as the Composting Council, the National Audubon Society, the Grocery Manufacturers of America, and the Food Marketing Institute. ("Composting Collection," *Waste Age*, July 1993.)

[10] "Yard Waste Legislation: Disposal Bans and Similar Passed Bills as of July, 1993" (Composting Council Fact Sheet).

[11] "Yard Waste Legislation: Disposal Bans and Similar Passed Bills as of July, 1993" (Composting Council Fact Sheet).

[12] "Solid Waste Legislation: The State of Garbage in America," *BioCycle*, June 1993.

market segments, essentially limiting yard trimmings management to a competition among different composting facilities and source reduction (e.g., backyard composting, the use of mulching lawnmowers). While flow controls require that certain wastes and materials be directed to particular management facilities, eliminating the competitive forces that may encourage efficiency, bans eliminate only certain types of competition (e.g., landfill disposal) but still allow waste generators and waste haulers to direct wastes to the facility of their choice.

Competitive Economics

Although landfill and combustion bans have accelerated yard trimmings composting trends, economic factors also support the growth of this market segment. Available data on yard trimmings composting costs versus landfill costs, for example, indicate that yard trimmings composting is an economical alternative to land disposal in some communities. Exhibit III-7 presents recent data on the

EXHIBIT III-7

Yard Trimmings Collection and Composting Costs Versus Mixed Waste Collection and Disposal Costs

Community	Percent Yard Trimmings Recovered	Yard Trimmings Collection & Composting Cost Per Ton ($)	Mixed Waste Collection and Disposal Cost Per Ton ($)	Cost Advantage (Disadvantage) Per Ton ($)
Berlin Township, NJ	39	$10	$108	$98
King County, WA	7	96	107	11
Lafayette, LA	6	109	62	(47)
Lincoln Park, NJ	31	23	173	150
Naperville, IL	13	106	111	5
Perkasie, PA	21	39	113	74
Takoma Park, MD	18	90	132	42
West Linn, OR	N/A	40	144	104
West Palm Beach, FL	18	63	102	39

cost of yard trimmings collection and composting versus mixed waste collection and disposal costs in nine communities across the country.[13]

In 8 of these 9 communities, yard trimmings collection and composting costs range from $5 to $150 per ton less than mixed waste collection and disposal. The one community where yard trimmings composting reportedly is more expensive than landfill disposal is located in Louisiana, where landfill tipping fees average a mere $15 per ton, according to *BioCycle*. Average landfill tipping fees in the other States shown in Exhibit III-7 range from $40 to $74 per ton. Most yard trimmings compost is distributed to users without charge,[14] and the cost comparisons in Exhibit III-7 indicate that most of these communities do not need compost revenues to make composting economical.

Exhibit III-7 also indicates a strong inverse correlation between the percentage of yard trimmings recovered and the average cost per ton for collection and composting. For example, the three communities with recovery rates between 6 and 13 percent incur costs between $96 and $109 per ton. Conversely, the two communities with recovery rates above 30 percent report costs of just $10 and $23 per ton; although these low costs raise questions about whether the full costs of collection are included above, the point is that higher participation rates from residents can spread the fixed costs of yard trimmings collection and composting and reduce the average cost per ton.

EXHIBIT III-8

Average Cost and Capacity of Compost Facilities

Facility Type	Operating Cost/Ton	Total Capital Cost	Design Capacity (tpd)
Yard Trimmings	$30	$43,296	70
Mixed Waste	$59.50	$12,286,000	201

Exhibit III-8 presents data on the average operating and capital costs and design capacity (tons per day) for yard trimmings and mixed waste composting facilities.[15] The yard trimmings composting capital costs in Exhibit III-8 may understate the actual capital requirements for the design capacities shown, because these are average values based on reported data

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[13] In-Depth Studies of Recycling and Composting Programs, Institute for Local Self-Reliance; and reported in "The Cost Effectiveness of Yard Debris Recovery," *Resource Recycling*, April 1993.

[14] "A Database On Composting Facilities: A Progress Report," *Resource Recycling*, December 1992.

[15] "A Database On Composting Facilities: A Progress Report," *Resource Recycling*, December 1992.

and do not reflect a rigorous cost analysis. The composting of yard trimmings can be accomplished with low-cost technology or with investment in high-cost equipment. Higher technology yard trimmings facilities may require capital investments of $2,000 to $12,000 per ton of daily processing capacity, equivalent to $140,000 to $840,000 total capital cost for 70 tons per day design capacity.[16] The capital cost estimates shown in Exhibit III-8 appear to reflect the predominance of low technology yard trimmings composting nationwide. Also, the cost estimates reported by many communities may not reflect a detailed accounting for the full costs of their composting operations.

Although the cost estimates in Exhibit III-8 do not represent a rigorous cost analysis for any single type of composting facility, a comparison of the costs reported for different types of facilities clearly indicates that mixed waste composting is substantially more expensive than yard trimmings composting. Furthermore, at $59 per ton, the average operating cost alone for mixed waste composting is higher than the average tipping fee for landfill disposal reported by *BioCycle*[17] for 46 States.

Capital Requirements and Scale of Operations

Exhibit III-8 also illustrates that mixed waste composting requires a large capital investment, entailing greater financial risk, which constitutes another competitive disadvantage for this market subsegment. Yard trimmings composting facilities, by contrast, do not require substantial initial capital investments.

Low technology yard trimmings facilities may require only the placing of yard trimmings in piles or windrows and turning them. This process generally requires at least one year to produce mature compost.

Higher technology facilities may be appropriate for urban or suburban communities with limited space and large quantities of yard trimmings. Higher technology yard trimmings facilities require capital investments for equipment to grind, shred, or screen yard trimmings prior to putting them in windrows, plus equipment for turning and mixing windrows more frequently, as well as sheds

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[16] "The Cost Effectiveness Of Yard Debris Recovery," *Resource Recycling*, April 1993.

[17] Robert Steuteville and Nora Goldstein, "1993 Nationwide Survey: The State of Garbage in America," *BioCycle*, May 1993.

for curing the compost to maturity. This type of active management program reduces the potential for odor generation, produces very low residuals for disposal (i.e., approximately two percent of waste received), and reduces the composting process to less than eight months.

The variety of cost-effective yard trimmings composting technologies makes the investment in composting facilities a viable alternative to landfilling for many communities. Communities can conduct cost-effective yard trimmings collection with existing packer trucks, although many communities use leaf-vacuum trucks or other specialized collection equipment. Small municipalities can use citizen drop-off systems. The ability to leverage existing collection equipment and the limited capital investment required for low technology yard trimmings composting facilities also reduce the lead time required for the expansion of composting activities. In summary, the range of facility and collection options allows communities to make incremental investments in yard trimmings composting programs without assuming substantial financial risk.

Public/Private Infrastructure

Although State and local governments have taken the lead in expanding the composting market segment, the Composting Council estimates that one-third of composting facilities are now owned and/or operated by private firms.[18] The limited amount of available data on public versus private activity in this market segment confirms that the private sector is expanding the infrastructure of technical and managerial resources available for composting:

- Private firms account for 31 percent of yard trimmings composting in the State of Florida;
- Privately-owned facilities account for 11 of the 17 composting facilities reported by the State of Washington;
- One firm in New York, specializing in the design and management of municipal, commercial, and industrial composting programs, now manages over 50 sites throughout the Northeastern U.S. and Canada;[19]

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[18] Conversation with Randy Monk, Director of Operations for the Composting Council, March 21, 1994.

[19] "Private-Public Partnership Proves Profitable for Regional Processing of Yard Trimmings," *Resource Recycling*, April 1992.

- The combined throughput of private facilities operated by four sludge composting firms in New England accounts for 40 percent of the total sludge composted in the region;[20]
- Several small waste firms are now investing in low-capital-cost food composting facilities, targeting source-separated organics from grocery stores, restaurants, educational institutions, prisons, hospitals, and large food processing companies;[21] and
- Most of the firms involved in contract operations for sludge, yard trimmings, and mixed waste composting facilities typically supply part or all of the facility design and required equipment.[22]

The expanding infrastructure of private sector composting services may facilitate the growth of this market segment in communities reluctant to assume the program or facility management risks associated with new methods of waste management.[23]

Flow Controls and MSW Composting

Unlike certain other MSW market segments such as MRFs and WTEs, data on the use of flow controls by composting facilities are not available; therefore, EPA reviewed a wide range of literature to identify anecdotal reports or indicators of flow control use. In all of the literature reviewed for this analysis, EPA has not identified any references to yard trimmings composting facilities subject to flow controls. Furthermore, *BioCycle* (April 1994 "State of Garbage") reported that New Jersey has just recently updated its list of yard trimmings composting facilities and found that many facilities had consolidated into larger composting facilities. Similar trends also have been found in other State (e.g., Indiana) reports. Such consolidation would not be occurring at such rates if yard trimmings composting facilities were being supported by flow controls; rather, market forces are encouraging consolidation of composting facilities to achieve greater economies of scale, and thereby lower unit costs and prices.

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20 "Compost Marketing in New England," *BioCycle*, August 1993.

21 "Composting Collection," *Waste Age*, July 1993.

22 "Contract Operations for Composting Facilities," *BioCycle*, April 1993.

23 "When Privatization Makes Sense," *BioCycle*, July 1992.

There were only 21 mixed waste composting facilities operating in 1992. Although complete data on their use of flow controls is unavailable, some of these mixed waste facilities appear to use flow controls. One facility was the subject of a court case on flow controls, and 6 of these 21 facilities charge tipping fees of more than $80 per ton,[24] which is not cost-competitive with other disposal alternatives, indicating support by flow controls.

B.4 MARKET SEGMENT POTENTIAL

The potential size of the composting market segment is subject to two constraints: (1) the supply of compostable waste; and, (2) the end-market demand for compost.

Supply of Compostable Waste

The major compostable components of MSW are paper and paperboard, food waste, wood waste, and yard trimmings. Exhibit III-9 presents estimates for 1992 generation of these compostable materials and the current amount of each type being composted.

EXHIBIT III-9

Current Supply and Composting of Municipal Solid Waste (MSW) (million tons)

Waste Type	Amount Generated (1992)	Amount Composted (1992)
Paper & Paperboard	75.3	0.4
Food Waste	13.5	
Wood Waste	12.5	
Yard Trimmings	36.0	8.8
Total MSW	137.3	9.2

The generation estimates in Exhibit III-9 are derived from multiplying EPA's 1990 estimate of per capita generation of these material types by the 1992 population (see Exhibit III-2 in Section A). The estimates of the amount of waste composted in 1992 reflect the Agency's estimate of 8.8 million tons of composted yard trimmings and 0.4 million tons of composted mixed waste.[25]

The ample supply of compostable waste indicates that it is theoretically feasible for this market segment to substantially expand its capacity for MSW management. The growing number of States

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[24] *U.S. Solid Waste Composting Facility Profiles*, Vol. II, U.S. Conference of Mayors, March 1993.

[25] EPA's 1994 Update of MSW in the U.S. (with 1993 data) was not finalized in time for use in this Report.

with yard trimmings disposal bans (27 States in 1993) and the favorable economics of this market subsegment support the continued growth of yard trimmings composting. There is also significant growth potential for source-separated organics composting. Residential participation rates for source-separated organics collection have ranged from 60 to 95 percent of households served by pilot programs and demonstration projects.[26] Commercial waste generators also could provide a large supply of source-separated organics. For example, the Grocery Industry Committee on Solid Waste estimates that six million tons of compostable food and paper waste are generated each year by grocery stores alone.[27]

End-Market Demand for Compost

Although the supply of compostable waste is ample, the end-market demand for compost is uncertain, even for compost that is available free of charge. A recent study by Battelle estimates that there is substantial potential for expanding end-markets for compost far in excess of the available supply of compostable waste.[28] However, although Battelle estimates that agriculture markets account for almost 90 percent of this potential demand, it is not clear to EPA whether a substantial expansion of agricultural demand is economically viable due to the cost of transporting and spreading compost.

End-market observations reported by other sources include the following:

- Many communities report that residents and other consumers are willing to take yard trimmings compost when it is distributed at no charge;[29]
- One composting facility in New England reports that it charges $15 per cubic yard for its compost, but the average price received by facilities that use brokers is $0.50 per cubic yard; one facility pays a broker up to $1.50 per cubic yard to find end users more than 45 miles away from the composting facility;[30]

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[26] "Pulling Compostables from the Waste Stream," *BioCycle*, May 1993.

[27] "Composting Collection," *Waste Age*, July 1993.

[28] "Compost Supply and Demand," *BioCycle*, January 1993.

[29] "The Cost Effectiveness of Yard Debris Recovery," *Resource Recycling*, April 1993.

[30] "Compost Marketing in New England," *BioCycle*, August 1993.

- Two mixed waste composting facilities in Minnesota use their compost as alternative daily cover at landfills, even though they have contracts with tree farms willing to take the compost, because the cost of hauling the compost to the tree farms and spreading the material is too expensive;[31] and

- Use of compost for pollution control (e.g., wetlands restoration, biofilters, site remediation) is in the preliminary research phase.

Finally, State and local governments can and are taking a variety of actions to expand end-market demand for compost by establishing procurement policies that favor the purchase of compost for public landscape and park maintenance uses. Similarly, EPA published in April 1994 a Comprehensive Procurement Guideline (CPG) which includes yard trimming compost among 21 items designated; once the CPG is finalized, procuring agencies (including federal agencies, State and local agencies using federal funds, and their contractors) will be required to develop affirmative procurement practices for yard trimmings compost. This could increase demand substantially.

C. RECYCLING MARKET SEGMENT

Key Findings

- Recycling has expanded rapidly over recent years to account for approximately 40 million tons of all waste received at MSW management facilities in 1992.

- Private sector paper and paperboard recyclers account for 62.5 percent of this market segment, with buy-back and drop-off programs accounting for 22.5 percent, material recovery facilities (MRFs) 14.3 percent, and mixed waste processing facilities (MWPFs) less than 1 percent.

- Flow control has been an important factor for MRFs, particularly MRFs that require substantial capital investments.

- In 1992, 13 percent of MRFs (26 facilities) with 19 percent of total MRF throughput (close to 1.1 million tons) received waste guaranteed by flow control. This represents 2.7 percent of the 40 million tons of MSW recycled in 1992. MRFs operating under contractual agreements represent an additional 41 percent (81 facilities) with 44 percent of total MRF throughput (approximately 2.5 million tons). Some of these contracts may be supported by flow control.

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[31] "The Key to a Successful Composting Program," *MSW Management*, 1994.

- Low-technology MRFs and other recycling activities generally can be initiated on a small scale, require relatively limited initial capital investments, and allow for an incremental approach to expanding the recycling infrastructure.

- There is a strong association between magnitude of capital costs and use of flow control by MRFs. Seven (7) percent of the throughput of low-technology MRFs is supported by flow controls, compared to 32 percent of the throughput of high-technology MRFs.

- In some cases, tipping fees supported by flow controls for mixed waste disposal (e.g., WTE) have provided a funding mechanism for the development and operation of curbside recycling programs and MRFs.

- A majority of recycling facilities are owned and operated by private firms, including about 69 percent of all MRFs, indicating future growth potential because private investors view this market segment as viable.

- An available supply of recyclable materials and a continuing expansion of end-market users (e.g., de-inking facilities) indicate that the recycling segment will continue to account for an increasing share of the MSW management market.

Data Limitations

Appendix III-C presents available data on the amount of waste managed by the recycling segment. EPA obtained data on 1992 recycling of some materials from industry trade associations and updated prior EPA estimates for other materials. The resulting total estimate of 40 million tons of recycled MSW plus EPA's estimate of 9 million tons of composted MSW (discussed in Section B) is consistent with *BioCycle's* estimate of 49 million tons of recycled/composted waste in 1992.

Appendix III-C also presents a summary of data on materials recovery by MRFs (which separate commingled recyclables) and MWPFs (which accept mixed waste). Data on MRFs' use of flow controls is derived from information reported in Government Advisory Associate's (GAA) *1992-93 Materials Recovery and Recycling Yearbook.* There is no similar source of information on MWPF use of flow controls, although EPA found some anecdotal information in its literature reviews. EPA assumed that recycled materials not recovered at MRFs and MWPFs are recovered by paper and paperboard recyclers ("paper packers") and other recycling centers (e.g., buy-back and drop-off programs). Although data show that flow controls are used to guarantee recyclable waste flows for an estimated 13 percent of MRFs (19 percent of MRF throughput) and some MWPFs, EPA has not found any data that flow controls apply to other recycling subsegments.

C.1 Overview of Growth Trends

Over the past decade, recycling has accounted for an increasingly significant share of the MSW management market. The recycling market segment managed approximately 40 million tons of solid waste in 1992 (as explained in Appendix III-C).

Recycling of certain commodities (especially paper and paperboard) has long been a significant segment of the MSW management market, because recycling often is an economical alternative to disposal. Historical data confirm that percentage changes in recycling over the last two decades generally tracked similar changes in economic growth. The recovery of old newsprint (ONP) and old corrugated cardboard (OCC) illustrates this point. Exhibits III-10 and III-11 compare percentage changes in ONP and OCC recovery, respectively, with percentage changes in gross national product (GNP). A departure from this historical linkage between recycling growth and GNP growth occurred between 1988 and 1992, when ONP recycling grew at a rapid rate, in spite of a stagnant economy (see Exhibit III-10); over the same period, OCC recycling performed relatively well, compared to earlier periods (Exhibit-III-11).

EXHIBIT III-10

Annual Percentage Change in Old Newsprint (ONP) Recycling and GNP

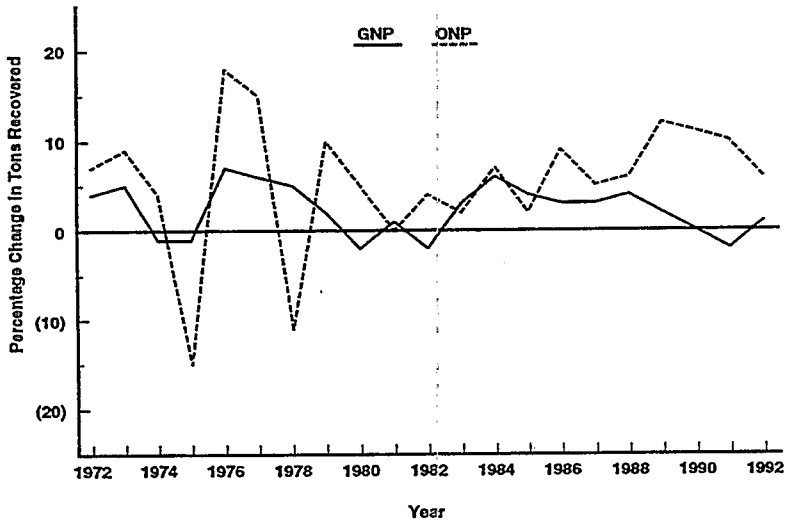
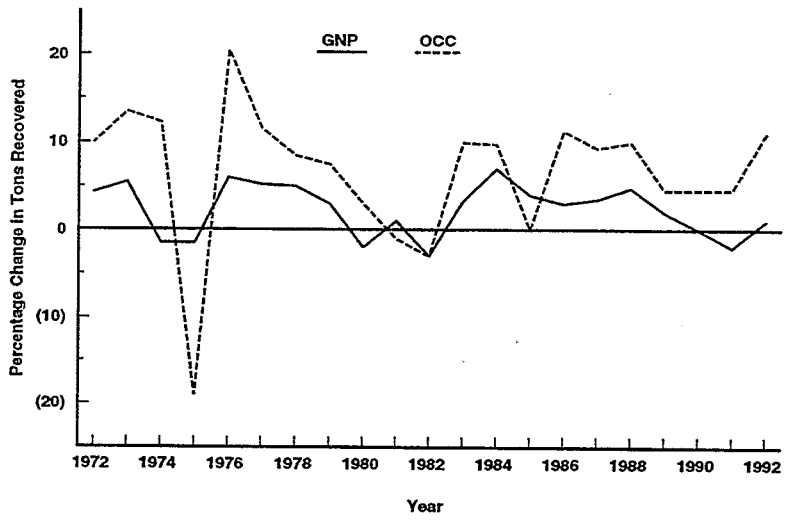


EXHIBIT III-11

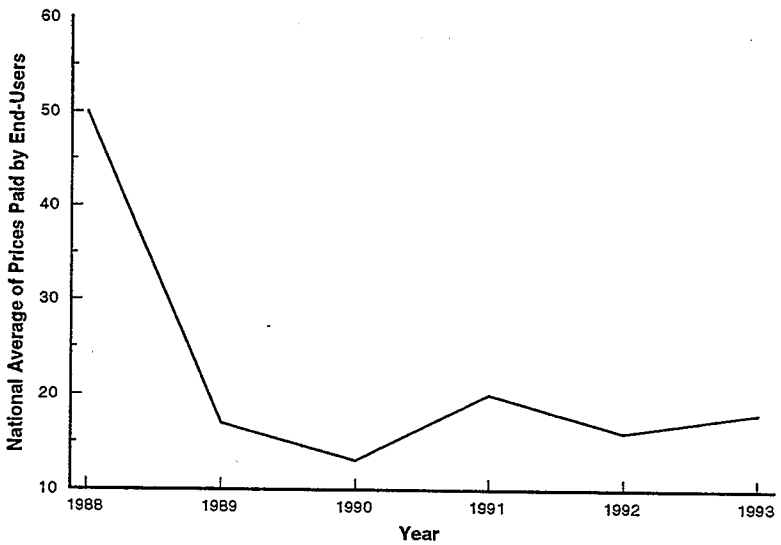
Annual Percentage Change in Old Corrugated Cardboard (OCC) Recycling and GNP



As Exhibit III-12 shows, this growth in newspaper recycling (due to growth in local curbside programs discussed later in this section) resulted in ONP prices declining sharply between 1988 and

EXHIBIT III-12

Old Newsprint Prices Paid by End-Users
($/Ton)



1993, due to both increased supply and decreased demand. Aluminum prices also dropped nearly 40 percent in 1991 and hit an all time low in 1993, primarily due to an influx of aluminum from the former Soviet Union. Despite low prices for some materials collected by curbside programs, recycling has continued to increase in most areas, primarily due to the strong growth in government-sponsored recycling programs. Although depressed prices made these recycling programs more costly than expected for many communities, prices have rebounded in 1994, making recycling more economically attractive.

The number of curbside recycling programs and MRFs has increased dramatically. This proliferation of curbside programs and MRFs has produced a reliable supply of relatively clean recyclables and has led to an expansion of end-markets. For example, the paper and glass industry both have developed an expanded capacity for recycling. These expanded end-markets have stabilized some recycled material prices, while communities have developed more efficient collection and processing methods. As a result, many communities now are finding recycling more cost effective than in previous years.

Exhibit III-13 shows that the number of curbside recycling programs reported by *BioCycle* grew by more than 560 percent between 1988 and 1993.[32] The growth in households served by curbside programs may be even greater, because many communities also are expanding the number of households served by existing programs. For example, in 1992, New York City added 630,000 housing units to its recycling program. Similar expansions took place in other major cities, such as Philadelphia, Houston, and Los Angeles.[33] Currently, there are more than 6,600 such programs reaching over 101 million people.[34]

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[32] Robert Steuteville, "1994 Nationwide Survey: The State of Garbage in America," *BioCycle*, April 1994.

[33] Robert Steuteville, "Year End Review of Recycling," *BioCycle,* December 1993, page 32.

[34] Robert Steuteville, "1994 Nationwide Survey: The State of Garbage in America," *BioCycle*, April 1994.

EXHIBIT III-13

Reported Growth in Number of Curbside Recycling Programs (1988 to 1993)

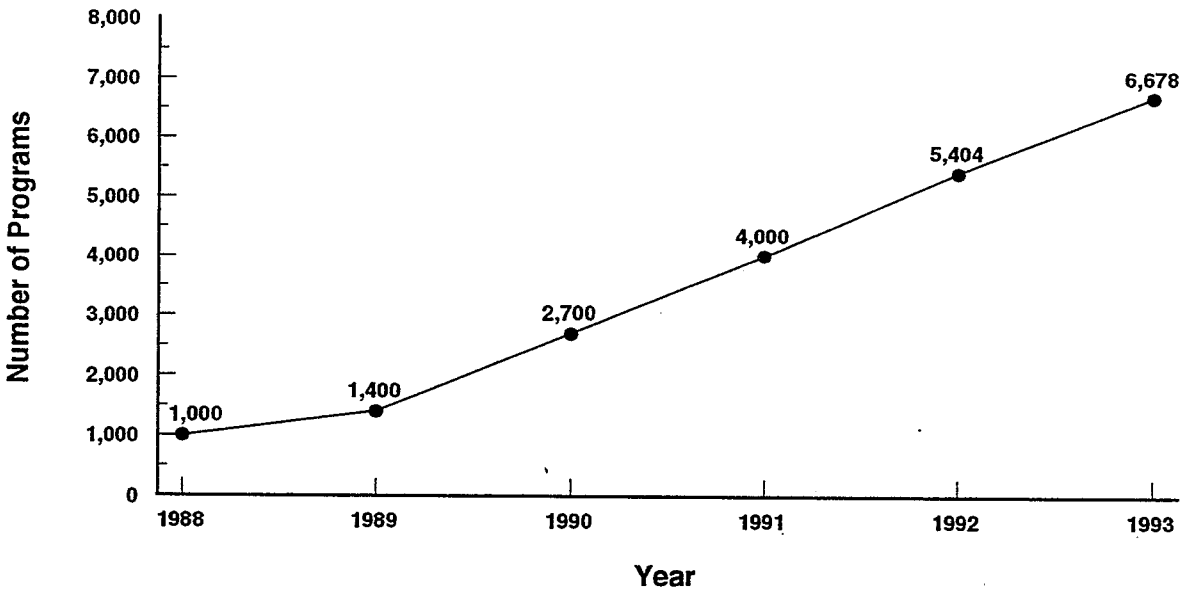

Exhibit III-14 illustrates MRF growth between 1985 and 1992, with the most significant development occurring in the early 1990s. For example, MRFs showed a record 100 percent growth from 1990 to 1992. For the purpose of this analysis, the definition of a MRF is limited to a facility that sorts and processes *commingled* residential recyclables into marketable raw materials for end-market use. Buy-back and drop-off centers and other recycling facilities that receive source-separated non-commingled recyclables are not considered as MRFs in this Report. According to GAA's biennial survey, 198 MRFs either were operational or planned to be operational in 1992.[35] (This varies slightly from *BioCycle's* estimate of 192 MRFs in operation in 1992.)[36]

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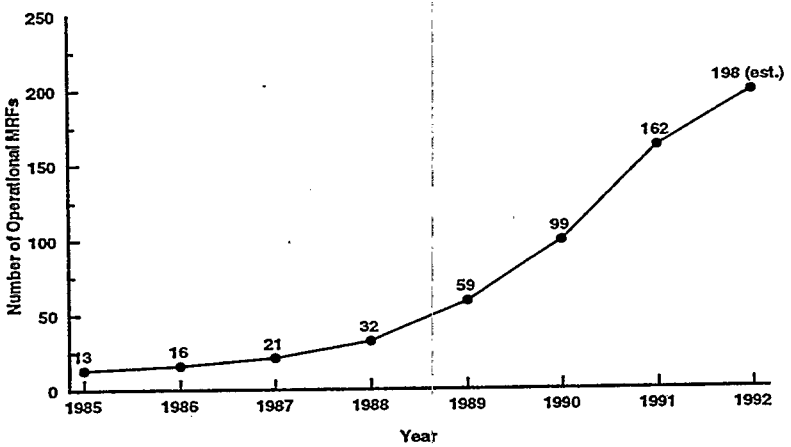
[35] *1992-93 Materials Recovery and Recycling Yearbook: Directory & Guide*, GAA, 1992.

[36] Jim Glenn, "Maturation of Materials Recovery," *BioCycle*, August 1992, page 34.

EXHIBIT III-14

Operational Materials Recovery Facilities (MRFs)
(1985 to 1992)

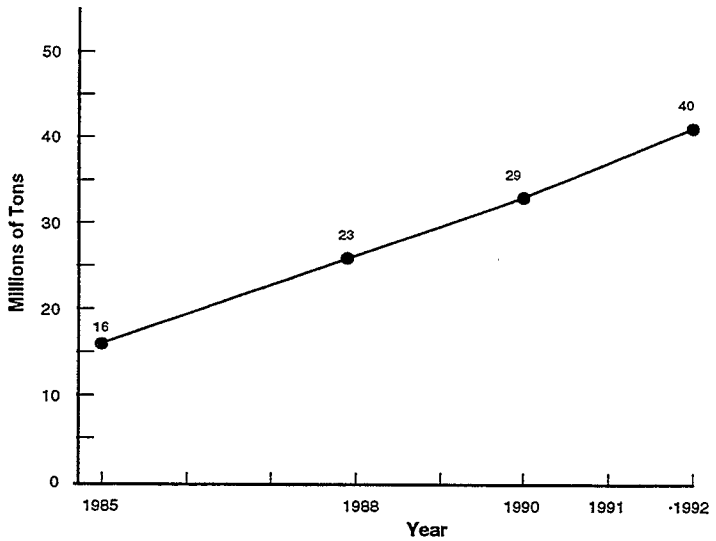


The growth in curbside programs and MRFs has propelled the remarkable growth in the recycling market segment. EPA's *Characterization of Municipal Solid Waste in the United States: 1992 Update* projected that by 1995, 41 million tons of MSW would be recycled.[37] More recent data show that this projection already has been reached, and trends indicate continued growth in recycling. Exhibit III-15 shows this trend line, with recycling accounting for 40 million tons of the solid waste managed in MSW facilities in 1992. (Appendix III-C provides analytical detail and State-specific estimates of recycling.) The paper industry alone anticipates 50 percent recovery by the year 2000 - an increase of 17.4 million tons recovered compared to 1992.

[37] As noted in Appendix III-C, recycling estimates rely on recent industry data to supplement EPA projections.

EXHIBIT III-15

Reported Growth in Recycling Market Segment
(1985 to 1992)



C.2 MARKET SUBSEGMENTS

The recycling market segment can be divided into four subsegments:

1. **Material Recovery Facilities (MRFs).** In 1992, an estimated 198 MRFs were either operational or expected to be operational and to process approximately 5.7 million tons of MSW recyclables. MRFs represent 14.3 percent of the overall recycling market segment. MRFs include low-technology and high-technology operations. About two-thirds of the operational MRFs are low-technology but the waste throughput is divided about 50/50, because high-technology MRFs process twice as much throughput on average. The Northeast region[38] accounted for 43.4 percent of all MRFs and 47.4 percent of all recyclables processed at MRFs. However, the Northeast accounts for less than one-fourth of the total volume of materials recycled. (Appendix III-C provides a detailed State-by-State listing of recycling estimates.) Nineteen (19)

[38] Northeast States include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont.

States do not have MRFs located within their borders.[39] This indicates that competition from MRFs in the Northeast may have reduced the amount of recycling by other market subsegments in that region.

2. **Mixed Waste Processing Facilities (MWPFs).** MWPFs accept mixed waste (just as mixed waste would be received at a landfill or WTE facility) in order to separate out recyclable materials. Due to higher degrees of contamination, such recyclables may not appeal to the same end-markets as materials from MRFs. This subsegment was in the nascent stage of development in 1992 and consequently recovered only 300,000 tons of recyclables, constituting less than 1 percent of the recycling market. Twenty-one (21) MWPFs either were planned or operational that year.

3. **Paper Packers.** Independent recovered paper and paperboard dealers, recycling centers, or processors (commonly referred to collectively as "paper packers") receive paper and paperboard that generally is source-separated by material type (e.g., used corrugated from large commercial sources). The American Forest and Paper Association (AFPA) estimates that there are 600 recovered paper dealers in the U.S.[40] As of 1992, AFPA directories identified paper dealers in all but 11 States and the District of Columbia. In addition, some of the major paper manufacturers, such as Weyerhauser and Stone Container, have paper collection and brokerage divisions.[41] Paper packers recycled approximately 25 million tons of paper and paperboard in 1992, accounting for 62.5 percent of the overall recycling market. (Newspapers processed by MRFs are not included in these figures.)

4. **Other Recycling Centers.** EPA defines this subsegment to include any recycled materials facilities not included in other subsegments. These facilities generally receive materials directly from consumers or via agreements with municipalities. In 1992, approximately 9 million tons of recyclables were recovered through a combination of industry-sponsored buy-back programs and drop-off centers (e.g., for glass, plastic, and metal containers). For example, the aluminum industry alone has over 10,000 industry-sponsored buy-back locations and agreements with more than 4,000 municipal curbside programs.[42] EPA estimates that most aluminum (used beverage cans) is recovered through these buy-backs, since the analysis of MRFs reveals that less than one half of all aluminum recovered comes through MRFs.

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[39] States that had no MRFs in 1992 include: Alaska, Arkansas, Colorado, Hawaii, Idaho, Indiana, Kansas, Kentucky, Mississippi, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, West Virginia, and Wyoming.

[40] PaperMatcher: A Directory of Paper Recycling Resources, American Forest Products Association, July 1992.

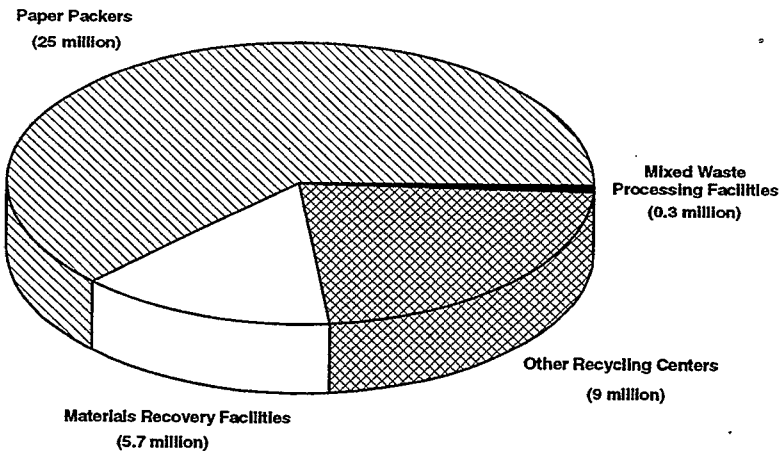
[41] Ronald Kopicki, Leslie Legg, and Michael Berg, Reuse and Recycling - Reverse Logistics Opportunities, Council of Logistics Management, 1993, page 91.

[42] Can Manufacturers Institute, "Turn Aluminum Cans into Cash: A Recycling and Fundraising Guide," 1993.

Exhibit III-16 illustrates the amount of waste recycled by these four market subsegments.

EXHIBIT III-16

Recycling Market Subsegments
(1992 tons)



Total Recycling = 40 million tons

C.3 MARKET SEGMENT COMPETITIVE STRUCTURE

The growth in the recycling market segment is driven by at least six separate factors:

(1) Forty-three (43) States and the District of Columbia have recycling and/or source reduction laws or goals and landfill bans on certain recyclable materials;

(2) Even in the absence of such laws, recycling can be an economical alternative to landfill disposal and waste combustion;

(3) Recycling programs often can operate efficiently on a relatively small scale, allowing for the expansion of recycling activity without the risk of substantial capital investments for new facilities;

(4) The private sector is heavily involved with recycling. A major portion of recycled materials goes directly to the private sector. This especially is true in the case of paper recycling. Private sector paper packers accounted for 62.5 percent (25 million tons) of the recycling market in 1992;

(5) There is an expanding infrastructure of privately owned capacity for providing MRF facility design, operation, and management services for local governments that do not wish to own and/or operate their own facilities; and

(6) Data show that flow controls play a smaller role for low-technology MRFs (7 percent) and a larger role for high-technology MRFs (32 percent); most of the MRFs supported by flow controls are located in the Northeast.

Recycling Laws and Landfill/WTE Bans

Recycling Laws. Forty-three (43) States and the District of Columbia have adopted recycling laws/goals.[43] These laws include provisions such as recycling goals for State or local governments, recycled-content legislation, curbside collection requirements, commercial recycling requirements, and general mandates to establish recycling programs. Over the past decade, these laws have fostered rapid expansion of the infrastructure for collecting and processing recyclables. Also, the demonstrated commitment of State and local governments to recycling has encouraged industries to invest in infrastructure to respond to the increased supply of recyclables and the increased demand for goods made from recyclables. For example, in 1992, 27 mills in North America had the capacity to de-ink recovered newsprint, up from just 9 mills in 1989. AFPA estimated 13 new newsprint de-inking mills or expansions slated for 1993-1995 with an increased de-inking capacity of nearly 1.5 million tons annually.[44] Additional industry investments also may result from State and federal procurement requirements for minimum recycled content.

Landfill and WTE Bans. As mentioned in the previous section on composting, 27 States currently have yard trimmings disposal bans. These States and others also have begun to ban certain other materials from solid waste landfills and WTE facilities. Prohibited wastes include such items as lead-acid batteries, tires, used oil, small batteries, and appliances. Other States have extended landfill bans to paper and various forms of packaging. For example, Wisconsin bans the disposal of most paper and packaging materials, unless the community has a State-certified recycling program. These bans generally were enacted in order to foster recycling and typically place the recycling burden on waste generators and haulers, rather than product manufacturers.

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[43] Robert Steuteville, "The State of Garbage in America: Part II," *BioCycle*, May 1994, pp. 30-36. Of the 43 States, 36 States specifically adopted statutes with recycling and/or source reduction goals. The other 7 States adopted goals through different means, such as executive orders by State governors.

[44] American Forest and Paper Association, Economics and Materials Department, "Recovered Paper De-inking Facilities," September 1993.

Competitive Economics

This subsection examines available data only on MRF processing costs and the costs of curbside collection programs. Cost data for other recycling subsegments generally are unavailable. MRF processing costs include the relatively significant cost of separating commingled recyclables. By contrast, other recycling subsegments incur lower costs since they generally require source-separation by material type (e.g., separation of OCC and ONP for paper recyclers, and separate bins for glass, aluminum, and other containers received at drop-off and buy-back centers).

Exhibit III-17 presents estimates of average material collection and processing costs. These estimates are drawn from a number of sources and provide an indication of potential costs. Many variables contribute to the costs of MSW programs. As with most commodities, regional variations in

EXHIBIT III-17

Average Estimated Collection and Materials Recovery Facilities (MRFs) Processing Costs ($ per ton)

Material	Collection Costs[1] (A)	MRF Processing Costs (B)	Revenue[2] (C)	Net Cost Per Ton [A+B]-C	Percent of Total MSW Collected[3]
Newspaper (ONP)	$72	$34	$17	$88	60
Glass[4]	$60	$73	$51	$82	27
Aluminum	$581	$143	$609	$116	2
Steel	$240	$68	$65	$242	8
Plastic[5]	$1,089	$184	$137	$1,136	3
Weighted Average Collection and Processing Costs				$131	

Sources: National Solid Wastes Management Association (NSWMA), *The Cost to Recycle at a Materials Recovery Facility*, 1992; NSWMA, *The Cost of Recycling*, 1993; and analysis of data from Governmental Advisory Associates.

Notes:

1. Costs per ton are much lower for dense, heavy materials, like ONP and glass, because a single truck can collect a higher tonnage. Collection costs assume a 50 percent set out rate for curbside collection.
2. Average 1993 prices paid by end-users as reported in "Year in Markets," *Recycling Times*, December 28, 1993. End-user prices may include transportation to the buyer of the recycled materials, and thus may overestimate net revenue.
3. Percentage based on materials processed at MRFs operational in 1992. Mixed containers reallocated to glass and plastic according to percentages reported by NSWMA.
4. Glass costs represent clear glass only.
5. Plastic costs represent PET only.

prices (i.e., revenues) can be significant in affecting net costs. Exhibit III-17 shows that the net cost per ton can vary greatly for different recyclable materials; this means that community costs will be affected by the relative mix of recyclables collected, among other factors.

Exhibit III-18 presents sample MRF cost data for eight cities with MSW curbside collection and processing programs, including data on mixed waste collection and landfill disposal for four of these cities. The weighted average cost shown in Exhibit III-17 ($131 per ton) is within the range of both recycling and mixed waste disposal costs provided for the programs covered in Exhibit III-18, which suggests that recycling costs may now be cost-competitive with mixed waste disposal in many communities. Net recycling costs for the surveyed programs range from $90 per ton to $168 per ton, because costs depend on many factors, such as program design, labor costs, and collection routes. Unfortunately, there is little comparative data available.

In addition, a recent survey of the costs of 17 curbside collection programs showed collection costs ranging from $77 per ton to $263 per ton, with a weighted average cost of $138 per ton.[45] This estimate is within the range shown in Exhibit III-18; this survey did not compile information on the costs associated with processing of recyclables.

Exhibit III-18 shows that net recycling costs for the surveyed programs range from $90 per ton to $168 per ton. This range is attributable to the unique nature of each program, for example:

- Regional markets for recyclables offer revenues from $0 to $41 per ton;
- Collection costs vary with the set-out rate, population and demographics, and crew size, among other variables; and
- The mix of materials significantly affects all recycling costs (see Exhibit III-17).

[45] Steve Apotheker, "Curbside Recycling Collection Trends in the 40 Largest Cities," *Resource Recycling*, December 1993.

EXHIBIT III-18
Overview of Curbside Collection and Processing Costs from Eight City Sample

City	Recycling Costs ($ per Ton)				Disposal Costs ($ per Ton)				Recycling Net Savings over Disposal ($ per Ton) (I)
	Collection Costs (A)	Processing Costs (B)	Revenue (C)	Net Cost D=[A+B]-C	Collection (E)	Transfer/ Disposal (F)	Revenue (G)	Net Cost (H)=[E+F]-G	
Sample 1[a]									
1	91.00	25.00	0.00	116.00	90.00	71.00	0.00	181.00	65.00
2[1]	89.00	42.00	41.00	90.00	67.00	70.00	0.00	137.00	47.00
3	191.00	0.00[2]	23.00	168.00	56.00	112.00	10.00[3]	158.00	-10.00
4	137.00	0.00	6.00[4]	131.00	85.00	71.00	0.00	156.00	25.00
Sample 2[b]									
A	112.78[5]	40.00	28.60	124.18	N/A	N/A	N/A	N/A	N/A
B	123.00[5]	42.00	27.60	137.40	N/A	N/A	N/A	N/A	N/A
C	115.38	24.00	30.00	109.38	N/A	N/A	N/A	N/A	N/A
D	110.26	26.03	38.45	97.84	N/A	N/A	N/A	N/A	N/A

Sources:

a. Clean Washington Center, *The Economics of Recycling and Recycled Materials*, December 1993. Represents different cities in Washington.

b. Lynn Scarlet, "Recycling Costs: Clearing Away Some Smoke," *Solid Waste and Power*, July/ August 1993. Represents different cities in California.

Notes:

1. MRF processing included in overall recycling program.
2. Recyclables are sorted by material type during collection and delivered directly to private processors; thus, processing costs are included in collection costs.
3. City earned "disposal" revenues from electricity sales to a power company.
4. Materials delivered to private processor for total revenue (over cost) averaging $6.00.
5. Collection figures exclude public department costs (e.g., education, public employee salaries), thus understating total costs by approximately $1.00 to $5.00 per ton.

Capital Requirements and Scale of Operations

The explosive growth in the MRF market over the past few years has shown that the lag time from planning to operational status for these facilities is relatively short. MRF development does not face the same public opposition or complicated and time-consuming processes that affect the siting and building of other waste management options, such as combustors and landfills. However, MRFs may entail significant capital costs, as summarized in Exhibit III-19[46] for 134 MRFs for which data are available.

EXHIBIT III-19

Average Capital Costs of Materials Recovery Facilities (MRFs)

High Technology MRFs	$4,797,292
Low Technology MRFs	$1,920,810
Weighted Average	$2,951,192

Exhibit III-20 represents the weighted average and median costs and design capacity calculated for the 198 MRFs estimated to be in operation in 1992. The median capital costs per ton are somewhat higher than the average costs per ton, indicating that larger MRFs realize some economies of scale. This may explain why 71 percent of planned facilities will be high-technology, large scale plants with higher total capital costs but lower capital costs per ton of capacity than existing facilities.[47]

EXHIBIT III-20

Median and Weighted Average Cost and Design Capacity of Materials Recovery Facilities

Type Of Cost	Median	Weighted Average
Operating Cost/Ton	$36	$36
Capital Cost/Per Ton Per Day of Capacity	$33,853	$24,732
Design Capacity (tpd)	75	117

[46] Database compiled from 1992-3 Materials Recovery and Recycling Yearbook: Directory and Guide, Governmental Advisory Associates, 1992.

[47] Ibid. Only 30 percent of operational and "shake-down" facilities are high-technology MRFs.

Most MRFs charge tipping fees far below the operating costs shown above and more than half charge no tipping fees or even pay for materials received; this indicates that the MRF subsegment is highly competitive. MRFs depend on the fluctuating markets for recyclables to earn revenues to cover their costs.

Public/Private Infrastructure

Analysis of MRFs operating or expected to be operating in 1992 indicates that the majority of MRFs were privately owned and operated:

- 69 percent were privately owned and operated;
- 17 percent were publicly owned facilities operated by the private sector; and
- 14 percent (primarily in the Northeast) were publicly owned and operated facilities.

A relatively small proportion (9 percent) of privately owned and operated MRFs are supported by flow controls; in comparison, flow controls support 25 percent of publicly owned and operated MRFs and 21 percent of publicly-owned and privately-operated MRFs.[48] (See Exhibit C.8 in Appendix III-C.)

The five largest private MRF firms represent approximately 50 percent of MRF processing capacity.[49] Three of these firms operate 30 sorting plants for commingled residential recyclables, which represent a combined capacity of 7,500 tons per day, and generate more than $55 million in annual revenues.[50] The other two firms each operate between 20 and 30 commingled sorting plants in conjunction with their waste hauling services. All of these firms saw vastly increased growth in the early 1990s. The growth in the MRF subsegment is beginning to level off to a more moderate rate of increase. Although the growth in the number of MRFs coming on-line is slowing, newer MRFs have larger capacities and often are owned by integrated companies.

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[48] Ibid.

[49] Jerry Powell, "Materials Recovery Facilities: Who are the big actors and what are they up to?" *Resource Recycling*, October 1993, page 47.

[50] Ibid, page 48.

Flow Control Role in Recycling Growth

Available data suggest that flow controls pertain to the MRF subsegment only. Although many States that authorize flow controls for mixed waste exclude recyclables from flow control restrictions, Exhibit III-21 shows that approximately 13 percent of MRFs (19 percent of MRF throughput) are supported by flow controls. Based on data from the GAA *Yearbook*, EPA estimates

EXHIBIT III-21

Use of Flow Controls by Materials Recovery Facilities in 1992

	#	%	Throughput	%
Flow Control	26	13%	1,081,587	19%
Contract	82	41%	2,491,170	44%
Neither	79	40%	2,034,156	36%
N/A	11	6%	97,068	2%
Total	198		5,703,981	

that about 2.7 percent (i.e., about 1.1 million tons) of the 40 million tons of waste recycled is subject to flow controls, as shown in the following exhibit.

Flow controls have been more important for high-technology MRFs than for low-technology MRFs. Exhibit III-22 shows that flow controls support 32 percent of throughput in high-technology MRFs, compared to only seven percent of throughput in low-technology MRFs. Another 24 MRFs are planned to be operational after 1992; the trend is for relatively greater development of high-technology MRFs (i.e., 17 of out of 24) with six facilities to be supported by flow controls. For the seven low-technology MRFs that are planned to be operational after 1992, only one is expected to be supported by flow controls. (See Exhibit C.10 in Appendix III-C.)

EXHIBIT III-22

Use of Flow Controls by High-Technology and Low-Technology Materials Recovery Facilities (MRFs) in 1992

	High-Technology MRFs			Low-Technology MRFs		
	#	Throughput	%	#	Throughput	%
Flow Control	17	890,426	32%	9	191,161	7%
Contract	29	1,414,590	50%	53	1,076,580	37%
Neither	14	492,868	18%	65	1,540,288	53%
N/A	1	20,222	1%	10	76,864	3%
Total	61	2,819,106		137	2,884,893	

As shown in Exhibit III-23, there is a strong association between the capital costs of MRFs and their support by flow control. Regardless of whether a MRF is high-technology or low-technology, facilities supported by flow controls have higher capital costs on average than MRFs not

EXHIBIT III-23

Capital Costs and Use of Flow Controls by Materials Recovery Facilities (MRFs) in 1992

	High-Technology MRFs		Low-Technology MRFs	
	#	Average Capital Costs	#	Average Capital Cost
Flow Control	13	$6,788,462	8	$3,256,250
Contract	26	4,605,769	46	1,255,602
Neither	9	2,474,444	36	2,035,889
N/A	0	0	4	2,022,500
Total	48	4,797,292	86	1,920,810

Note: Only 134 of the 198 MRFs reported capital costs; of these 134, all but 4 provided data on use of waste guarantees (e.g., flow controls). Only 21 of the 26 MRFs supported by flow controls reported capital cost information.

supported by flow controls. The difference in use of flow controls by high-technology and low-technology MRFs reflects the greater capital costs of the former ($4.8 million on average) compared to the latter ($1.9 million on average). (See Exhibit III-19.)

To date, the use of flow control to support MRFs has been concentrated in the northeast. Exhibit III-24 shows that 77 percent (20 out of 26) of the MRFs supported by flow controls, with a corresponding 86 percent of the MRF throughput supported by flow controls, are located in the Northeast. Nineteen (19) States have no MRF facilities at all.

EXHIBIT III-24

Use of Flow Controls by Materials Recovery Facilities in the Northeast (n = 86 of 198)

	High-Technology		Low-Technology		Total	
	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)
Flow Control	13	764,680	7	163,661	20	928,341
Contract	19	795,716	17	334,991	36	1,130,707
Neither	8	321,451	21	338,433	29	659,884
N/A	1	20,222	0	0	1	20,222
Total	41	1,902,069	45	837,085	86	2,739,154

In addition to throughput supported by flow controls, a significant amount of MRF throughput is guaranteed through contractual arrangements. The contractual arrangements may, but need not, be supported by some form of municipal control over waste disposition: the municipality may either collect the waste itself, contract out for collection, use franchises to control the ultimate destination of waste collected, and/or enact a flow control ordinance. For example, a local government under contract to provide waste to a privately-owned MRF may use a flow control ordinance to ensure that enough waste is delivered to meet the terms of the contract. As a result, some of the waste guaranteed by contracts also may be backed by local government use of flow controls; however, data are not available to assess how often this situation occurs.

Flow controls on mixed waste disposal facilities (e.g., WTEs) also may have an impact on recycling by allowing State and local governments to increase tipping fees above market levels. These higher tipping fees can make recycling more cost-competitive with mixed waste disposal and can provide a funding mechanism to subsidize curbside recycling programs and recycling promotion and education programs. Data describing the extent and magnitude of such use of flow controls is not available.

At EPA's public hearings on flow control, many local governments indicated that recycling subsidies, resulting from tipping fees supported by flow controls, played an important role in developing curbside collection programs and MRF infrastructure over the past few years. During this time, cost-effective residential recycling methods generally were in a developmental stage; economic conditions limited end-market demand; and many communities incurred significant "start-up" costs for recycling programs, including public education costs to raise recycling participation rates.

C.4 Market Segment Potential

The potential size of the MSW recycling market segment is subject to two constraints: (1) the supply of recyclable MSW; and, (2) the end-market demand for recyclables.

Supply of MSW Recyclables

The major recyclable MSW materials are paper and paperboard, glass, plastics, metals, textiles and wood. Exhibit III-25 presents 1992 generation estimates for these recyclables (see Appendix III-A) and the current amount of each recovered (see Appendix III-C). The improving economics of recycling and the ample supply of recyclable MSW should support continuing growth in the recovery of recyclable MSW.

EXHIBIT III-25

Current Supply and Recovery of EPA-Defined Municipal Solid Waste (million tons)

Material Type	1992 Generation	1992 Recovery
Paper and paperboard	75.3	29.1
Glass	13.5	4.15
Plastic	16.6	.65
Metals	16.6	3.8
Textiles, wood, and other waste (appliances, batteries)	24.8	2.3
Total Recyclable	**146.8**	**40.0**

End-Market Demand for Recyclables

Although projecting end-market demand is beyond the scope of this market analysis, the prospects for increased recovery of recyclable MSW are reflected in a variety of industry investments to expand the end-market demand for recycled materials.[51] For example, the paper industry anticipates an increased demand for nearly 5 million tons of OCC, with expansions at 18 containerboard mills from 1993 to 1995; and AFPA reports that nearly four million tons of expanded de-inking capacity will come on-line by 1995. The paper industry has set a goal of 50 percent recovery (an additional 17.4 million tons compared to 1992) by 2000.

Anecdotal data also indicate expanding end-markets for other recycled materials. For example, the largest plastics processor in the country plans to increase processing capacity in one of its plants by 70 percent for post-consumer PET containers - adding 40,000 tons of annual capacity for PET bottles by the end of 1994. Also, 6 more glass cullet beneficiation plants came on-line in 1993, and 3 major steel companies have new facilities that utilize 100 percent recycled material scheduled to come on-line in the next few years.

D. WASTE-TO-ENERGY MARKET SEGMENT

Key Findings

- WTE facilities and incinerators together combusted approximately 32 million tons of MSW in 1992. Respectively, WTE accounted for approximately 31 million tons, and incinerators, approximately 1 million tons.

- The use of flow controls to guarantee waste flows to WTE facilities is significant; approximately 58 percent of WTE throughput (from 61 facilities) is guaranteed by flow control. One reason for this high percentage is the substantial debt service entailed by the large initial capital investment required to construct WTE facilities.[52] WTE facility operators and owners need to ensure adequate, long-term supplies of waste and operate at high capacity utilization rates (e.g, 85 percent) in order to generate sufficient tipping fee

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[51] See Lisa Rabasca, "1993 Recycling Market - Ebbs and Flows," *Recycling Times*, December 1993; and Robert Steuteville, "Year End Review of Recycling," *BioCycle*, December 1993. (Unless otherwise noted.)

[52] In 1992, the average initial capital cost for existing WTE facilities was $60 million (adjusted for inflation). For facilities being constructed, the average capital cost was approximately $136 million. Because they are more modern, larger, and include more up-to-date pollution control equipment, facilities under construction cost more than existing facilities.

revenues to meet debt service payments. Data show a strong association between magnitude of capital costs and use of flow controls by WTEs.

- Data also reveal that the use of flow controls is strongly associated with the size (throughput) of WTE facilities. WTEs supported by flow control have an average throughput three times the average throughput of WTEs that are not supported by flow controls or long-term contracts. Regardless of ownership, the larger facilities on average were much more likely to be supported by flow controls than the smaller WTEs.

- Although WTE facilities require substantial initial capital investments, they are cost-competitive with landfills in regions of the country where land and energy costs are relatively high, such as the Northeast. Higher land costs raise the cost of landfill disposal, and higher energy prices reduce the net cost of WTE facilities. Nearly half of all MSW combusted in 1992 took place in WTE facilities located in the Northeast.

- There will be only a modest gain in the amount of waste managed by this market segment in the future for the following reasons: (1) existing facilities already operate at nearly 85 percent of capacity; (2) the number of new facilities being planned and constructed has declined significantly from 202 expected in 1988 (as reported by GAA) to 53 expected in 1993; and, (3) various other factors, such as increasingly higher initial capital investments due to land and pollution control costs, increased emphasis on recycling and waste reduction strategies, and public opposition likely will limit potential growth of this segment.

Data Sources and Limitations

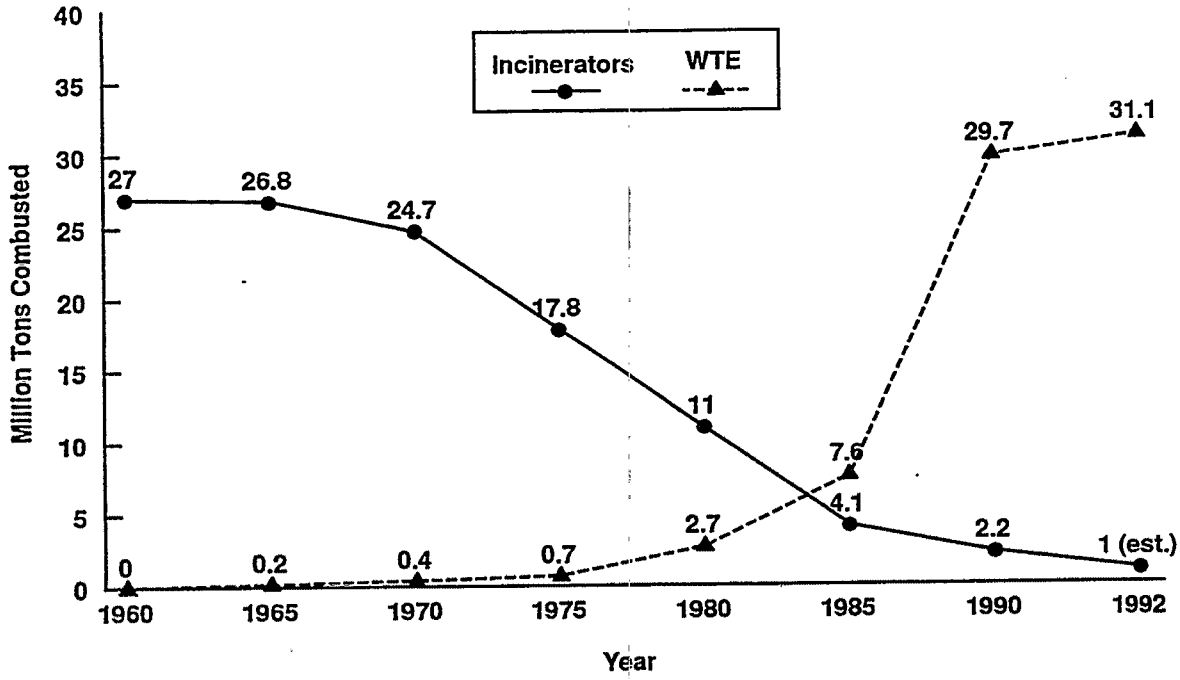
The primary source of information for this section is the *1993-94 Resource Recovery Yearbook: Directory & Guide*, published by Government Advisory Associates, Inc. (GAA). This biennial survey of all WTE facilities located in the United States provides detailed operating data on each facility, as well as data on use of flow controls. This section relies primarily on the raw data for each facility, sorted according to parameters necessary for this analysis. Appendix III-D presents data used to prepare this section. Where footnoted, several other data sources also were used in preparation of this section.

D.1 Overview of Growth Trends

MSW is combusted in two types of facilities: (1) waste-to-energy (WTE) facilities, which recover heat from the combustion of waste to produce either steam or electricity; and, (2) incinerators, which combust waste without energy recovery. Exhibit III-26 illustrates the amount of waste

EXHIBIT III-26[53]

Combustion Market Since 1960: Throughput of Waste-to-Energy (WTE) Facilities and Incinerators



combusted in both WTE facilities and incinerators from 1960 to 1992. As this exhibit shows, WTE facilities have largely replaced the older and now obsolete incinerators. Since WTE is dominant, this section discusses WTE only.

There are three stages of development for WTE facilities (for a complete listing of all WTE facilities and location by State, see Appendix III-D):

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[53] Data on incineration are provided in EPA's *Characterization of Municipal Solid Waste in the United States: 1992 Update*, EPA. The estimated amount of waste incinerated without energy recovery in 1992 (1 million tons) is based on the trend line decline in the amount of waste incinerated as reported in that publication.

1. **Existing.** In 1992, there were 145 existing WTE facilities, including 135 that were operating and 10 that were temporarily shutdown for rebuilding or retrofitting. The 135 facilities in operation combusted 31.1 million tons of MSW in 1992. The remaining 10 facilities temporarily shutdown represent a potential throughput of an additional 0.6 million tons. Six (6) are expected to come back on-line by 1995.[54]

2. **Advanced Planned.** An "advanced planned" facility is defined as one in which the sponsors have initiated the permitting process, established construction schedules, and determined vendors. In 1992, 26 WTE facilities were advanced planned, of which 5 were under construction.

3. **Conceptually Planned.** Twenty-seven (27) facilities were conceptually planned in 1992. Sponsors of a "conceptually planned" facility have completed a feasibility study and submitted requests for qualifications and proposals. These sponsors had not initiated the permitting process as of 1992.

D.2 MARKET SUBSEGMENTS

The 135 operational WTE facilities can be divided into 3 subsegments based on the type of technology employed:

1. **Mass Burn** plants combust unprocessed MSW, with or without removal of recyclables prior to combustion.

2. **Refuse-Derived Fuel (RDF)** plants pre-process the incoming MSW to remove noncombustibles and prepare a more homogenous fuel product (i.e., RDF). The refuse usually is shredded to reduce particle size for burning in semi-suspension or suspension-fired furnaces.[55]

3. **Modular Mass Burn** facilities employ 1 or more small-scale combustion units to process lesser quantities of wastes than the more typical mass burn facilities. The average existing modular facility has a design capacity of 147 tpd or 15 percent of the design capacity of an average size mass burn facility.[56]

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[54] The GAA Yearbook notes that 6 facilities are expected to resume operations by 1995, with the expected start-up date of the other 4 listed as "unknown."

[55] The RDF either is sold to outside customers or burned in a dedicated furnace. Facilities that sell RDF (and do not combust on site) do not have boilers and/or turbines, which lowers their capital costs (see Section D.3).

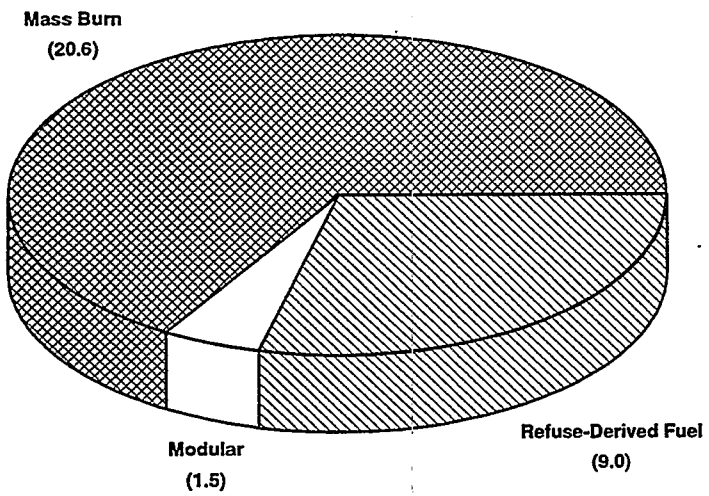
[56] Modular facilities usually are pre-fabricated and can be shipped fully assembled or in modules to a site. In contrast, mass burn facilities typically are custom designed and field-erected.

Throughput of Market Subsegments

Exhibit III-27 illustrates that mass burn facilities accounted for almost two-thirds of WTE waste throughput in 1992 (20.6 million tons). Modular facilities combusted only 1.5 million tons, and RDF facilities accounted for 9.0 million tons of total throughput.

EXHIBIT III-27

Waste-to-Energy Market Subsegments by Throughput

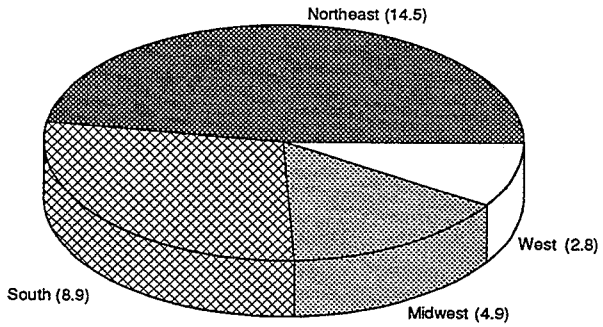


Geographic Distribution of WTE Market Subsegments

Exhibit III-28 shows the distribution of throughput for WTE facilities by 4 geographic regions of the nation. (Appendix III-D includes a detailed listing of throughput for each State by the 3 market subsegments.) As this exhibit indicates, nearly 47 percent of all MSW combusted took place in WTE facilities located in the Northeast, where land and electricity costs are relatively higher than in other parts of the nation. In this region, WTE facilities are more likely to be cost-competitive since high land costs raise the costs of landfills, and high energy prices reduce the net costs of WTE facilities.

EXHIBIT III-28[57]

Geographic Distribution of Waste-to-Energy Market Subsegments



TOTAL = 31.1 million tons

D.3 MARKET SEGMENT COMPETITIVE STRUCTURE

WTE facilities rely on flow controls or long-term contracts to ensure high capacity utilization. Consistently high utilization is essential for facilities to meet their high debt service costs and achieve a net cost that is competitive with landfill costs. WTE costs are competitive with modern landfill costs, especially in the Northeast. However, even though WTE costs are competitive with landfill costs, WTE tipping fees supported by flow controls generally are higher than landfill tipping fees. Due to flow control, such WTE tipping fees need not be constrained by competition and often cover other municipal system costs (e.g., curbside recycling). In contrast, private regional landfills are more likely to set tipping fees at (lower) levels that recover disposal costs only (including return on investment), in order to remain competitive. Landfill tipping fees also may be lower due to

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[57] Regions with States containing 1 or more WTE facilities are as follows: Northeast Region -- Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont; South Region -- Alabama, Arkansas, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia; Midwest Region -- Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin; and West Region -- Alaska, California, Hawaii, Montana, Oklahoma, Oregon, Utah, and Washington. States that have no existing WTE facilities include: Arizona, Colorado, Idaho, Kansas, Kentucky, Louisiana, Missouri, Nebraska, Nevada, New Mexico, North Dakota, Rhode Island, South Dakota, West Virginia, and Wyoming.

competitive pressures, lower costs (for older landfills), and lack of full cost accounting in the landfill segment (discussed in Section III.E below). As stated previously, due to data limitations, the Report does not analyze price-cost relationships in jurisdictions with and without flow control authority. This section describes the competitive economics of the WTE market, use of flow controls, and level of tipping fees to assess the role of flow controls for this market segment.

Role of Flow Control in WTE Market

Flow controls play a significant role in the WTE market segment. As Exhibit III-29 shows, 58 percent of waste throughput is subject to flow controls.

EXHIBIT III-29

Guaranteed Flows of Municipal Solid Waste to Existing Facilities

Number of Facilities	Guarantee Mechanism	Throughput	Average Throughput	Percent of Throughput
61	Flow Controls	18,129,988	297,210	58
40	Contract	9,645,551	241,150	31
34	None	3,319,362	91,620	11
10	N/A (Temporarily Shutdown)	0	N/A	0
145		31,094,901		100

In addition to throughput supported by flow controls, 31 percent of throughput is guaranteed through contractual arrangements. As was stated for MRFs, the contractual arrangements with WTEs may, but need not, be supported by some form of municipal control over waste disposition including a flow control ordinance to ensure that enough waste is delivered to meet the terms of the contract.[58] Thus, some of the waste guaranteed by contracts also may be backed by local government use of flow controls; however, data are not currently available to assess how often this situation occurs. Finally, only 11 percent of waste received at WTE facilities was not guaranteed.

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[58] Telephone conversation with Mr. Mark Ryan, formerly Director of Municipal Finance for Standard & Poor's, and with Ms. Marie Pisecki, Vice President and Manager of the Solid Waste Group for Moody's (May 12, 1994).

The types of waste guarantees, if any, used by WTEs differ across the three different types of WTE facilities. As shown in Exhibit III-30, most mass burn facilities, are supported by flow controls; most RDF facilities rely on either flow controls or contracts; most modular facilities do not rely on flow controls, instead they operate with either contracts or no form of waste guarantee. These differences mirror differences in average size (measured as throughput) and capital cost for the three types of WTEs.

EXHIBIT III-30

Use of Waste Guarantees by Type of Waste-to-Energy Facility Operational in 1992

Facility Type	Waste Guarantees								
	Flow Controls			Contracts			Neither		
	# Facilities	Through-put	% Total	# Facilities	Through-put	% Total	# Facilities	Through-put	% Total
Mass Burn	44	14,365,752	69.9	15	5,376,367	26.1	6	826,886	4.0
RDF	11	3,426,933	38.1	13	3,645,638	40.8	8	1,901,199	21.1
Modular	6	337,623	22.2	12	593,547	39.0	20	591,327	38.8
Total	61	18,129,988	58.0	40	9,645,551	31.0	34	3,319,362	11.0

As shown in Exhibit III-31, average facility throughput for the 61 WTE's with flow controls is three times the average throughput of the 34 WTE facilities without guarantees. Publicly-owned and operated facilities have both the smallest average throughput and the lowest level (i.e., 2.4 million tons out of 4.7 million tons or about 50 percent) of flow control support. In general, the throughput of privately owned and/or operated facilities averages almost three times the throughput of publicly owned and operated WTEs. Facilities owned and operated by the private sector and lacking the support of flow controls or contracts are among the smallest WTEs, in terms of average throughput; however, over 97 percent of the throughput of WTEs owned and operated by the private sector has the support of either flow controls or contracts.

EXHIBIT III-31

Waste-to-Energy Ownership and Use of Flow Controls

	Flow Control		Contract		Neither		Total	
	#	Total Throughput (average)	#	Total Throughput (average)	#	Total Throughput (average)	#	Total Throughput (average)
Privately Owned and Operated	23	8,843,776 (384,512)	27	7,083,744 (262,361)	8	430,364 (53,796)	58	16,357,884 (282,032)
Privately Operated/ Publicly Owned	23	6,929,624 (301,288)	6	2,122,423 (353,737)	5	1,000,114 (200,023)	34	10,052,161 (295,652)
Publicly Owned and Operated	15	2,356,588 (157,106)	7	439,385 (62,769)	21	1,888,884 (89,947)	43	4,684,857 (108,950)
Total	61	18,129,988 (297,213)	40	9,645,551 (241,150)	34	3,319,362 (97,628)	135	31,094,901 (230,333)

Data indicate that WTEs supported by flow controls are more likely to have greater throughput than WTEs not supported by flow controls. The association between the capital costs of WTE facilities and use of flow controls is similarly strong. WTEs supported by flow controls generally have higher mean and median capital costs, regardless of facility type (mass burn, RDF, or modular). Facilities supported by neither flow controls nor contracts generally have lower capital costs. (See Exhibits III-D.7 and III-D.8 in Appendix III-D.) Because of the large capital costs, financing is important; the better the terms, the lower the resulting net operating costs, due to reduced debt service costs.

Individuals with Standard & Poor's (S&P) and Moody's estimate that WTE facilities account for 50 percent ($12 billion) of the total dollar volume of outstanding solid waste bonds, both general obligation and revenue bonds.[59] Moody's and S&P view flow controls as a positive rating factor but also state that flow controls are only one factor in the rating of solid waste bonds. Moody's states

[59] Telephone conversations with Mr. Mark Ryan, formerly Director of Municipal Finance for Standard & Poor's, and Ms. Marie Pisecki, Vice President and Manager of the Solid Waste Group at Moody's (May 12, 1994).

that its "ratings are not based solely on legal structures; factors involving comparative efficiency and cost effectiveness are taken into account."[60] S&P notes that:

> "While important, legal waste flow control is not a requirement for receiving a rating. It is not necessarily even a requirement for receiving a high rating. If a system can provide solid waste disposal at a cost level below the surrounding market, the incentive for a hauler to avoid the system is eliminated. The more competitive the rate, the higher the rating the system's debt is likely to enjoy."[61]

In sum, this is one market segment in which existing market conditions reflect a high use of flow controls and other mechanisms to guarantee waste flows particularly for larger capacity facilities.

Competitive Economics

Mass burn and RDF facilities have total capital costs that are an order of magnitude larger than the capital costs of modular facilities; however, because of their greater throughput, the former's capital costs per ton, and resulting debt service costs, are competitive with modular facilities. For each market subsegment, Exhibit III-32 lists the weighted average costs of operation and maintenance (O&M), debt service, and ash disposal, as well as revenues from the sale of electricity and net cost per ton of throughput.

Mass burn facilities operate at the lowest net cost, $38 per ton of throughput. Even though these facilities have the highest debt service cost, $30 per ton, they have relatively low costs of O&M per ton. Because they are smaller than mass burn facilities and cannot achieve similar economies of scale, modular facilities have higher O&M costs. O&M costs at RDF facilities also are high because, unlike mass burn facilities, they separate incoming waste and process it into a fuel for combustion.

It is important to note that debt service costs listed in Exhibit III-32 account for more than 60 percent of net WTE cost (79 percent at mass-burn facilities). This is one reason why many WTE

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[60] "Solid Waste Flow Control Ordinances," Perspective on Solid Waste, *Moody's Public Finance*, October 5, 1993.

[61] "Courts Complicate Solid Waste Financings," *Standard and Poor's Creditweek Municipal*, November 9, 1992.

EXHIBIT III-32[62]

Average Costs and Revenues of Waste-to-Energy Market Subsegments

Subsegment	O&M ($/ton) (A)	Debt Service ($/ton) (B)	Ash Disposal ($/ton) (C)	Electricity Sale ($/ton) (D)	Net Cost ($) per ton Throughput [(A+B+C)-D]
Mass Burn	24	30	10	26	38
Modular	34	26	9	26	43
RDF	32	28	11	26	45

facilities rely on flow controls or long-term contracts: to guarantee enough waste to spread their fixed costs of debt service and lower their net costs per ton.

The costs in Exhibit III-32 do not include facility siting cost, contingency cost (e.g., the costs incurred during a temporary shutdown), or profit. When these factors are considered, WTE costs are likely to be similar to modern landfill costs, although costs will vary due to location-specific factors. S&P and Moody's agree that most WTE facilities could compete with landfills on the basis of net operating costs.

Tipping Fees

Although WTEs appear competitive with landfills on the basis of net operating costs, reported tipping fees at WTE facilities in several major WTE States are substantially higher than tipping fees at landfills in those same States. *BioCycle's* 1993 survey of MSW generation and management lists average tipping fees charged by landfills and WTE facilities in States that reported this information.[63] For major WTE States that reported tipping fees for both landfills and WTE facilities, the average tipping fees charged are listed in Exhibit III-33. Average WTE tipping fees for

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[62] This exhibit includes all 135 operating facilities and the 10 facilities temporarily shutdown. Costs may vary depending on the efficiency of the facility, debt service arrangement (e.g., interest rate), and location (e.g., costs for ash disposal). Electricity sale revenues may vary depending on location, contractual arrangement with end user, and the amount of electricity generated per ton of waste throughput. Exhibit III-25 reflects an average revenue of approximately 5.5 cents/kwh, which varies considerably across regions of the country (e.g., 3.2 cents/kwh in the South to 6.8 cents/kwh in the Northeast).

[63] "The State of Garbage in America," *BioCycle*, May 1993.

these States, with the exception of Massachusetts, are higher than the average tipping fees at landfills in these States. This tipping fee differential is consistent with the inference that, because their waste flows are guaranteed, WTE facilities are more likely to charge higher prices to cover other municipal system costs, whereas competition will limit the ability of private landfills to recover amounts greatly in excess of costs. It is worth noting that the tipping fees at landfills in most of these major WTE States are already much higher than landfill tipping fees in the other 43 States.

EXHIBIT III-33

Tipping Fees: Landfills Versus Waste-to-Energy Facilities (WTE) ($/ton)

State	Average Landfill Tipping Fee	Average WTE Tipping Fee	Difference
Connecticut	65	74	+9
Maryland	43	49	+6
Massachusetts	65	65	0
Minnesota	50	84	+34
New Jersey	74	93	+19
New York	62	75	+13
Virginia	25	35	+10

The financial community has confirmed as common practice that tipping fees at many WTE facilities (and some municipal landfills) are used by local governments to recover the costs of other integrated waste management activities, such as collection and disposal of household hazardous waste, closure and remediation of older landfills, and recycling programs:[64]

> "The fee structure at most municipal systems [e.g., WTE facilities and municipal landfills] covers other costs in addition to disposal, such as recycling programs and transfer stations. In contrast, charges at private landfills cover only disposal costs. When the tipping fee is broken down into its component parts, prices are usually comparable for facilities sited in similar locations and built about the same time."[65]

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[64] Telephone conversations with Mr. Mark Ryan, Director of Municipal Finance for Standard & Poor's, and Ms. Marie Pisecki, Vice President and Manager of Solid Waste Group at Moody's (May 12, 1994.)

[65] Moody's Public Finance, *Perspective on Solid Waste,* August 16,1993, page 3.

Public/Private Infrastructure

Exhibit III-34 shows WTE throughput by ownership status. In this market segment the distinction between publicly- and privately-owned facilities alone does not necessarily determine whether a facility is more likely to be supported by flow controls.

EXHIBIT III-34

Waste-to-Energy (WTE) Ownership Status and Throughput

WTE Ownership	WTE Throughput
Privately owned and operated	52%
Publicly owned and privately operated	32%
Publicly owned and operated	16%
	100%

It is noteworthy that the private sector has an ownership or operational role for 84 percent of WTE throughput, including most of the larger WTEs. As noted above in connection with the discussion of Exhibit III-31, WTE throughput for these facilities averages nearly three times the amount of the throughput at facilities owned and operated exclusively by the public sector. The involvement of the private sector has been critical to the growth of this market. Conversely, the public sector has an ownership stake in 48 percent of WTE throughput. Some of the largest WTE facilities represent public-private partnerships. Without the involvement and support of the public sector, this market segment would be much smaller.

D.4 MARKET SEGMENT POTENTIAL

Between 1980 and 1990 the amount of MSW combusted in WTE facilities increased ten-fold. Recent trends indicate that the WTE market segment will continue to grow but not at the rate experienced in the 1980s. The reasons for this limited rate of growth are discussed below.

Existing Facilities

Exhibit III-35 indicates that the average ton per day capacity of operating facilities is 742 tons, while the average throughput per day is 630 tons. As a result, the average facility is operating at 84.9 percent of capacity. In addition, the average facility is operating 6.5 days per week or 338 days per year. This high capacity utilization rate means that potential growth resulting from higher utilization of operating facilities is limited.

EXHIBIT III-35

Waste-to-Energy Market Subsegment Capacity and Utilization Rate

Subsegment	Capacity (tpd)	Throughput (tpd)	Utilization (percent)
Mass Burn	983	848	86.3
Modular	147	123	83.7
RDF	1,035	855	82.6
Weighted Average	742	630	84.9

As of 1992, 10 facilities were temporarily shutdown for rebuilding or retrofitting. These 10 facilities together represent 0.6 million tons of additional annual throughput. Six (6) of these facilities are expected to come on-line by 1995, while the re-start date for the other 4 is unknown.

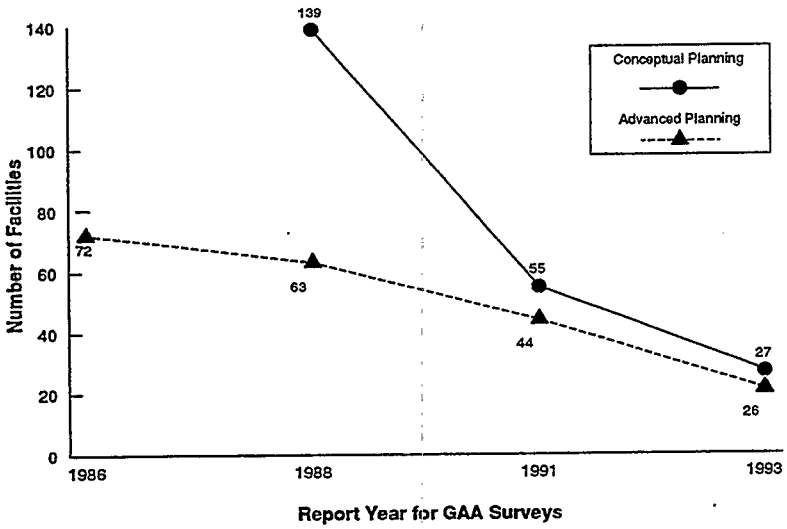
New Facilities

The number of new facilities being planned and coming on-line has decreased in recent years, further suggesting that future growth will not keep pace with the growth experienced since 1980. Exhibit III-36 shows the number of facilities that were reported as conceptually planned and advanced planned in Government Advisory Associate, Inc. (GAA) surveys from 1986 to 1993. For example, in 1988, GAA found that 139 facilities were in the conceptual planning stages of development, and 63 facilities were advanced planned. By 1993, however, GAA found only 27 conceptual and 26 advanced planned facilities.

This decrease in the number of conceptual and advanced planned facilities has affected the number of new facilities coming on-line. The number of new facilities coming on-line peaked in 1988. For example, in the four years prior to 1988, 60 new WTE facilities came on-line; while in the 4 years following 1988, only 41 new facilities came on-line.

EXHIBIT III-36

Number of Conceptually Planned and Advanced Planned/Under Construction Facilities 1986 to 1993



Another indicator of diminished growth in future capacity from new WTE facilities is the number of facilities under construction. In its survey, GAA found only 5 facilities in 1992 under construction: three in the Northeast, one in the South, and one in the West. Four (4) of these facilities are expected to come on-line by 1995, with the fifth scheduled to come on-line by 2000. Together, these five facilities would add approximately 1.6 million tons of annual throughput.

Should the 10 facilities temporarily shut down (discussed above) and the 5 facilities under construction all come on-line by 2000 as planned, 2.2 million tons of throughput will be added to the existing throughput of 31.1 million tons, an increase of seven percent. The remaining 21 facilities that are advanced planned (but not under construction) could add up to an additional 6.5 million tons of throughput. However, GAA data indicate that many advanced planned projects have been abandoned in recent years prior to beginning construction. Therefore, it is uncertain whether facilities not actually under construction will ever come on-line.

Other Factors Inhibiting Future Growth Rates

Other factors occurring both inside and outside the market may limit future growth in WTE throughput, for example:

- **High capital investment.** Relative to the other market segments, WTE facilities require a substantial initial capital investment. The average capital investment for planned facilities is approximately $136 million, which is much greater than the original capital investment for existing WTE facilities. Even high technology MRFs require capital of no more than $7 million, on average; capital costs of landfills can be spread out over time as cells are opened and closed.

- **Increased emphasis on recycling, composting, and waste reduction strategies.** Recycling and composting rates have increased significantly in recent years as many State and local governments attempt to reach recycling goals. Increased recycling and composting, as well as source reduction, decrease the amount of waste available for combustion in WTE facilities.

- **Landfill competition.** Price competition from landfills has left many WTE facilities at a relative price disadvantage. *Solid Waste Price Digest* (November, 1992), for example, estimates that the average price of disposal at a landfill is $28 per ton versus $56 per ton at WTE facilities. (These estimates are similar to those reported in *BioCycle*, May 1993). Competition for waste can be seen in the tipping fees charged by WTE facilities for local waste versus waste brought in from outside of the area of operation. For example, in Broward County, Florida, the tipping fee for local waste is $55 per ton, while the fee for outside waste is $42 per ton. Montgomery County, Pennsylvania, charges $63.50 per ton for local waste, but $41 per ton for outside waste. Both localities use flow controls to guarantee local waste inflows at higher tipping fees.[66]

- **Public opposition.** In the past 5 years, Massachusetts, Florida, and New Jersey (all States with significant amounts of existing WTE capacity) placed temporary moratoria on new WTE development. This led to a general decrease in the number of planned WTE facilities, as well as increases in the number of cancelled and delayed projects.[67]

The combination of high capital costs, competition from other market segments, and political uncertainties are likely to limit the growth of this market segment in future years.

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[66] "Fading Garbage Crisis Leaves Incinerators Competing for Trash," *The Wall Street Journal*, Jeff Bailey, August 11, 1993.

[67] GAA Yearbook, 1993-94.

E. LANDFILL MARKET SEGMENT

Key Findings

- The number of municipal solid waste landfills (MSWLFs) has declined rapidly since 1988, although estimated total landfill capacity has not shown this same decline. On a national basis, very small landfills account for most landfill closings, and large, regional landfill openings and expansions have offset this lost capacity.

- Large private landfills account for approximately 30 percent of the landfill market segment, smaller private landfills are estimated to account for 25 percent, and government-owned landfills are estimated to account for 45 percent of this market segment.

- No evidence was found that flow controls have played a significant role in financing new landfills or landfill expansions. Private firms have demonstrated their ability to raise substantial capital from publicly-issued equity offerings, indicating that investors have been willing to provide capital for the expansion of landfill capacity in response to a perceived market demand for this segment and its cost-competitiveness.

- Modern landfills are more cost-competitive when designed for large-scale operations receiving 750 tons per day or more. The cost for such large landfills is approximately $40 to $50 per ton. Smaller, older landfills generally charge lower tipping fees at present, due to lower historical landfill costs, including land acquisition costs. New landfills incur higher land acquisition costs and regulatory costs.

- Anticipated growth in composting and recycling, modest growth in WTE, and increased source reduction efforts likely will result in a continuing decline in the share of waste received at MSW landfills. However, the nation will continue to rely on landfills as a component of integrated solid waste management for the foreseeable future.

Data Limitations

Available data on the total number of landfills are not entirely consistent. In addition, there are no systematic data on the total amount of remaining landfill capacity; however, available reports over recent years indicate that remaining national landfill capacity has not been significantly reduced by the closing of many small landfills.

Quantitative data on the role of flow controls in this market segment also are unavailable. However, indirect evidence indicates that flow controls are not a major factor in this market segment. For example, private firms have demonstrated their ability to raise capital from publicly-issued equity offerings, indicating that investors are willing to provide capital for capacity expansion on a general nationwide basis (e.g., without site-specific flow control guarantees). Also, financial experts[68] familiar with publicly-issued solid waste bonds have indicated that flow controls are not as significant in the financing of landfills as they are for WTE facilities because of the much greater amounts of upfront capital required for WTEs.

E.1 Overview of Growth Trends

Landfills have long been the dominant segment of the MSW management market. Although the majority of waste still is managed in landfills, recent growth in all of the other segments (i.e., recycling, composting, and WTE) slowly has eroded the landfill segment's market share. In 1992, landfills managed approximately 211 million tons of MSW and non-MSW (see Appendix III-E).

Number of Landfills

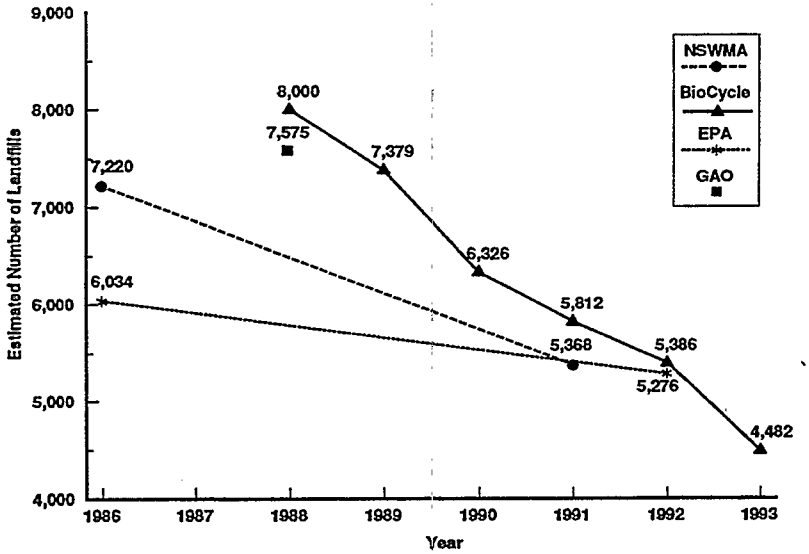
Several sources have estimated the number of MSW landfills in the U.S. Exhibit III-37 charts estimates from four different sources: National Solid Wastes Management Association (NSWMA), *BioCycle*, EPA, and the Government Accounting Office (GAO). The differing estimates from these sources can be explained in part by continuous landfill closures and openings; changing State definitions of landfills (e.g., revisions to exclude open dumps, inclusion of C&D or industrial landfills); different survey mechanisms; or lack of formal tracking mechanisms in some States.

Although the estimates tend to vary (with annual discrepancies among sources ranging from 100 to over 1,000 landfills), all estimates indicate a substantial, constant decline in the number of landfills over the past decade. For example, *BioCycle* reported 8,000 landfills nationwide in 1988; five years later, nearly 50 percent of these landfills were closed. Two main reasons for this decline are: (1) facilities reaching capacity and closing; or (2) facilities closing due to failure to meet environmental standards. For instance, to avoid new RCRA Subtitle D regulations mandating stricter liner and site management standards (although not fully implemented as yet), over 900 landfills are

[68] Mr. Mark Ryan, Standard & Poor's, and Mr. Michael Decker, Public Securities Association.

EXHIBIT III-37

Estimated Number of U.S. Municipal Solid Waste Landfills



believed to have closed between 1992 and 1993 alone, according to *BioCycle*.[69] Moreover, this observation is consistent across the nation, as 36 States reported a decline in the number of landfills in 1993.

Landfill Capacity

In the 1980s, the landfill capacity situation often was characterized as a disposal crisis. The substantial decline in the total number of landfills, however, has not significantly affected total landfill capacity. Exhibit III-38 presents the results of two surveys conducted by NSWMA. In 1986, NSWMA identified eight States with less than five years of remaining landfill capacity. The 1991 NSWMA survey, however, found that five of these States were still reporting less than five years of remaining capacity, two were reporting five to 10 years of capacity, and one was reporting more than 10 years of capacity. Also, two States, reporting five to 10 years of remaining capacity in 1986, reported more than 10 years remaining capacity in 1991. These data show that some combination of expanded landfill capacity and growth in other market segments, causing a decrease in demand for

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[69] Robert Steuteville, "The State of Garbage in America," *BioCycle*, May 1994.

landfill capacity, has either stabilized or increased remaining capacity in States that had reported imminent shortfalls in 1986.

BioCycle's surveys of remaining capacity in 21 States conducted in 1990 and 1993 found that, although the number of landfills declined between those years, capacity in these States actually increased by 68 percent from 9.5 years to 16 years. Only two (Indiana and Missouri) of the 21 States showed a net decline in remaining capacity. More significantly, all reporting States showed increases in recycling and composting, which closely corresponded to increased or stabilized landfill capacity over this period. (See Appendix III-E for more detail on this comparison.)

EXHIBIT III-38

Estimated Remaining Landfill Capacity In Selected States

States in 1986	States in 1991
<5 years remaining	
Connecticut Kentucky Massachusetts New Jersey Ohio Pennsylvania Virginia West Virginia	Connecticut Kentucky New Jersey Virginia West Virginia
5 to 10 years remaining	
Colorado Oklahoma	Massachusetts Ohio
>10 years remaining	
	Colorado Oklahoma Pennsylvania

Source: NSWMA, "Landfill Capacity in North America: 1991 Update"

Another NSWMA study (summarized in Exhibit III-39) compares the change in the number of landfills with remaining capacity in 8 States. This study found that the decline in the number of landfills did not result in a decline in capacity; rather, capacity increased in many of the States. This increase in capacity is due to the fact that newer and expanded facilities are much larger in size than facilities that are closing.

A review of the largest private companies in the industry confirms this general trend toward opening large new landfills, expanding existing facilities, and acquiring smaller facilities with expansion potential, for example:

EXHIBIT III-39

State Estimates for Landfill Closings, Openings, and Expansions 1986-1991

State	Number of Landfills: Closings	Openings	Expansions	Net Change in: # LFs	Capacity (million tons)
California	46	5	Unknown	(41)	5
Delaware	0	0	7	0	3.6
Massachusetts	43	3	72	(40)	0.4
Nevada	1	0	1	(1)	0.13
New Hampshire	22	5	0	(17)	0.03*
Rhode Island	4	0	0	(4)	(0.2)*
Texas	191	60	29	(131)	n/a
Wisconsin	850	9	12	(841)	n/a

Source: "Landfill Capacity in North America: 1991 Update," 1992, NSWMA; * Volume in tons per year, rather than total tonnage.

- Waste Management Services reported in 1992 that it was developing 30 new sites and expanding approximately 50 other sites.[70]
- In 1992, Mid-American Waste Systems obtained permits to expand 8 facilities and was seeking permits to expand another 9. The company reported a projected expansion of more than 100 million tons of landfill space.[71]
- Chambers Development Company reported in 1992 that it was opening 3 new landfills, expanding operations at 2 sites, and beginning development for several others.[72]

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[70] *Waste Management Services, Inc., 1992 Annual Report*, page 23.

[71] Securities and Exchange Commission, Form 10K, Mid-American Waste Systems, 1992, page 13.

[72] Securities and Exchange Commission, Form 10K, Chambers Development Company, Inc., 1992, pages 6, 7.

- Sanifill reported in 1992 that it replaced more than 5 times the amount of landfill space it used and achieved an additional 21 percent expansion in permitted capacity.[73]

The continuing expansion of landfill capacity by large waste management firms indicates that these firms will account for an increasing share of the landfill market segment.

E.2 MARKET SUBSEGMENTS

MSW landfills existing in 1992 can be classified in 3 categories:

1. **Large private landfills owned by publicly-held companies.** The landfills generally range from 500 to 1,500 tons per day capacity, with a few facilities having capacities greater than 2,000 tons per day. Landfills owned by large, publicly-held corporations accounted for 30 percent of the landfill market segment, based on EPA's analysis of available data on MSW landfill capacity for 13 large waste management firms (see Appendix III-E).

2. **Smaller, independently-owned private landfills.** These landfills tend to have less than 500 tons per day capacity and probably have an average disposal rate of less than 100 tons per day.

3. **Government-owned landfills.** These facilities generally have less than 500 tons per day capacity and probably have an average disposal rate of less than 100 tons per day.

There are no verifiable data on the amount of waste managed by small private landfills and government landfills, but one large waste management firm estimated that large firms account for 30 percent of landfill revenues, small firms 25 percent, and government landfills 45 percent.[74] The 30 percent revenue estimate for large firms is consistent with EPA's analysis of the share of landfilled waste managed by large firms. In general, landfill revenue share should be proportional to the share of waste received, because tipping fees produce revenues on a dollar per ton basis. Therefore, in the absence of more definitive data, EPA estimates that large firms account for 30 percent of the landfill market; small firms, 25 percent; and government landfills, 45 percent.

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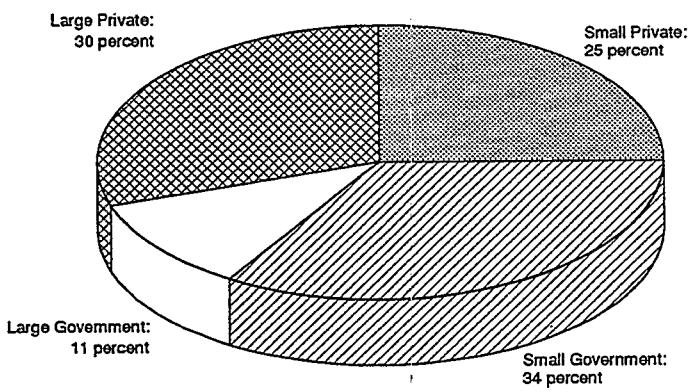
[73] *Sanifill 1992 Annual Report,* page 8.

[74] *Sanifill 1992 Annual Report,* Page 8. Sanifill cites "EPA estimates," but does not indicate where these estimates were found.

Also, there is no available data detailing the number of large and small government-owned landfills. However, EPA's review of landfill disposal in 14 States (see Appendix III-E) found that large landfills have the capacity, on average, to dispose of 41 percent of all waste landfilled in these States. If all large landfills account for 41 percent of this market segment, and large private landfills account for 30 percent of the market, then large government-owned landfills must account for the remaining 11 percent of the landfill market. If all government landfills account for 45 percent of this market segment, and large government landfills account for 11 percent, then small government landfills must account for 34 percent. Exhibit III-40 presents landfill market share estimates based on this analysis of limited available data.

EXHIBIT III-40

Landfill Market Share



E.3 MARKET SEGMENT COMPETITIVE STRUCTURE

This section discusses the competitive economics of the landfill market, capital requirements and scale of operations, the availability of investment capital, and the role of flow controls in guaranteeing waste for landfills.

Competitive Economics

Financial reports from large waste management firms indicate that the landfill market segment has been highly competitive in recent years. For example, one company reported experiencing intense price competition largely due to the rapid use of existing capacity by many older landfills seeking to fill capacity and close rather than comply with EPA revised MSWLF criteria.[75] Another firm noted that the recession caused some competitors to accept lower profit margins to maintain market share.[76] Another source noted that the continued decline in disposal rates, coupled with increases in capacity within the industry, could result in "further softening of disposal rates . . . and increased competitive pressure."[77] Finally, independent financial analysts confirm that waste minimization and recycling ". . . are altering the supply-demand side of the landfill business. This situation has intensified competitive price pressures."[78]

Capital Requirements and Scale of Operations

Although estimates vary depending on location and facility type, landfill development and expansion involves substantial capital requirements. For example, one company estimated that start-up costs, including site preparation, excavation, and installation for a liner system at the base elevation, require significant capital expenditures - often exceeding $200,000 per acre.[79] However, unlike WTE facilities, landfills do not incur all of their capital costs "upfront" before any waste is received. Large landfills operate in cells (i.e., opening one section of the landfill as another section is closed), allowing some capital expenditures to be incurred over the life of the entire landfill.

Exhibit III-41 shows that there are substantial economies of scale associated with the development and operation of modern landfills ranging from 100 to 1,500 tons per day. Although multiple factors cause costs to vary, Exhibit III-41 provides an example of the costs for modern

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[75] Securities and Exchange Commission, Form 10K, Chambers Development Company, Inc., 1992, page 9.

[76] Securities and Exchange Commission, Form 10K, Browning-Ferris Industries, 1993, page 14.

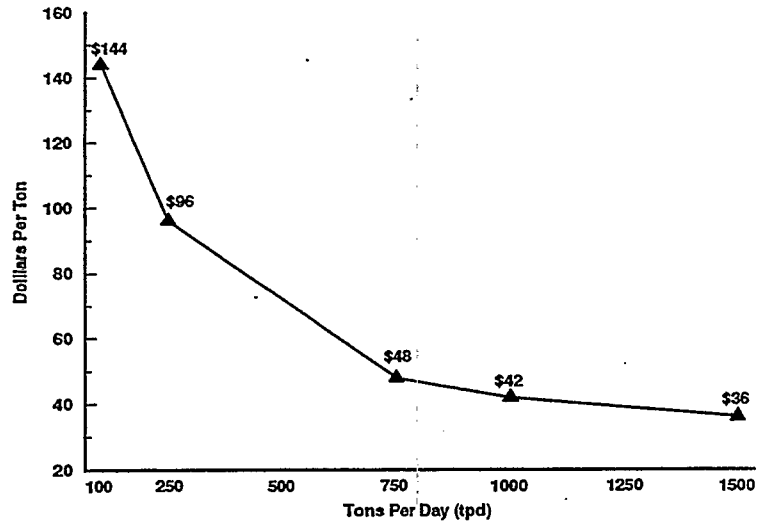
[77] *American Waste Services 1992 Annual Report*, page 16.

[78] *Value Line*, March 25, 1994, p. 339.

[79] *Chambers Development Company, Inc., 1991 Annual Report*, page 3.

EXHIBIT III-41

Economies of Scale at Landfills



Source For 100 tpd. "Waste Age," March 1991; For 250-1500 tpd. NSWMA.

landfills. These costs reflect site development, operating costs, closure and post-closure care costs for meeting EPA revised MSWLF criteria, as well as profit and corporate overhead costs.

As shown in Exhibit III-41, landfills with capacity less than 250 tons per day cost twice as much per ton as those facilities with capacity of 750 tons per day. The cost triples for 100 ton per day facilities. The economies of scale begin to level out for facilities between 750 and 1,500 tons per day.

The economies of scale realized by regional landfills may encourage some amount of inter-State and intra-State waste transport. This does not mean that a few, extremely large landfills will dominate this market segment in the future. Because additional economies of scale are minimal for facilities exceeding 750 tons per day, transportation costs and transfer facility costs would eventually render long-distance waste hauling non-competitive.[80] Therefore, it appears that landfills with capacity between 500 and 1,500 tons per day will remain competitive in the waste disposal sector.

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[80] One source provides a rough estimate of $4 per ton for transfer facility costs, and $4 and $7 per ton for every 100 miles for rail and truck hauling, respectively. Konheim and Ketcham, "Exporting Waste: A Report on Locations, Quantities, and Costs of Out-of-City/State Disposal of New York City Commercial Waste," April 1991.

The economies of scale demonstrated above support the conclusion that regional (often privately owned and operated) landfills potentially are more cost-effective for small communities than smaller, closer landfills. Other analyses have found that regional landfills use land more efficiently, lowering the risk of adverse environmental impacts, and are supported by a larger tax base than local landfills; private companies also are able to buy materials and equipment in bulk at lower cost.[81]

Tipping Fees

Exhibit III-42 compares tipping fees of larger landfills (greater than 500 ton per day capacity) with those of all landfills. Although the previous sections demonstrate economies of scale for larger landfills, tipping fees nationwide are slightly higher for larger landfills than for all landfills. This is likely due to the fact that large landfills tend to be newer and designed to spread the fixed costs of new environmental requirements. Small landfills, on the other hand, tend to be older, having been established when the lack of rigorous environmental requirements encouraged small towns to have their own landfills to minimize waste transport costs. Many older landfills have lower tipping fees, which do not recover their full costs of operation; for example, they may not cover costs such as proper closure and post-closure care. Also, older landfills have lower costs due to lower historical land acquisition and site development costs compared to newer landfills. Finally, some older landfills facing imminent closure have lowered tipping fees in order to attract customers and use up remaining capacity.

EXHIBIT III-42

Comparison of 1992 Tipping Fees at Large Facilities and All Facilities ($/ton)

Region	Larger Facilities (>500 TPD)	All Facilities
Northeast	59.81	51.63
South	25.34	22.71
MidWest	26.92	23.13
West	28.58	23.45
National	31.51	29.00

Sources: Larger facility fees from Solid Waste Digest, October 1992; all facility fees reported in "The State of Garbage in America," *BioCycle*, May 1993.

[81] James Powell, "Regionalization of Landfills: A Solution for 21st Century Solid Waste Disposal," Florida League of Cities, January 1993.

Flow Controls

Although quantitative data on the use of flow controls in the landfill segment are unavailable, the private sector has demonstrated its ability to raise investment capital through issuance of common stock to expand landfill capacity nationwide without site-specific flow control guarantees. Public stock offerings raised substantial equity capital for both well-established and relatively new landfill disposal firms in recent years. This ability to raise capital quickly in response to the closure of many small landfills allowed the private sector to significantly expand its share of the landfill market segment.

An examination of recent (1990-92) financing activities of major publicly-held firms in the industry documents substantial cash flows raised through issuance of common stock. Exhibit III-43 shows the nearly $1.25 billion equity capital raised by selected landfill companies. These landfill firms also raised substantial capital through debt issues and retained earnings. Companies have been able to raise this investment capital on the basis of their general business acumen and prospects, not on the basis of specific proposed developments supported by flow controls.

Financial experts familiar with municipal solid waste bonds also have stated that flow controls are not as significant in the financing of landfills as they are for WTE facilities.[82]

EXHIBIT III-43

Equity Raised Through Issuance of Common Stock ($ million)

Company	1990	1991	1992
American	60.2*	0.2	0.5
Chambers		164.7	
Eastern	5.3	10.7	0
Laidlaw	448.8	42.2	217.2
Mid-American	75.5*	93.4	20.6
Republic	13.5*	30.5	11.5
Sanifill	9.6*	2.0	
USA	4.2	2.8	0
Western	27.9	1.0	1.3
Total	645.0	347.5	251.1

* Year of initial public offering.
Information obtained through company 10K reports filed with the Securities and Exchange Commission.

[82] Telephone conversations with Mr. Mark Ryan, formerly Director of Municipal Finance for Standard & Poor's, and Mr. Michael Decker, Director of Policy Analysis at the Public Securities Association (May 13, 1994).

Furthermore, municipal waste contracts cited in *Solid Waste Digest* and *Value Line*[83] report major landfill contracts with 6 and 3-year terms, as opposed to the 20-year commitments common in the WTE segment. Landfills can operate under shorter term contracts, because they incur many fixed costs in increments as they open new cells. WTE facilities, by contrast, must operate at high utilization rates over 20 years to spread the cost of large up-front capital investments.

E.4 Market Segment Potential

As discussed above, the landfill market segment share has shrunk over the past decade. The continued growth projected in the recycling segment and potentially dramatic growth in composting will continue to erode the landfill market segment share. Although growth in the WTE segment is slowing, this segment is not expected to drop the way that landfills have. Also, the relatively high capital costs (and debt service needs) of WTE facilities mean that these facilities are likely to "bid" aggressively for new garbage to maintain capacity utilization (and energy output), forcing landfills to absorb market losses to recycling and composting. This reduced flow of waste to landfills will be compounded each year and could result in a significant extension in the operating life and remaining capacity at existing landfills.

Also, there is significant growth potential for the recycling and composting of non-MSW that competes for management capacity at MSW landfills. For example, regional data indicate that 6 New England States increased their sewage sludge composting from 150 dry tons per day in 1990 to 250 dry tons per day in 1993.[84] The State of New York reported that sludge composting increased from 24,715 tons in 1991 to 85,783 tons in 1992. Further expansion of sewage sludge composting will reduce the amount of sewage sludge received by MSW landfills, extending landfill capacity.

In addition, it is technically possible to recycle a large amount of C&D wastes, and one expert estimates that 90 percent of C&D wastes could be recycled.[85] Available information reveals that a growing number of facilities throughout the country are processing C&D wastes for recycling. One

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[83] *Value Line*, March 25, 1994, p. 343 and *Solid Waste Digest*, September 1993, p. 3.

[84] "Compost Marketing in New England," *BioCycle*, August 1993.

[85] Gershmann, Brickner & Bratton, Inc., (GBB), "Construction Waste and Demolition Debris Recycling . . . A Primer - Draft," June 30, 1992.

source estimates approximately 150 facilities nationwide,[86] while another estimates 58 facilities in the Northeast alone.[87] Further expansion of C&D recycling could significantly reduce C&D waste disposal at MSW landfills, thus extending available MSW landfill capacity.

Although the landfill market segment will continue to shrink, MSW landfills are a necessary component of any MSW management system. Recycling and composting can divert a significant portion of MSW from landfills, but not all MSW is recyclable or compostable. Likewise, although WTE technologies can reduce the volume of MSW, all WTE facilities produce residual ash that must be landfilled. Finally, modern landfills are cost-competitive with WTE facilities and in some areas of the country may be more cost-effective for consumers.

F. ANALYSIS OF KEY ISSUES IN FLOW CONTROL DEBATE

EPA's analysis of the MSW facility market and its use of flow controls supports the following findings on issues raised by Congress:

Findings

- ***Flow controls play a limited role in the solid waste market as a whole. Flow controls are not typically utilized by landfills or composting facilities. Less than 3 percent of the recycling market is subject to flow controls; however, approximately 19 percent of the materials handled by existing MRF-based recycling programs is supported by flow controls. Flow controls play the largest role in the waste-to-energy market where at least 58 percent of the throughput is supported by flow controls.***
- ***Although flow controls have provided an administratively efficient mechanism for local governments to plan for and fund their solid waste management systems, there are alternatives. Implementation of these alternatives by communities currently relying on flow controls may be disruptive and take time.***
- ***Accordingly, there are no data showing that flow controls are essential either for the development of new solid waste capacity or for the long term achievement of State and local goals for source reduction, reuse and recycling.***

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[86] Robert Brickner, Gershmann, Brickner, and Bratton, August 1993.

[87] C.T. Donovan Associates, Inc., "Recycling Construction and Demolition Waste in Rhode Island," December 1992.

Evaluation of the four MSW market segments indicates that sufficient capacity exists on a national basis to manage the waste stream. Recycling and composting rates have increased substantially in recent years; WTE has grown, then leveled off; and landfill capacity has been extended due to increased recycling/composting efforts and landfill bans. This analysis also reveals that flow controls play a limited role in the solid waste management market as a whole. Only a small percentage of the waste managed by the composting, recycling, and landfill market segments is affected by flow controls. The MRF segment, currently handling 5.7 million tons of MSW, is the only one of these segments making any significant use of flow controls: about 13 percent of MRFs (with over 1 million tons of throughput) are supported by flow controls. Flow control has been used more extensively for MRFs that require substantial capital investment, with over 32 percent of the throughput of high technology facilities being flow controlled. The WTE market segment, accounting for 31 million tons of the 292 million ton MSW facility market, is the segment where flow controls play the largest role; a minimum of 58 percent (i.e., 18 million tons) of WTE throughput is supported by flow controls.

Adequate MSW management capacity, along with the increase in recycling and composting rates, results from competitive waste management markets that are increasingly intertwined with other dynamic markets (i.e., energy, recycled materials, paper, compost). Over recent years, unforeseen market developments repeatedly have altered the competitive position of different market segments and subsegments. Recent and ongoing changes in waste management market segments include the following examples:

- In the early 1980s, rising energy prices and concern about the risks of land disposal appeared to offer unlimited potential to the WTE segment of the waste management market; but the explosive growth in new WTE facilities coming online between 1985 and 1990 coincided with an unanticipated plunge in world energy prices and increasing public concerns about the risks of waste combustion.

- Landfill capacity, perceived to be in extremely short supply in the 1980s, has been unexpectedly extended by the successful diversion of waste materials to the growing recycling and composting markets. Economies of scale, successful siting of large regional landfills, competitive waste transport markets, and legal decisions removing obstacles to interstate waste transport also have expanded the geographic range of modern landfills, making their capacity available to more locations.

- The recycling segment offered tremendous growth potential in the late 1980s, relative to WTE costs and an apparent shortage of landfill capacity. However,

the sudden expansion in the supply of recyclables, coinciding with depressed demand for recycled materials during the 1990-1991 recession, resulted in some calls for a critical review of recycling costs. More recently, collection vehicles and collection crew staffing specifically designed for recycling and improved MRF processing appear to be reducing the cost of recycling at a time when end-market demand is growing with the economic expansion. These factors are now serving to enhance the growth of the recycling market segment.

- Just a few years ago, the potential of the composting segment was virtually unrecognized by many waste management experts, but yard trimmings landfill bans and competitive costs in some communities now hold the potential for substantial expansion of this market segment. Also, more competitive technologies and collection strategies for composting are evolving, as mixed waste composting competes with yard trimmings composting and source-separated organics composting.

The remainder of this section addresses in more detail congressional questions concerning the role of flow controls in ensuring adequate capacity and achieving recycling goals.

F.1 ARE FLOW CONTROLS NECESSARY TO ENSURE ADEQUATE WASTE MANAGEMENT CAPACITY?

In a relatively short time period, adequate capacity for national and regional MSW management has been developed. Prospectively, the need for flow controls appears limited. As explained below, however, flow controls may be desirable to provide self-sufficient capacity for State and local political jurisdictions.

Recycling and Composting Capacity

The recycling and composting market segments have grown significantly in recent years. This growth was not primarily a direct result of the use of flow controls within these two market segments. Rather, the evaluation of these segments shows that:

- A minimum of 13 percent of MRFs, with 19 percent of total MRF throughput, are supported by flow controls. This represents 2.7 percent (about 1 million tons) of the waste managed by the recycling market and a minor fraction of all waste managed in MSW facilities.

- Flow controls have been a more important factor for MRFs requiring substantial capital investment; 32 percent of the throughput at high technology MRFs is supported by flow controls.

- Even though some of the 21 mixed MSW composting facilities may have waste guaranteed by flow controls, these facilities in total managed only 0.4 million tons in 1992, which was less than one percent of all recycled MSW and a negligible portion of all waste managed in MSW facilities.

- Although the "flow constraint" of yard trimmings landfill bans has had a positive impact on the composting segment, flow controls are not used to direct a large amount of yard trimmings to specific composting facilities.

These findings are consistent with the fact that many of the States that authorize flow controls exclude certain recyclables.

Waste-to-Energy Capacity

Approximately 58 percent (i.e., 18 million tons) of all waste managed by WTE facilities is guaranteed by flow controls and an additional 31 percent is guaranteed by contractual arrangements. Moreover, representatives from bond rating agencies (Standard and Poor's and Moody's) indicate that many WTE contracts are long-term "put-or-pay" contracts, which require local governments to provide an agreed upon amount of waste or pay for the difference. Local governments, in turn, may use flow control (or other mechanisms) to ensure that they can deliver a sufficient amount of waste to meet the terms of such contracts.

The number of new WTE facilities actually beginning operations has slowed significantly in recent years. Even with continued use of flow controls, the future growth of this market segment will slow considerably due to market forces such as:

- The decrease in energy prices in recent years is removing one of the main reasons for investment in WTE facilities; and

- Greater use of recycling and composting may remove waste from WTE waste inflows.

Although these market developments will slow the growth in WTE market share, existing facilities and those under construction will continue to supply substantial MSW management capacity.

Without flow controls, what would become of this waste management capacity? Some WTEs and local governments would use alternative mechanisms to secure needed waste flows; these mechanisms could include contracts, franchises, and subsidies (i.e., economic flow controls). Some waste no longer directed to WTEs would be managed at composting, recycling, and landfill facilities; on a national basis, all of these market segments have adequate capacity and could absorb wastes not managed by WTEs.

Landfill Capacity

Although the number of MSWLFs has decreased significantly over the past five years, several factors have contributed to maintaining a consistent level of landfill capacity:

- Most of the landfills that have closed had relatively small capacities and could not benefit from economies of scale;
- The private sector has made substantial investment in new regional landfills and landfill expansions, which have offset loss of capacity resulting from landfill closures; and
- Growth in recycling and composting activities, yard trimmings and other landfill bans, and WTE facilities have all diverted waste from landfills, thus extending capacity.

These market developments indicate that there is no national shortage of landfill capacity and no anticipated shortage in the foreseeable future.

Use of Flow Controls to Ensure Adequate In-State Capacity

Whether States and local governments consider in-State capacity to be an important goal, or how much additional waste management costs (if any) should be incurred in pursuit of such goals are issues beyond the scope of this Report. However, flow control is one of a variety of mechanisms that States and local governments can use to provide for the development of in-State or local capacity to manage MSW.

Flow controls can foster local capacity by making it easier to properly size and finance waste management facilities. Controlling the disposition of locally-generated MSW allows planners to more accurately determine how much waste must be handled and the types and sizes of facilities needed.

Similarly, control of the waste ensures that waste management facilities will be amply utilized, which should result in cost-efficient operations. Finally, legal control over MSW can help assure investors that proposed projects are financially viable, thus securing financing at relatively favorable rates.

F.2 ARE FLOW CONTROLS NEEDED TO ACHIEVE STATE RECYCLING GOALS?

There are two potential ways in which flow controls might aid in achieving State recycling goals:

(1) The direct impact of flow controls explicitly requiring that recyclables be sent to specified recycling facilities (e.g., MRFs); and

(2) The indirect impact of State and local governments using higher tipping fees under flow controls as a funding mechanism to subsidize curbside recycling programs, MRFs, recycling promotion and education programs, and household hazardous waste programs. (Addressed in Section F.3 below.)

Direct Impact of Flow Control on Recycling Rates

As noted earlier, flow controls direct less than 3 percent of recycled materials to specific recycling facilities, and there is no evidence that flow controls commonly are used to direct yard trimmings to specific composting facilities. Furthermore, some of the States that authorize flow controls for mixed waste explicitly exclude recyclables from flow control restrictions. Therefore, the use of flow controls to direct recyclable and compostable materials to specific facilities does not appear to be a major factor in the future growth of the recycling and composting segments except for high technology MRFs.

F.3 INTEGRATED SOLID WASTE MANAGEMENT

Integrated solid waste management (ISWM) involves using different approaches for handling the entire MSW stream in a State or community. ISWM allows each type of waste to be managed according to the waste management hierarchy, taking into account environmental and economic considerations. The waste management hierarchy emphasizes a preferred order of solid waste management approaches: source reduction, recycling, waste combustion with energy recovery, and landfilling. ISWM can be a cost-effective MSW management approach.

Some desirable components of an ISWM program do not lend themselves to generation of their own revenues. For example, outreach and education on source reduction generally are performed at no direct charge (i.e., a separate fee) to the target audiences. Household hazardous waste programs similarly are offered at no direct charge in order to encourage participation. These activities all require sources of funding.

State and local officials indicated at the flow control meetings that revenues generated by flow controls are used by some jurisdictions to support various elements of ISWM systems. Where flow controls are used to support ISWM, costs of the various service elements of the system are built into the tipping fees of the designated facilities. As a result, these tipping usually are higher than the market level. Flow controls ensure that the MSW goes to these facilities, rather than to facilities with lower tipping fees. The revenues generated by the flow control-supported tipping fees are used to fund elements such as those noted above that comprise the ISWM system. Thus, prior to the Supreme Court *Carbone* ruling, flow controls provided an administratively efficient mechanism for local governments to fund ISWM.

G. ALTERNATIVES TO FLOW CONTROL

One of the primary purposes of flow control has been to generate revenues to finance solid waste facilities and other components of an ISWM system that cannot generate sufficient revenue to cover program costs (e.g., curbside collection programs, outreach and education, household hazardous waste collection). The Agency explored various alternatives, both in terms of organizational options and funding mechanisms, that State and local governments could or are employing to support solid waste management systems. This section describes the alternatives and discusses how solid waste managers might assess them when planning a new or modified system of fees and charges.

Organizational Alternatives

By using various organizational arrangements, municipalities can direct waste to specific facilities, an effect similar to that produced by flow control. Among the options available to local governments are:

- providing waste collection services themselves and delivering waste and discarded recyclables to selected facilities;

- hiring contractors to perform collection services and using the contracts to require delivery of wastes to selected facilities;
- awarding franchises for collection and hauling services within given collection districts; haulers agree to deliver waste to the facility designated by the community; and,
- establishing special purpose districts or utilities to manage MSW collection and delivery to designated facilities.

Financial Alternatives

Among the financial mechanisms which State and local governments can use are the following: (1) taxes, (2) uniform user fees, (3) unit-based (i.e., variable) fees, and (4) market-based tip fees. The following paragraphs describe each of these alternatives.

Taxes, which can apply to property, income, and/or sales, are the primary mechanism most State and local governments use to generate funds. Taxes serve as the basis for the issuance of general obligation bonds, which can be used to finance capital investments in facilities such as WTEs and MRFs. A number of States restrict the amount of money that can be raised through property taxes. As a result, local governments may be subject to debt limitations or restrictions on the amount of bonds that can be supported by taxes. Also, special purpose entities, such as waste management districts, may lack the authority to tax.

Uniform User Fees are commonly employed to recover the costs of public services such as waste management. These user fees are termed "uniform" because they do not vary by the amount of waste discarded. User fees are attractive for the following reasons: (1) they may not be subject to legal limitations that apply to taxes, (2) they may be better accepted by the public than taxes, and (3) they can be set on a user basis (e.g., per person, per household), whereas taxes are tied to measures of property ownership, income, or spending. For capital investments or new facility development, a "special assessment" can be imposed to aid in raising up-front funds.

Unit-Based Pricing is a method of charging service users for the costs of waste management on the basis of how much waste is discarded. The more waste discarded means a higher charge. Also termed "pay as you throw" or "variable rate pricing", this system creates incentives to reduce the amount of waste that generators discard. Over 1,000 communities have unit pricing programs in place.

Market-Based Tip Fees mean that the fees charged are based on the facility's costs and the prices charged by its competitors. The difference between fees charged and costs incurred is profit or loss; depending on market conditions, a waste management facility may be more or less profitable. In contrast, a tip fee supported by flow controls need not be based on costs or competition but can be set at any level. As a basis for financing capital costs, the market-based tip fee can be secured through long-term contracts, negotiated between willing buyers and sellers. Local governments can use such contracts to demonstrate commitment of sufficient waste flows to convince lenders to arrange financing of proposed facilities.

Among the considerations used by solid waste managers when they weigh alternative approaches or combinations of approaches are adequacy of revenue, equity, political feasibility, administrative ease, impact on innovation, and efficiency. These criteria are described below.

- **Adequacy of revenue** means the ability of an alternative to (1) generate funds for financing up-front costs of capital-intensive facilities; (2) provide long-term funding stability (i.e., for debt-service or program costs); and (3) support source reduction education, recycling/composting, household hazardous waste, and related public services that do not directly generate their own revenues.

- **Equity** has at least two relevant aspects. First, it considers the degree to which costs or prices of MSW services are "hidden" from the parties paying the bills. For example, when MSW services are funded out of general taxes, the tax bill does not indicate how much is for MSW; in effect, the price of solid waste management is hidden from the taxpayer. Second, equity measures the degree to which the costs or prices are related to the amount of waste discarded by generators or disposed at facilities; the closer the relationship, the more equitable the alternative.

- **Political feasibility** refers to the need for legislative or regulatory authority to enact an alternative and the willingness of the public to accept a new fee system.

- **Administrative ease** reflects the burden of using an alternative, considering both the required resources and costs of designing and implementing new systems or expanding existing systems.

- **Impact of innovation** considers how use of an alternative might create barriers or incentives for the development of improved practices or technologies for waste reduction, recycling, or management.

- **Efficiency** refers to the optimum use of scarce resources to obtain the desired goods or level of service while protecting human health and the environment. For example, the use of flow control vs. open competition may impact total system costs and the level of services provided.

Taxes can provide a reliable source of funding. Although taxes may be politically unpopular, they are relatively easy to administer. Taxes can be set at levels sufficient to support integrated solid waste management programs, although potential tax caps and exemptions may limit their usefulness in financing very high capital cost facilities. Taxes have the disadvantage of masking the costs of MSW services from taxpayers and not being based directly on waste generation or services provided.

Uniform user fees also can provide local governments with a reliable source of funding, support revenue bonds to raise money for capital outlays, and fund integrated solid waste management programs. Uniform user fees may be more politically acceptable than taxes.

Unit-based user fees' greatest advantage is that they directly relate waste management charges to the number of waste units discarded by generators. However, unit-based pricing offers a less stable basis for program funding due to the potential for declining revenues over time, if waste generators respond to the waste reduction incentives this option creates. Unit-based fees have proven to be politically acceptable in many communities. However, they can pose administrative challenges, both in setting up the system and operating it over time.

The market-based tip fee may be the most feasible politically; this option entails no authorization issues and is familiar to the public. However, market-based tip fees may not be able to generate sufficient profits to fund other MSW activities and remain competitive. In general, free market systems pose the fewest obstacles to innovation.

It is important to emphasize that communities can use a combination of options to support their programs. The alternatives described need not be mutually exclusive.

APPENDIX I-A

Flow Controls and Municipal Solid Waste

Summary of Public Comments

INTRODUCTION

Flow control of MSW, also referred to as designation, is a high priority issue for a wide spectrum of parties involved in municipal solid waste management. In preparing the Report to Congress on municipal solid waste flow control, EPA actively sought information from business, industry, government, and the public. EPA invited both written comments and participation in any of three public meetings in Arlington, Virginia (August 17, 1993); San Francisco, California (August 31, 1993); and Chicago, Illinois (September 15, 1993). Commenters included 74 State and local governments, 60 waste management companies, 29 recycling companies, two financial institutions, and 14 environmental groups and individuals for a total of 179 commenters.

These commenters submitted written materials at the meetings and also provided additional comments to the public docket. This report is strictly a summary of the various positions discussed in the written comments.[1] The summary does not contain editorial comments, nor does it reflect EPA's position on any of the issues raised.

Much of the information provided in the written comments is anecdotal and lacks quantitative details. In addition, the written comments did not always provide examples or explanation of opinions, especially on the topic of alternatives to flow controls. While many of the comments and perspectives are enlightening, they do not provide all of the necessary information or documentation for preparing the Report to Congress.

Table 1 provides a breakdown by respondent type (e.g., State and local government) that identifies the number of commenters, number of commenters who support or oppose flow

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[1] Some commenters submitted more than one copy of their comments. Also, if the comments submitted contradict the information contained in the state matrix, the discrepancy will be identified in a footnote. An additional six comments were received and reviewed. Generally, no new issues were raised by the additional commenters.

TABLE 1

NUMBER OF COMMENTERS BY ISSUE AND NUMBER OF COMMENTERS IN FAVOR OF AND AGAINST FLOW CONTROL

Commenters	Total Number of Commenters	Number of Commenters For/Against Flow Controls	Total Number of Commenters That Discuss the Impacts of Flow Controls on:					
			Solid Waste Management and Capacity	Source Reduction and Recycling	Economics	Recyclable Materials	Human Health and the Environment	Alternatives to Flow Controls
State and Local Governments	74	66/5 1 had no opinion 2 did not comment	61	33-recycling 10-source reduction	54	36	17	13
Waste Management Industry	60	10/50	13	29	46	7	20	8
Recycling Industry	29	3/11 15 opposed flow control of recyclables only	7	17	18	17	8	8
Financial Institutions	2	1/0 1 had no opinion	2	1	2	1	0	1
Environmental Groups and Individuals	14	7/6 1 had no opinion	4	4	5	4	6	1
TOTAL	179	For - 87 Against - 72 No Opinion - 5 Oppose FC of recyclables- 15						

controls and the issue areas that received comment. This report organizes the information into six issue areas: (I) impacts of flow control on solid waste management and capacity; (II) impacts of flow control on source reduction and recycling; (III) impacts of flow control on economics; (IV) impacts of flow control on recyclable material; (V) impacts of flow control on human health and the environment; and (VI) alternatives to flow controls. Within each issue area, the report is organized by respondent type. After the issue area sections, the summary provides a list of commenters that provided written materials to EPA.

I. IMPACTS OF FLOW CONTROLS ON SOLID WASTE MANAGEMENT AND CAPACITY

State and Local Governments

Sixty-one of the 74 state and local government commenters addressed the impact of flow control on solid waste management and capacity (i.e., 13 did not specifically comment on this issue). Of these 61 commenters, 59 support flow control and two local governments oppose it in favor of free market approaches. The issues of effective and environmentally responsible solid waste management planning and capacity development are central to the flow control concerns of state and local governments. The 59 commenters supporting flow control include 10 state agencies and 49 local governments or local government organizations involved in municipal solid waste management. These commenters urge EPA and Congress to explicitly grant flow control authority to state and local governments. Based on the written comments, it is unclear what Massachusetts' position is on flow control. Also, the submission from Ohio EPA does not state an opinion for or against flow control. Instead, it answers specific questions posed by the U.S. EPA in the July 12, 1993 Federal Register.

One municipality, Lancaster County, Pennsylvania, advocates improved flow control, not the elimination of it. It suggests that regulators identify and resolve the problems with existing systems and educate and train local government officials who will be planning and implementing municipal solid waste management in the future. Lancaster County also recommends that EPA establish the following:

- A national requirement for local governments to develop and implement a long-term plan for managing all municipal solid waste and recyclables generated within the community;
- Planning standards, materials definitions, and plan adoption procedures that incorporate public participation;
- Procedures allowing commercial and industrial generators of municipal solid waste to "opt out" of a local waste management system at the time of plan adoption if the generator can assure adequate disposition and meet recycling and waste management goals; and
- Indisputable authorization of local government flow control authority for municipal solid waste, including recyclables, as necessary, to implement their plans.

Responsibility/Right to Manage Waste. Eighteen state and local government commenters, including the Spokane Regional Solid Waste Management System in Washington State, view municipal solid waste management and planning as the "natural" responsibility of local governments. Five of the 18 commenters went even further by categorizing municipal solid waste management as a public utility, similar to sewage disposal and electricity. Both the National Association of Counties (NACo) and the United States Conference of Mayors pointed out that the only difference between solid waste flow control and sewage waste flow control is whether the waste moves by truck or by pipe. Two commenters noted that without flow control, New Jersey would be unable to finance and develop the additional capacity needed to meet its goal of achieving self-sufficiency for solid waste management before the 21st Century. Flow control is needed for effective management, capacity planning, and to keep "foreign" waste out of the facilities. Since solid waste management is a government's inherent responsibility, derived from its police powers, government should have the legal authority to exercise control over the flow of waste.

One commenter noted that when there are waste management problems (e.g., garbage is not collected), citizens automatically call the local government, regardless of whether the local government runs the collection services. Thus, citizens view solid waste management as a public service. Two commenters added that the public interest should come before economics. The Pennsylvania Department of Environmental Resources cited court cases from as early as 1905 that declare municipal governments responsible for managing their own wastes. Lackawanna County, Pennsylvania claimed that it is their "right to pursue viable, long-term land-use planning," which is not protected by the free market system, and it is their "right of self-determination of how we want to use our land, water, and resources."

Ensuring Economic Viability of Environmentally Preferred Facilities. One of the issues receiving the most attention is the use of flow control to finance solid waste management facilities. Nineteen commenters noted this benefit of flow control. Flow control provides the financial assurance that the investor communities and bond rating agencies require, by guaranteeing, over the life of the facility, contracts for a definite amount of solid waste and/or recyclables for which the facility will receive a specified revenue (tipping fee). Some local governments have "put or pay" contracts with solid waste management facilities that require a definite amount of solid waste and/or recyclables to be delivered or the local government must pay for the shortfall in waste or recyclables. Flow controls allow local governments to meet these

contracts by requiring that solid waste or recyclables be managed at specific facilities. Flow control also reduces the risk faced by the bondholders (i.e., more tonnage equals more money, which increases the security of the bonds). Once the facility is constructed, flow control allows for its financial viability and continued operation. As two commenters explained, flow control guarantees sufficient revenues for the facility owners (either a private company or local government unit) to repay the debt incurred during initial start-up and to guarantee the long-term financial viability for the facility (usually 30-year bonds).

A related issue, noted by 17 commenters, is that flow control guarantees the flow of particular types of waste to the designated facilities. Flow control ensures that food and yard wastes go to the compost facility, mixed waste goes to a transfer station to separate out the recyclables, and combustible waste goes to the incinerator. In this manner, facilities are guaranteed efficient operations, such as the incinerator receiving an ample amount of waste to maintain environmentally safe temperatures. In addition, this guaranteed flow of waste allows facilities to predict their revenues and, as mentioned above, repay their debt on a fixed schedule. One commenter noted that if facilities, operating under a "put or pay contract," did experience shortfalls in waste received, tax dollars would be wasted since local governments would still need to pay the facilities to meet contractual obligations.

The Michigan Department of Natural Resources (DNR) and Clinton County, Michigan, both commented that voluntary agreements to ensure the flow of waste to a facility are not strong enough guarantees to build facilities. Only flow control can assure the controlled movement of waste and protect against competitors undermining rates and diverting waste streams. Likewise, Winnebago County, Wisconsin, noted that flow control is necessary to protect municipalities from competition so that they can properly manage and finance their facilities.

Ensuring Adequate Long-term Capacity. According to 14 commenters, flow control protects and ensures long-term capacity. Future capacity also is protected financially through guaranteed revenues which foster the continued, long-term operation of a facility. These flow control assurances, for example, allow Delaware to guarantee capacity through the year 2009. In Honolulu, flow control is used to ensure that waste is sent to the waste-to-energy facility, which is necessary to extend landfill capacity and to keep the city from "being swamped with garbage." Long-term capacity also is guaranteed when flow control is used to minimize the amount of waste actually disposed by emphasizing source reduction and recycling. One commenter added that

source reduction and resource recovery are not economically appealing to the waste management industry; therefore, flow control is needed to ensure that these environmentally beneficial management options, which ensure long-term capacity, are implemented.

Flow control can prohibit facilities from accepting waste generated outside of the designated planning area; this legal issue is currently a problem in Illinois. Federal and state courts are examining the legality of flow control prohibitions and restrictions on the movement of municipal solid waste. Legal decisions may affect the ability of flow controls to protect and ensure capacity.

Solid Waste Management Planning. Seventeen government commenters stated that flow control allows for effective and environmentally responsible solid waste planning and management. State and local governments can plan for and manage the appropriate type and number of facilities to handle the long-term generation of waste within a specified area. Additionally, effective planning also can predict and manage facility closure. Six commenters noted the benefit of being able to predict the quantity of solid waste over time. This predictability allows state and local governments to plan for and develop future capacity. The Solid Waste Association of North America (SWANA) indicated that Lancaster County, Pennsylvania, through its flow control ordinance, has assured capacity through the year 2015. Six commenters indicated that flow control allows local governments to meet their goals, such as source reduction, recycling, and capacity goals. For example, New Jersey has the goal of a 60 percent municipal solid waste stream recycling rate by 1995. New Jersey believes that this goal is attainable only through effective flow control. Two commenters also indicated that flow control allows for the appropriate selection, planning, and management of the costs associated with a reliable solid waste management system.

Not only does flow control allow for the effective planning of solid waste management systems, it also provides for the implementation of solid waste management plans, as noted by 15 commenters. With flow control as the foundation, all aspects of the plan, particularly an integrated solid waste management system, can be implemented. More specifically, four commenters noted that flow control allows for the development of capacity needed to (1) make this integrated system a reality, (2) replace the capacity lost by closing landfills, and (3) meet recycling goals. As a result of planning and the use of flow control, little uncertainty about the amount of waste exists, and financial obstacles, if any, are minimal. The system can integrate

source reduction initiatives, recyclables collection and processing, resource recovery, and landfilling (as the option of last resort) to manage waste in an efficient and environmentally protective manner. This type of system has been the goal of the Southeastern Public Service Authority of Virginia (SPSA) and, as SPSA indicated, it has been quite successful. The system will succeed because haulers will not have the option of diverting waste from the local materials recovery facility to a cheaper landfill. Many states require development of integrated solid waste management plans. Local governments are fulfilling their legal responsibility by implementing their plans and, therefore, should be empowered to use the necessary tools, such as flow control, to achieve effective implementation.

Eight commenters focused on general waste management hierarchy issues related to flow control and solid waste management planning. Five commenters indicated that flow control allows local governments to decide the best and most protective methods to handle their waste, based upon the solid waste management hierarchy. Source reduction and recycling take priority over incineration, and landfilling. The local governments can then plan for the necessary facilities to implement the chosen methods of management, and flow control guarantees that the waste will be sent to the proper facilities. For example, in Florida, a county must meet a 30 percent recycling goal, have a commercial recycling program, and have some type of yard waste management program as a prerequisite to siting a waste-to-energy facility. Two commenters added that the result of flow control will be less waste sent to landfills. The City of Springfield, Missouri expanded on this issue by stating that without flow control, law suits may arise over the "improper disposal of solid waste." An additional commenter, the Greater Lebanon Refuse Authority in Pennsylvania, discussed the concept of recycling landfills, or landfill mining. Through recycling, a 200-ton per day 15-acre landfill serving 100,000 people could operate for 100 years, based on several repetitive periods of use, recycling, and reuse. This would limit the need for new landfill capacity.

Five commenters indicated that local governments also are obligated to provide and/or fund all supplementary waste management services, such as household hazardous waste collection, curbside recycling programs, composting programs, and community education programs. Flow control is essential to keep local governments from going bankrupt trying to fulfill these obligations, in addition to covering the costs of meeting regulatory requirements, planning, and public participation in decision making activities.

Three commenters argued that citizens are willing to pay more for integrated solid waste management systems that are technologically advanced and, thus, more protective of human health and the environment. As SWANA pointed out, in many instances, the public has even voted in favor of paying higher tipping/user fees than they would for private landfilling in order to obtain the services provided by the integrated systems. Lancaster County, Pennsylvania adds that, in its experience, flow control authority is what allows the citizens to strive for and achieve the highest quality services and the maximum value for their investment. Finally, SWANA asserts that, without flow control, state and local governments cannot have the municipal solid waste management system of the future that the public is demanding.

Liability Issues. Six state and local government commenters addressed liability issues. As described by NACo, local governments are subject to "arranger liability," which is premised on the theory of actual or potential local government control of the solid waste stream, based on the police power authority and the government's right to monopolize waste disposal if it so chooses. If a private owner/operator abandons a dump site or landfill, the local government may be liable for clean-up, closure, and post-closure care under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), if they designated (or arranged) that waste be sent there. Further, NACo stated that these activities are extremely expensive, and many local governments nationwide, such as Tacoma, Washington, are incurring significant debt to fund remediation activities. If local governments might incur these future liabilities, they should be granted flow control now to build up funds to cover future clean-up and closure activities. In addition, flow control is a positive mechanism for limiting a local government's future liability since the local government would have the authority to direct municipal solid waste to the most environmentally protective facilities. These commenters hold that if local governments cannot have flow control authority, they should not be held accountable for how the waste is managed by the private sector.

Waste Import/Export. Four commenters addressed waste import and export issues. Michigan DNR noted that the control of imports and exports of waste across state boundaries is a key requirement in establishing and maintaining a comprehensive solid waste management system. This control has been threatened by the U.S. Supreme Court decision in Fort Gratiot. The Supreme Court held that a Michigan law restricting landfill operators from receiving waste generated outside of the county, unless it was approved in the integrated solid waste management plan, violates the Commerce Clause of the Constitution. Michigan DNR views this decision as

jeopardizing the ability of counties to ensure long-term capacity, which could eventually lead to a nationwide disposal crisis. Clinton County, Michigan, referred to the Fort Gratiot decision as crippling the planning process. If waste generated in Michigan is taken out of state, waste from other states will be needed to maintain a sufficient flow of waste to facilities in Michigan. NACo stated that Congress needs to declare that flow control, and local government management of its own waste, is not unlawful interference or an unreasonable burden upon interstate commerce. Finally, Minnesota remarked that a state cannot ensure the environmentally safe management of waste sent outside of its borders. Only if other states have equal or better standards and policies would waste exportation be a viable option.

Use of Flow Control in Negotiations. Minnesota commented that flow control, or waste designation, can often be used as a leveraging tool to motivate voluntary delivery to designated facilities when negotiating contracts. In Minnesota, flow control is the tool of last resort. In order to adopt a flow control ordinance, a county or group of counties must undergo a series of public hearings and state or regional approval. They must attempt to achieve flow control by voluntary delivery before an ordinance can be implemented. The City of Urbana, Illinois, echoed this benefit of using flow control as a leveraging tool during solid waste management negotiations.

Private Sector Issues. Four commenters raised issues regarding the private sector and flow control. San Diego County, California, pointed out that private companies, when entering contracts, rely upon negotiating the type and volume of waste to be sent to their facilities; in effect, a form of flow control. Similarly, granting flow control authority to local governments would allow them to compete with private firms and enter into comparable agreements. Private industry would continue to play a significant role in solid waste management, as they do today in areas where local governments exercise flow control.

Hennepin County, Minnesota, recalled that when it was deciding to finance an integrated solid waste management system and impose waste designation (i.e., mandated flow control), companies did not raise opposition. However, companies are now complaining because, as Hennepin County believes, they were not successful enough in selling their facilities and technologies when local governments were contracting for waste-to-energy facilities. Hennepin County asserts that EPA and Congress should not be persuaded by these companies who want the rules changed for their own financial benefit. Similarly, the Greater Lebanon Refuse Authority (GLRA) asserted that many private companies develop business plans that include the receipt of

waste from, or into, flow controlled areas and, therefore, planned for a greater volume of municipal solid waste than is reasonable to expect under the state and municipal regulatory plans. For example, a company may decide to site a landfill 15 miles outside of a county that has flow control ordinances designating where the county's waste is sent. The company, however, may disregard this flow control authority and plan to obtain a portion of its waste from that county. GLRA asserts that this should not be allowed. The new facilities, not the old ones, are the chief flow control antagonists.

In addition, Clinton County, Michigan, believes that the private sector is too unpredictable to be a reliable manager of waste. Citizens would be vulnerable to pricing monopolies, choices between vendors would be removed, and communities could be unwilling recipients of waste from unknown origins. The local government would end up dealing with frustrated citizens who experience lapses in service.

Arguments Against Flow Control. The Village of Westbury, New York, resists flow control and believes it to be inimical to their interests and to the general public interest for the following planning- and capacity-related reasons: (1) flow control locks out capacity to those who need it; (2) burdens citizens with paying for any excess capacity; and (3) leads to unnecessary transport of waste.

Ventura County, California, also raised several arguments against flow control. The county believes that flow control and the creation of service monopolies are not necessary to implement integrated solid waste management plans and ensure capacity. Through the exercise of police powers, local governments can solicit private sector proposals for materials collection and designated facilities; encourage the development of diverse merchant ventures; set service rates and standards; assess fees to finance local diversion programs; and provide regulatory incentives to service providers and manufacturers who offer system enhancements. Ventura County further asserts that local government could still make financial guarantees if they choose to own and operate all solid waste collection services.

Capacity objectives also can be met through smaller, more diversified facilities with multiple operators and processes. This more market driven system, in which government serves as a skillful buyer of privately financed and competitively priced services, provides greater flexibility,

minimizes public sector risk, and catalyzes the development of innovative technologies and markets. A waste-management facility does not need to be large, monolithic, and expensive.

For example, in Ventura County, processing curbside program materials costs $65 per ton net of revenue at the local materials recovery facility, but only $15 per ton net at smaller process lines operated by independent haulers at their service yards. Establishing small, strategically located green materials mulching and vermiculture operations in the County has alleviated the need for construction of a capital-intensive regional composting facility which would quadruple per ton processing costs. In all of these cases, cost-effective and market-sensitive capacity has been created in the absence of flow control. Even where large capital projects are essential to integrated solid waste management systems, these regional facilities, such as the waste-by-rail megafills of eastern Washington, Oregon, and the western deserts do develop with private capital and without flow guarantees.

Waste Management Industry

Six waste management industry commenters that support flow control, and six that oppose it, addressed solid waste management and capacity. Another commenter, WMX Technologies, Inc., generally supports NSWMA's anti-flow control arguments, but stated that they would not oppose legislation establishing flow control of residential recyclables as long as certain conditions were included (e.g., the designation is made under a competitive process, facilities not limited to collecting from specific geographic areas, and prior investments and arrangements are protected).

Capacity Issues. One commenter indicated that flow controls guarantee that waste will flow through facilities developed under solid waste management plans, thus allowing for the development of increased capacity, and guaranteeing its viability and efficient use. Two commenters, however, believe that flow control does not create increased capacity. One company commented that flow control actually may lead to reduced capacity by forcing privately-owned facilities out of business. The other company cited New Jersey as an example. New Jersey relies heavily on flow control, yet it has still failed to provide adequate disposal capacity for its own waste.

Planning Issues. One commenter, Ogden Martin Systems, stated that flow control is an essential solid waste management planning tool. Local governments need to determine the

amount of waste within their jurisdictions, and the expected growth of that waste, so that they can estimate the amount of waste reduction possible with proposed recycling and composting programs. A second commenter, California Refuse Removal Council, echoed this belief, indicating that planned, ambitious recycling and waste reduction goals could not be achieved without flow control.

Recycling Industry

Four recycling industry commenters that support flow control, and two that oppose it, addressed issues related to solid waste management and capacity. Another recycling industry commenter, the California Resource Recovery Association, supports flow control for solid waste, but not for source separated recyclables.

Capacity Issues. The California Resource Recovery Association recognizes the value of flow control for financing materials recovery facilities and increasing the overall waste management capacity in a region. Flow control of source separated recyclables, however, does not accomplish these ends. In fact, when exclusive franchises for recycling have been implemented, business generators reportedly have had to stop recycling some materials because the exclusive hauler chosen was unable to manage the amount of material and no other recyclers could service the account.

Planning Issues. Three commenters indicated that flow control allows local governments to achieve landfill diversion and recycling goals set forth in solid waste management plans and/or mandated by state laws. In reaching this end, two commenters noted that flow control allows for investment in landfill alternatives, such as incinerators and composting facilities, which would otherwise be impossible. Local governments may find that these alternative facilities will result in lower overall costs for municipal solid waste disposal. On the other hand, another commenter believes that facilities should be financed by their users and, if they are not viable without flow control, then they probably are unnecessary in the free market.

One recycling industry commenter stated that local governments cannot easily implement comprehensive, integrated waste management plans without flow control.

Financial Institutions

Planning Issues. Both Paine Webber and Standard & Poors commented on solid waste management and capacity. Paine Webber supports flow control and believes that it is necessary for state and local governments to effectively plan capacity and determine the amount of capital needed to implement the plans. While Standard & Poors took no position on flow control, it stated that, "Without legal waste flow to limit competition, the result will be significantly lower rated bonds with higher costs which will make funding an integrated solid waste management system much more difficult."

Environmental Groups and Individuals

Capacity Issues. A University of Wisconsin research assistant stated that flow control is necessary to help provide more accurate predictions of quantities of solid waste in order to effectively plan for future capacity needs.

The Pennsylvania Chapter of the Sierra Club stated that standardized fees under flow control help to insure capacity and that many Pennsylvania counties use flow control as a necessary planning tool. In addition, Pennsylvania would benefit from using flow control to protect itself from the inundation of out-of-state waste.

Hierarchy Issues. The Californians Against Waste Foundation opposes put-or-pay contracts because they may run counter to the waste management hierarchy. Source reduction and recycling should be top priorities. If flow control of recyclables is prohibited, local governments still should provide recycling services (e.g., collection) in competition with other local recyclers. Local governments could adopt mandatory recycling ordinances that prohibit residential and commercial generators from disposing of certain garbage.

Supporting Other Waste Management Programs. The Ohio Chamber of Commerce raised the issue of communities using flow control to collect fees to pay for other waste management programs, such as household hazardous waste collection or recycling. Flow control allows for cross subsidies from one class of rate payer to another. The Chamber of Commerce opposed this use of flow control because industrial waste generators should not have to pay for programs in which they are not involved.

II. IMPACTS OF FLOW CONTROLS ON SOURCE REDUCTION AND RECYCLING

The commenters that directly addressed the impact of flow controls on source reduction and recycling could generally be divided into the following three categories:

- Encourages source reduction and recycling efforts;
- No effect on source reduction and recycling efforts; and
- Detrimental to source reduction and recycling efforts.

State and Local Governments

Encourages Source Reduction and Recycling Efforts. Of the ten state and local governments that addressed the issue of source reduction, six commenters noted that flow control either had been or was expected to be beneficial to the source reduction efforts in their states or counties. It specifically was noted that increased disposal fees tended to encourage source reduction. The more a generator has to pay per volume disposed, the greater the economic incentive the generator has to reduce the amount of solid waste generated. One commenter noted that flow controls are necessary to help states meet source reduction goals.

Of the 33 commenters from state and local government that addressed the issue of recycling, twenty-six stated that flow control is either beneficial for or encourages recycling efforts. In the absence of flow control, low tipping fees could result in less recycling overall. Most of the commenters noted that without flow control there would be no economic incentive to recycle because the cost to landfill is cheaper.

For example, according to the Minnesota Legislative Commission on Waste Management, mandatory flow control in Minnesota encourages source reduction and recycling because the cost of managing waste in a mixed waste facility ($156-200 per ton) is higher than the cost of recycling ($100-156 per ton). Additionally, the commenter from the Maine Waste Management Agency indicated that with incinerators that depend upon flow control, those who create the waste pay the true costs of waste disposal. This provides a financial incentive for waste generators to reduce at the source and to recycle whenever possible in order to avoid the costs of incineration. Specifically, in Maine, recycling increased from 16 to 30 percent from 1988 to 1991; incineration

fell from 45 to 37 percent; and landfilling fell from 9.5 to 4 percent. In this case, flow control had an extremely positive impact on recycling efforts.[2]

Thirteen of the commenters in favor of flow control observed that flow control was necessary for states and localities to meet their mandatory recycling goals. The National Association of Counties observed that many state laws mandate recycling and diversion from landfill requirements. Local governments, not private industry, have the responsibility to meet these requirements. Virtually every option considered for recycling and diversion is more expensive than landfilling. Thus, flow controls are necessary for states to meet recycling and diversion goals, because without them haulers would simply choose the cheapest option, landfilling.

Hennepin County, Minnesota will recycle and compost 50 percent of its waste in 1993; in 1992 only two percent of its waste was unprocessed and landfilled. This achievement is attributed to the successful use of flow controls. New Jersey has a mandatory recycling goal of 60 percent and flow controls are expected to help the state meet that goal.

Also, according to Union City, New Jersey, solid waste collectors and facilities are regulated as public utilities whereby rates are subject to regulation to avoid price gouging and to ensure reasonable rates. Since the government is responsible for ensuring services, flow control positively impacts the delivery of solid waste recycling and disposal service by county implementing agencies. With the adoption of mandatory recycling goals (e.g., 60 percent by 1995), solid waste management districts have an obligation to provide a management strategy whereby at least 60 percent of their waste streams are returned to the economic mainstream as raw materials. Thus, as a result of the recycling mandate, source reduction and recycling are encouraged in New Jersey.

The commenter from the City of Milwaukee noted that without flow control, recycling would suffer as a result of the fluctuations in market conditions. Without flow control as the market varies, private haulers have to adjust the cost of processing to reflect these changes. Further, the vendors of recyclable processing and marketing services suffer because they are

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2 These percentages do not add up to 100 percent, however, they are the numbers that appear in the comment.

unable to guarantee end users a reliable quantity and quality of product. While Milwaukee implied that with the implementation of flow controls, the market would fluctuates less, they did not address specifically how this situation would be made more effective under flow control.

No Effect on Source Reduction and Recycling Efforts. Three of the state and local government commenters noted that flow controls were not incompatible with nor an impediment to source reduction efforts. As one commenter noted, flow control has little impact on source reduction because companies have always taken their own source reduction initiatives (e.g., in Delaware companies now fabricate 27 to 29 cans per pound of aluminum as compared to 20 to 28 cans when cans were first introduced into the marketplace).

One commenter, from the Pennsylvania Department of Environmental Resources, noted that flow control would have no significant impact on recycling efforts in the state since recycling is mandatory for most of the state. Currently, recyclables are not subject to flow control.

Detrimental to Source Reduction and Recycling Efforts. One commenter found flow control to have negative impacts on source reduction efforts. The commenter from Ventura County observed that solid waste management obligations and source reduction are inherently in conflict. Flow controls that require collectors to maintain a steady stream of waste to a facility can provide disincentives for source reduction.

Six commenters noted that flow control has some negative effects on recycling efforts. The commenter from the Minnesota Legislative Commission on Waste Management noted that flow controls may stultify recycling as a permanent waste management practice rather than allow it to develop into a materials marketing system. According to the commenters, the development of a materials marketing system is the only way recycling will become a permanent part of the production process.

Mayor Sheri Barnard, of Spokane, Washington, stated that under flow control, local governments contract primarily with large national corporations, making competition by small recycling firms nearly impossible. In some cases, when all waste is designated to a specific incinerator, small recyclers are prevented from using their new recycling technologies. Therefore, the overall level of recycling is diminished.

The commenter from the Michigan Department of Natural Resources stated that flow controls might hurt recycling efforts, unless revenues from the disposal facility could be used to support recovery facilities through an integrated waste management program. The commenter from the Greater Detroit Resource Recovery Authority observed that flow control ordinances could possibly result in a build up of recyclable materials, which might result in the unsanitary storage of recyclable material or possibly even lead to illegal dumping.

Although three state and local government commenters noted some negative impacts of flow control, two of the six commenters were vehemently opposed to flow control. The comments of the Incorporated Villages of Westbury, Mineola, and New Hyde Park, New York, noted that with flow control recyclables become a burden, not an opportunity. This burden occurs because unnecessary transportation costs add to the management costs for recyclables.

Ventura County observed that flow control eliminates competition over the supply of wastes and ignores the effect of the recyclable market dynamics on planning, program development, and service delivery. Specifically, Ventura County noted that flow controls inhibit the development of a recyclables market. Long-term commitments to facilities both decrease the local government's ability to respond effectively to changes in the commodities marketplace and provide a disincentive to develop and utilize innovative and more cost effective waste management alternatives. Moreover, costs increase due to a lack of competition, and lower service choices and quality lead to customer disenfranchisement. Flow controls also restrict a manufacturer's access to recyclables, thus limiting essential market development.

Waste Management Industry

Encourages Source Reduction and Recycling Efforts. Four commenters observed that flow control can provide benefits for recycling efforts. Two commenters noted that flow controls allow local governments the ability to maximize recycling and meet recycling goals. With flow controls, localities can require that collectors recycle materials that cannot be recycled economically. Another commenter added that flow controls help to develop new markets for recyclable goods because of the increased predictability of quantity and quality of recyclable material. Another commenter stated that because of the financial security provided by flow control, major investments are made in new facilities that use recycled raw materials. Therefore, increased recycling is a benefit of flow control.

No Effect on Source Reduction and Recycling Efforts. Four commenters stated the position that flow control neither ensures nor encourages recycling. Two commenters in particular noted that the only way to ensure recycling is to strengthen the market for recycled materials.

Detrimental to Source Reduction and Recycling Efforts. Most of the commenters did not address the issue of source reduction directly. A few commenters did note that flow control did not encourage waste reduction.

Of the 29 commenters from the waste management industry that addressed the issue of recycling, 21 stated that flow control would be detrimental to the recycling industry and recycling efforts. Some of the reasons cited for disapproving of flow controls include:

- The creation of a monopolistic environment that inhibits innovation in the recycling marketplace;
- Protection of hauling practices that allow wastes to be mixed, thus degrading the resources; and
- An increase in the fixed costs for recyclers.

Frank Perrotti & Sons, Inc of Woodbridge, Connecticut stated that when municipalities fall short of meeting their put or pay obligations, they have an incentive to reduce recycling to meet their other obligations. The commenter noted further that, the more effective a municipality is at meeting its recycling goals, the less likely it is to meet its put or pay obligations under its solid waste contract with a Resource Recovery Authority.

The commenter from Waste Stream, Inc. (WSI), located in New York, used their firm as evidence of the fact that flow control thwarts the efforts of successful recycling firms. In WSI's case, the St. Lawrence Solid Waste Disposal Authority planned to build a waste-to-energy facility, but worried more about having enough waste volume to guarantee adequate cash flow for financing the facility than about the development of an effective recycling program.

SEMASS, which is a waste-to-energy facility located in Massachusetts, represented a different perspective.[3] They stated that if flow controls were implemented in the SEMASS service area, and waste were directed to a landfill rather than the SEMASS facility, many potentially recyclable materials would be landfilled, and society would lose the recovery value of those materials.

Recycling Industry

Encourages Source Reduction and Recycling Efforts. Two commenters noted that flow control might be beneficial for recycling efforts. National Recovery Technologies, Inc. observed that flow controls could encourage recycling if the waste stream is directed toward facilities that process mixed solid waste. Flow control also might encourage recycling if some of the tipping fees collected at public facilities could be used to pay for recycling and composting programs including curbside and drop off programs. Marin Resource Recovery and Recycling Association (California), observed that flow controls will enhance recycling opportunities and the ability of individuals to participate in local recycling programs, however, they never provided any examples.

Detrimental to Source Reduction and Recycling Efforts. Of the 17 commenters from the recycling industry that addressed the issue of recycling, 15 stated that flow control would have negative effects on recycling efforts, particularly on the future of the recycling industry. Ten commenters noted that the monopolistic nature of flow control would be detrimental to the recycling industry and efforts for future expansion. As one commenter from the Chicago Paperboard Commission stated that even the threat of flow controls reduces the incentive to invest in the recycling industry. The most noted opposition to flow control is that without free markets for recyclables, recycling firms would be unable to do business because of the restricted access to raw materials. Recyclers also oppose flow control because they are concerned that the lack of competition will reduce innovations in the recycling industry. Another obstacle flow control imposes on the recycling industry, noted by six commenters, was the potential degradation of resources that results from hauling of mixed wastes. The quality of recyclable materials may be decreased by mixed waste processing.

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3 Some states including Rhode Island classify waste-to-energy facilities as recycling facilities.

Financial Institutions

Encourages Source Reduction and Recycling Efforts. Paine Webber was the only financial institution that addressed the impacts that flow control would have on recycling. They commented that flow control might enhance and foster recycling programs by improving the ability of local governments to fund materials recovery facilities.

Environmental Groups and Individuals

Encourages Source Reduction and Recycling Efforts. One commenter from the Institute for Environmental Studies at the University of Wisconsin stated that flow control is necessary to help Wisconsin meet its recycling goals.

The Pennsylvania Sierra Club observed that if states are permitted to exclude waste generated out-of-state through the use of flow controls, each state will have more incentive to effectively promote recycling and source reduction within their state. Governments need to be able develop integrated solid waste management plans that incorporate recycling. Flow control provides a tool that will permit state and local governments to meet their responsibility to implement such plans.

Bio-Engineering Fuels, an alternative energy company located in Washington, observed another way in which flow control has positive effects on recycling efforts:

- Without flow controls, recycling and source reduction will suffer because it is cheaper to landfill everything. Many private companies do not want the expense or the hassle of reducing their use of landfills to manage their solid waste.

Detrimental to Recycling Efforts. The Californians Against Waste Foundation noted that flow control has the following negative effects on the recycling industry:

- Flow controls limit the amount of material ultimately diverted. An exclusive franchise on recyclable material could prevent a recycler from collecting material that a franchise hauler does not collect.

- Flow controls limit the quality of the material that is collected and marketed. The exclusive hauler may offer only mixed waste processing or minimal source separation.

- Flow controls reduce the incentive for a company to reduce costs via source reduction or recycling. An exclusive franchise that controls both solid waste and recyclables may offer a flat rate for services. In this case, a company must pay the same amount to have both its solid waste and recyclables removed regardless of the volume of waste to be recycled. This situation might be remedied by the introduction of a tiered fee structure to encourage the hierarchy of source reduction, recycling, and then disposal. With such a fee structure, the franchisee might charge the company less money to remove recyclable material.

- Generators want to have the flexibility to choose the recycling company with which they do business, especially when the generator is a chain with outlets in different states. Flow control may hinder the development of company-wide recycling programs for generators in this position if different outlets of the company must operate under different flow control restrictions.

III. IMPACTS OF FLOW CONTROLS ON ECONOMICS

State and Local Governments

Increased Disposal Costs. One of the main points stressed by state and local governments was that the goals of government and private industry differ in providing waste management services. Private industry seeks profit, while government seeks the safest, most cost effective method for managing waste and protecting human health and the environment, without producing a profit. Governments reach their goals by developing comprehensive waste management plans, which often incorporate recycling and composting programs as well as construction plans for state-of-the-art, environmentally sound, disposal facilities. Realizing that their plans are expensive to implement, 22 governments defended increased costs stating that the higher goals of long-term waste minimization and increased protection of public health and the environment supersede any short-term negative impacts of increased costs.

Fifteen commenters claimed that flow controls are necessary to acquire waste for facilities and guarantee revenue to finance them. Four government commenters specifically stated that current solid waste management systems would suffer greatly if flow control authority were removed. Existing facilities would not receive adequate quantities of waste and, thus, could not repay their debts. State and local governments that have already invested large amounts of money and capital in facilities dependent on flow control, financially would be devastated. The Concord Regional Solid Waste/Resource Recovery Cooperative, formed by 36 municipalities in New Hampshire to manage the financing, construction, and operation of waste-to-energy facilities, fears that the municipalities will not be able to meet their 20 year put-or-pay commitment to deliver solid waste without flow control. A put-or-pay commitment means that a municipality must deliver a specified amount of solid waste and must pay its vendor (e.g., the Cooperative) its fee, whether or not the solid waste is delivered to the facility. Haulers will choose to take the waste to cheaper facilities, such as far-off landfills, for disposal. The League of California Cities advocates that "one size does not fit all," and that current flow control flexibility must be retained.

Five state and local governments stated that flow control does not create inefficiency. They said instead that flow control will ensure that the least expensive and least risky method of financing facilities is implemented. One commenter took the argument a step further implying that the current approach to waste management, without flow controls, is inefficient.

Market Inefficiencies. Sixteen commenters countered the argument that flow control inevitably results in a monopoly stating that with flow control, competition is still an integral part of the waste management process. Vendors must compete to win bids when local governments contract with the private sector to provide waste management services.

Five commenters remarked that flow control establishes a fair and level playing field by stabilizing solid waste management prices and disposal/tipping fees. As the City of Tampa, Florida, stated, "In order to keep the price manageable, one entity must be able to balance the total fiscal and waste stream picture." Delaware levies uniform fees on commercial and residential generators of waste such that all residents share the total cost of solid waste management, which is treated as a public utility. As experienced by Marion County, Oregon, flow control ensures that waste is sent to the local waste-to-energy facility, so that the county can meet its contractual obligations. Failure to meet this commitment would cause increased garbage rates. "The control was, and still is, necessary to keep rates stable." Finally, two commenters noted the economies of scale gained by aggregating waste for collection and processing on a regional or state basis.

The Town of Wallingford, Connecticut, commented that there is no evidence to indicate that there are either more or less inefficiencies in flow control municipalities than in other communities. They stated that, "Connecticut, which allows flow control by statute, is one of the most successful states in the U.S. in its construction and utilization of waste-to-energy plants and MRFs."

Waste Management Industry

Increased Disposal Costs. The majority of waste management industry commenters (35 of 46) specifically stated that flow controls foster the monopolistic control of solid waste by local governments and inevitably lead to increases in cost without concurrent increases in benefits. The commenters generally stated that when laws restrict or abolish competition, the natural market forces that keep prices from unnecessarily rising disappear.

Many waste management commenters provided examples of situations where disposal costs in counties with flow controls exceeded disposal costs in neighboring free market counties. A solid waste collector in Mercer County, New Jersey (the name was not provided), where flow controls presently exist, described such a situation. The commenter stated that under flow

controls in Mercer County, trash haulers must pay $117.81 per ton to dispose of municipal solid waste and $136.36 per ton to dispose of construction debris at a transfer station owned by the county. All trash from the transfer station is then delivered to a privately owned and competitively operated landfill in Pennsylvania where the fee for dumping is only $55 per ton for either municipal solid waste or construction debris. The result is that haulers in Pennsylvania pay $55 while haulers in Mercer County pay $117.81 or $136.36 for disposing the same amount of trash that will eventually go to the same place.

The Waste Material Trucking Company Inc., located in Southington, Connecticut, provided another example of increased disposal costs due to monopoly control. Residents and haulers in Southington, once accustomed to free trash disposal at the now closed Southington landfill, currently must deliver their waste to the nearby Bristol waste-to-energy facility. Tipping fees have increased since the time the Bristol facility opened from $37.50 in January of 1988 to $55 in July of 1993. Rates increase every year, and they now more than double the disposal fees charged in nearby Massachusetts towns that operate under free market conditions. The Waste Material Trucking Company is outraged because it cannot take advantage of lower cost options, though they are available.

Some comments made by the waste management industry dealt with taxation issues. Five firms implied distrust of governments in their use of revenues resulting from flow control. These firms stated that government officials use flow controls to create hidden taxes that sometimes support projects unrelated to waste management. In addition, three commenters noted that ironically, as governments attempt to raise more revenues with flow control, excessive costs are actually driving private firms out of business, leading to an overall decline in tax revenues.

Market Inefficiencies. Over half of the waste management industry commenters (27 of 46) specifically stated that flow control leads to inefficiency. Commenters addressed the inefficiencies experienced both by government owned or government subsidized firms in general, and the inefficiencies experienced by private firms as a result of flow control.

Because government owned businesses do not fear competition and loss of revenue, they do not have incentives to cut costs and improve efficiency. Flow control effectively shields government owned waste management facilities from free market forces by guaranteeing waste and revenue. Consequently, prices increase and efficiency suffers. In support of this argument,

one commenter (Container Corporation of Carolina, Inc.) pointed to a Virginia study comparing public and private trash collection services in the Virginia suburbs of Washington, D.C. The study determined that in general, public facilities were much more expensive and far less efficient than private ones (e.g., municipal departments used smaller trucks and therefore, had to make more trips to dump sites, they also used larger pick-up crews but served fewer homes per shift, and public employees were absent a greater percentage of time).

Not only were commenters displeased by the inefficiencies of government owned facilities, they also were unhappy about the inefficiencies forced upon private firms by flow control. Private firms described situations in which they were forced to haul waste long distances to comply with flow control laws when more conveniently located disposal sites were available. Being forced to dispose of waste in inconvenient, distant locations often resulted in backtracking of waste, longer hours for haulers, and higher costs due to extra fuel use. Other, less obvious consequences included increased air pollution, greater probability of accidents due to more hours on the road, and more wear and tear on roads and highways.

York Waste Disposal Inc. provided an example of the inefficiencies private firms must endure as a result of flow controls that prohibit waste export. York cites a specific example involving the Township of Derry in Dauphin County, Pennsylvania whose waste, prior to flow control laws, was hauled to the waste-to-energy facility in York county as out-of-county waste. Because the hauling distance was only five miles, waste disposal was being handled efficiently. However, flow control laws forced Derry to transport its waste to the Dauphin Meadows Landfill, 35 miles away. The additional hauling distance requires more diesel fuel, more wear and tear on trucks, and causes more air pollution. Additionally, York stressed that absolutely nothing is gained from choosing one disposal site over another because they are both environmentally safe (double lined landfill versus incinerator).

With flow controls, private firms also complained that they had to choose facilities with unfavorable credit terms and operating hours. These are often serious considerations for smaller companies, which do not have the financial flexibility of larger firms.

Four representatives of the waste management industry commented that flow control is a form of economic protectionism. They believed that shielding facilities, whether or not they are government-owned and operated, is often detrimental to the economy, unproductive, and

inefficient. Commenters believe that flow control should not be allowed to keep facilities operating by guaranteeing waste, when those facilities would not otherwise survive under free market conditions. One company questions why government-owned facilities need economic protection to survive, when privately-owned facilities operate successfully without any form of revenue guarantee.

One commenter stated that large government construction projects, such as those resulting from flow control, are often unnecessarily costly and highly inefficient. Local governments often waste tax money on poorly planned projects. Projects are more likely to succeed if handled by the private sector, which is driven by the free market.

Disincentive to Investment. Another complaint made by nineteen waste management industry representatives was that incentives to invest are often curtailed by the prospect of flow control. If companies believe their revenue stream will be removed by government-owned facilities that are supported by flow control, they are unlikely to invest millions of dollars on new and potentially risky ventures.

Energy Answers Corporation (EAC), stated that, contrary to arguments claiming that flow control reduces financial risks by guaranteeing waste and revenue, flow control does not guarantee financial success, and lenders and bondholders oppose flow control because it creates uncertainty when planning and developing a project. For example, if social or economic changes occur, such as shifting populations, then facilities will have no mechanism to adjust their disposal options if they are limited to a specific geographic area.

EAC asserts that flow control is not necessary to support a facility. EAC is responsible for the development of SEMASS, a three hundred million dollar resource recovery facility in Massachusetts. Although SEMASS is one of the nation's largest waste-to-energy facilities in the country, EAC has never required flow control for any aspect of its development or operation. All of EAC's projects are privately financed and rely on long-term negotiated contracts. The SEMASS Partnership, owned by EAC, is an example of a successfully operating facility that never utilized flow controls. In order to secure financing, SEMASS was required by its lenders to secure 1,000 tons of waste under long term contract. They were able to do this successfully by negotiating with 32 cities and towns and by demonstrating that they would provide the most cost effective disposal option.

Supporters of Flow Control. Ten of the 60 waste management industry commenters supported flow control. Two stated that flow control did not result in monopoly control and instead, provided a balanced playing field for all waste management companies. With flow controls, smaller firms could compete evenly with larger firms; without flow controls, larger firms, especially those with their own management facilities, could undercut prices and capture most of the waste market. Ogden Martin Systems, Inc. commented that flow controls in northern Virginia actually caused competition to flourish and pointed out that over 800 individual trash collection and disposal contractors compete for business within Arlington County, Fairfax County, and the City of Alexandria. Four of the companies argue that flow control is necessary to guarantee waste to facilities, which in turn guarantees that the facility owners (either local governments or private firms) will pay off their debts. Minnesota Resource Recovery Association added that haulers would simply choose cheaper alternatives.

Recycling Industry

Increased Disposal Costs. Ten recycling industry commenters either explicitly stated or implied that flow controls create monopolies and cause price escalation. These commenters agree that the free market is responsible for keeping prices at reasonable levels and that flow controls interfere with the free market system causing all the benefits associated with competitive markets to disappear (e.g., system upgrades, improved quality of service, market development, and low prices).

One recycler also believes that flow control is a tool used to disguise new taxes. However, as stated by another commenter, increased costs resulting from flow control can drive private recycling firms out of business and therefore reduce tax revenues.

Market Inefficiencies. Six of the recycling industry commenters feel that flow controls would result in either inefficient collection of recyclable goods or inefficient waste disposal in general. Four commenters also stated that flow controls would retard the development of the recycling market by blocking local businesses with the potential to use recycled feedstock from obtaining the material from monopoly collectors.

Disincentive to Investment. Two recyclers addressed the effects of flow control on incentives to invest. They stated that flow controls that regulate recycling will prevent further

private investment in recycling efforts. Often, existing flow controls compete with private sector recycling investments and crush any incentive to invest in the recycling industry. In addition, the municipal operations taking control of recycling efforts have less incentive to invest in state-of-the-art facilities in an effort to increase efficiency, because they are protected from the forces of the free market.

Financial Institutions

Market Inefficiencies. Only two financial institutions commented, Paine Webber, Inc. and Standard & Poor's Corporation. Paine Webber stated that competition still exists with flow control since haulers must competitively bid to haul waste for municipalities. Standard & Poors also commented on the market effects of flow control stating that flow control would limit competition. In general, Standard & Poors is neutral on the flow control issue, stating both that, "flow control is not necessary for a solid waste issue to receive a high rating" and yet "if municipal solid waste facilities are to be financed with tipping fees, legal waste flow is needed to have strong investment grade ratings and the lowest possible borrowing costs to the municipality."

Environmental Groups and Individuals

Increased Disposal Costs. Three commenters opposing flow control stated that it creates monopolies and results in higher costs to consumers. They said that when a monopoly replaces the free market system, prices increase and the consumer suffers.

A University of Wisconsin research assistant supporting flow controls, stated that if large regional landfills are allowed to underbid the services provided by county-wide or municipal disposal systems, the government-owned facilities will not be able to compete. Consumers will choose the cheaper option in a free market system. Flow control ensures that consumers will pay the higher disposal costs necessary for an environmentally safe facility.

The Pennsylvania Chapter of the Sierra Club agreed stating that flow control is needed to help cover the costs of existing solid waste disposal facilities.

Incentives to Investment. One commenter also stated that flow control is necessary to convince investors to buy the bonds that finance facilities. Without revenue guarantees, the ability to plan and finance new, state-of-the-art facilities would be greatly reduced.

IV. IMPACTS OF FLOW CONTROLS ON RECYCLABLE MATERIALS

Comments concerning recyclables and flow controls could be divided into the following three categories:

- No exclusion of recyclables;
- Limited exclusion of recyclables; and
- Complete exclusion of recyclables.

Addressing the exclusion of certain materials from flow controls, most of the comments from the recycling industry raised the issue of discarded versus non-discarded materials. The position of these commenters on the use of flow controls to manage materials depended on whether flow controls could regulate all materials or only materials discarded (e.g., placed at the curb or delivered to a recycling facility).

Some of the commenters included in the "Complete Exclusion" category did not provide a definition of recyclables or differentiate between clean and mixed recyclables in their comments. As more information concerning this distinction was acquired, it appears that most commenters believe that source separated recyclables should be excluded from flow control.

State and Local Governments

Of the 74 commenters from state and local government, 36 commenters directly addressed the issue of materials covered by flow control ordinances. The central issue raised in most of the comments was defining recyclables and determining who has the right to regulate them.

No Exclusion of Recyclables. Fourteen commenters noted that the government had the authority and/or the need to control the flow of all municipal solid waste, including recyclables.

Two commenters justified the authority of municipalities to implement flow control over recyclables by explaining that it enables them to meet state recycling goals. The commenter representing the League of California Cities observed that without the authority to control the flow of recyclables, cities will not be able to meet the ambitious diversion mandates established by California law and by 1995 will be subject to fines of $10,000 per day. Further, if recyclables are

exempted, many contracts will be void and exclusive franchisees will be unable to meet their obligations. Local governments also will experience similar revenue/tonnage problems.

Regional Waste Services, Inc. (RWS is an organization representing 21 municipalities in Maine) expanded on this by adding that all household, commercial, industrial, municipal, and institutional solid waste, including the recyclable component of the waste stream in Maine, is the property of RWS. As a result of this ownership, RWS has the right to subject all discarded and unused materials regardless of their material value to flow controls.[4] RWS stated that recyclables need to be included to help each municipality in Maine meet its mandatory recycling goals. Each municipality in Maine is under a statutory mandate to recycle 50 percent by January 1, 1994. If a municipality fails to make reasonable progress towards this goal, it will be assessed $1.50 per ton on its tipping fee. Since the responsibility to meet these recycling goals ultimately falls on the municipalities, it is likely that the encouragement of voluntary recycling by generators will result in the imposition of penalties against the municipalities.[5]

In September 1992, New York City approved a Solid Waste Management Plan consisting of ambitious source reduction, recycling, landfilling, and incineration programs. As part of the plan, New York City will consider promulgating flow control pursuant to New York City Administrative code §16-201 et seq., that will facilitate the recycling and composting of some categories of residential, institutional and commercial solid waste. Since the Department of Sanitation only collects waste from residential and certain institutional generators, flow control may need to be employed to direct certain categories of recyclables and/or compostable solid waste currently collected by the private sector to specialized handling facilities in order to meet planning goals.

Limited Exclusion of Recyclables. Ten commenters stated that while recyclables were different from the rest of the municipal solid waste stream, it was important to be selective in excluding recyclables from flow control. Most importantly, there was considerable concern that "recyclables" and "recycling" be clearly, universally, and equitably defined. Some commenters

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[4] According to state regulations, municipalities may designate certain materials as recyclables and exempt them from flow control.

[5] The municipality may have trouble tracking the voluntary quantities recycled and thus may not be able to demonstrate that they have met their recycling goal.

described the recyclable materials excluded from flow controls in their own state. These exclusions are implemented in two ways: some states list specific materials to be excluded from flow controls and other states list the materials actually subject to flow controls.

According to the Maine Waste Management Agency, Maine flow controls cover residential, commercial, and industrial waste, as well as recyclables that are abandoned or discarded by the owner. In Maine, commercial businesses with their own disposal facilities are an additional exception.[6]

According to the Minnesota Legislative Commission on Waste Management, municipal solid waste flow control or waste designation in the state is based on a waste management hierarchy (source reduction, recycling, waste-to-energy, landfilling). This approach allows designation only for wastes that would otherwise be managed in a less environmentally sound manner. The state will not authorize the use of flow controls for waste that is being managed at a facility using a method that occupies the same or higher place on the state's waste management hierarchy (e.g., flow controls could not be applied to MSW currently being managed at a waste-to-energy facility in order to send the waste to a landfill). Waste designation may not be applied to source separated recyclables. Also exempt from designation is waste processed at a resource recovery facility in operation at the time a designation ordinance goes into effect. Anyone can apply for exclusion from designation, and it must be granted if it would not financially impair the facility. Designation encourages source reduction, recycling, and waste management facilities at the higher end of the hierarchy and discourages the use of landfills.

While the Michigan Solid Waste Management Act does not authorize flow control, it does regulate the entire solid waste stream except for hazardous and liquid wastes. According to the Michigan Department of Natural Resources, Michigan also exempts certain recyclable materials from the Solid Waste Management Act, "if they are separated and actually being recycled." In Prince Georges County, Maryland, the local government has the authority to direct all solid waste, but exempts construction demolition debris, commercial recyclables (i.e., white paper and corrugated cardboard), old cars, sludge, and asphalt.

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[6] This differs slightly from the language in the state regulations, which states that municipalities may require delivery of solid waste to a designated facility. Under the regulations, municipalities may designate certain materials as recyclables and exempt them from flow control.

According to Lycoming County, Pennsylvania, flow control is authorized for curbside separated recyclables and delivered recyclables for all commercial, industrial, household, or institutional recyclables (i.e., flow control is authorized for discarded materials). Lycoming does exempt charities, private industry, and residential drop-off or buy-back centers from flow controls. The Solid Waste Authority of Central Ohio, excludes secondary materials recovered from a materials recovery facility, as long as they are destined for market and not another disposal facility.

The Florida Department of Environmental Protection states that recovered materials, (defined as those with known recycling potential that have been diverted from the solid waste stream for sale, use, or reuse) are exempt from municipal solid waste flow control if the materials are used within one year, they do not cause pollution, and they are not hazardous or derived from hazardous wastes. While local governments have the right to exclusive collection of recovered material from residences, they cannot restrict the flow of commercial source-separated recovered material.

Union City, New Jersey explains that flow control should govern all residential, commercial, and industrial solid waste, including recyclable material, unless they are separated at the point of generation (e.g., source separated). This is necessary because only a public entity will resist market forces and recycle material instead of opting for the cheaper landfilling.

Illinois authorizes flow controls for the management of all municipal solid waste including recyclables. However, Illinois considers that each planning jurisdiction should have the authority to decide what materials to include for flow control in their municipal solid waste management plans.

Champaign, Illinois considers that municipalities need to control the entire residential waste stream in order to achieve economies of scale and to assure adequate volumes to finance programs and facilities. To achieve this, Champaign suggests that all residential waste (including recyclables), all commercial solid waste (excluding source-separated recyclables), all industrial waste (excluding source-separated recyclables), and all landscape waste should be covered by flow control.

The commenter from the Resource Recovery Project in Wallingford, Connecticut, which represents 5 counties, explained that the authority to control the flow of municipal solid waste and residential recyclables is essential to enable states to finance waste-to-energy plants, landfills, and materials recovery facilities. Many Connecticut municipalities have guaranteed waste and/or recyclable streams to enable the financing of such facilities. At the same time, the commenter also noted that it seems logical to treat recyclables as separate once they have been segregated.[7]

Complete Exclusion of Recyclables. Twelve state and local governments hold that recyclable material should be excluded from flow controls. Most of these twelve noted that flow control should be applicable only to municipal solid waste, which should be defined to exclude recyclables.

Waste Management Industry

No Exclusion of Recyclables. One commenter from the waste management industry stated that recyclables were no different than any other material in the solid waste stream. In their opinion, no basis exists for excluding some materials from flow controls while including others.

Limited Exclusion of Recyclables. Of the seven waste management industry commenters on this issue, three noted that certain types of recyclable material should be exempt from flow controls. Specifically, one commenter stated that only materials to be sold or donated materials can safely be exempted from municipal solid waste flow control. Two other commenters from WMX Technologies and Mid-American Waste Systems, Inc. stated that while they were not opposed to the flow control of residential recyclables, commercial recyclables should not be subject to flow control. According to WMX, local government should not assume the responsibility or burden of managing commercial and industrial wastes except to the extent that regulations are necessary to protect human health and the environment. Commercial recycling has a long history of being successful and there is no need for it to be disrupted or limited by government.

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[7] Under current regulations, municipalities in Connecticut may designate where solid waste and specified residential recyclables may be managed.

Complete Exclusion of Recyclables. Three waste management industry commenters stated that it was inappropriate for government to subject recyclables or materials of any value to flow control. These three commenters accepted that local governments need to control municipal solid waste (one commenter defined municipal solid waste as residential waste and another commenter referred to municipal solid waste as any materials that have been discarded).

Recycling Industry

Among the 17 commenters from the recycling industry that addressed the issue of materials covered, the main issue was the need to clearly define the extent to which recyclables should be subject to flow controls. One commenter stated that clarifying the materials covered by flow control ordinances is essential.

No Exclusion of Recyclables. One commenter observed that even if a material is potentially recyclable, it is still a solid waste and inherently could present many of the same potential risks to public health and safety as any other solid waste and therefore should be treated no differently. It is the availability of markets that determines a material's recyclability.

Limited Exclusion of Recyclables. Seven commenters stated that flow control of recyclables is only appropriate when the materials have not been separated from the waste stream or when materials have been discarded through actions such as placing the materials on the curbside. One commenter elaborated on the need to categorize recyclables into at least two types based on their management pathways. The first type entails removal of recyclable materials from discarded solid waste. Since this is a regulated solid waste activity, recyclables following this path may be subject to flow controls. The second pathway, however, involves source separated materials that have never been part of the solid waste stream. This second category is not waste management but resource management. Flow controls are not appropriate here. Recovered materials are not solid waste and not subject to flow control.

The commenter from the Free-Flow Packaging Corporation (FFP) also noted that the ability to collect source-separated recyclable material directly from the generator is essential to maintaining the high quality raw material for their polystyrene needs. Specifically, FFP collects polystyrene directly from its generators (e.g., Apple Computer, Sony, Saturn Motor Company), so that it is clean, dry, and free of all contamination. This source of usable raw material would not

be available if flow controls included recovered materials in the definition of solid waste. It is not feasible for FFP to purchase polystyrene from a municipal transfer station because if the polystyrene is collected by a garbage hauler, it is commingled with other plastics, cans, and covered with dust.

Six of these seven commenters that are in favor of limited exclusions noted that flow controls should not interfere with the property rights of the generator. One commenter also noted that the right of commercial businesses to contract directly with scrap metal dealers for the collection of materials separated prior to disposal must be protected.

Complete Exclusion of Recyclables. Nine of the commenters from the recycling industry stated that recyclables should be excluded from the materials covered by flow controls because (1) recyclables are a commodity; and (2) the personal property rights of the owner need to be protected. Generators should have the right to dispose of materials as they choose.

Financial Institutions

One commenter addressed the issue of what materials ought to be covered by flow controls. Paine Webber's position is that bondholder security is greatest when the commitment of flow includes 100 percent of all waste generated in a region. However, Paine Webber has successfully financed projects where local community recycling efforts have been exempted. They feel that the role of recyclables in the waste stream needs to be further evaluated.

Environmental Groups and Individuals

No Exclusion of Recyclables. Two commenters stated that recyclables should not be exempt from flow control ordinances. The Pennsylvania Sierra Club noted that all materials should be covered by flow control including commercial, residential, and industrial solid waste as well as curbside separated recyclables and commercially generated recyclables.

One commenter observed that in California "recyclables" are legally a part of the solid waste stream. Consequently, local governments have legal justification for their authority to regulate "recyclables."[8]

Limited Exclusion of Recyclables. Of the four individual and environmental group commenters that addressed the issue of materials covered by flow controls, two commenters noted that certain exclusions were necessary.

The Californians Against Waste Foundation (environmental group) stated that flow control should be limited to mixed solid wastes. Source separated recyclable materials which have been separated by the generator for the purposes of reuse, recycling, or composting should not be defined as solid waste, nor should they be subject to the flow control authority of local government. The definition of solid waste should not depend upon the value of the material. Generators should be able to recycle their materials with the recycler of their choice whether it is on a donate, sale, or fee for service basis.

The American Automobile Manufacturers Association noted that flow control must include certain exclusions. Solid wastes transported for the purpose of recycling to a facility owned or operated by the generator should be excluded. Recyclable materials separated from municipal waste should be excluded as well. The definition of municipal solid waste also should exclude industrial process waste, or other solid wastes resulting from industrial activity that are unlike general refuse and trash, including construction, demolition, and any renovation debris; used oil; scrap metal; machinery and equipment; and any solid waste identified or listed as a hazardous waste under section 3001 of RCRA, or any solid waste containing polychlorinated biphenyls (PCBs) that is regulated under the Toxic Substances Control Act.

[8] California Public Resources Code protects the right of persons to sell, donate, or otherwise dispose of recyclables.

V. IMPACTS OF FLOW CONTROLS ON HUMAN HEALTH AND THE ENVIRONMENT

State and Local Governments

Seventeen state and local governments commenters addressed the impacts of flow controls on human health and the environment. All of the 17 commenters favor the use of flow controls. The general opinion of 14 state and local governments is that improperly handled waste can present serious environmental and human health problems that do not arise in the handling of most other commodities. State and local governments seem most concerned that without flow controls, economics would cause haulers to bring waste to the cheapest disposal facilities regardless of their level of environmental protection. In addition, incentives would remain for environmentally unsound facilities to continue operating indefinitely without upgrading. Since substandard and minimally standard facilities contaminate ground water, impose health risks to citizens and cost tremendous amounts of money to clean up and upgrade, it is wise to implement flow controls to steer waste away from unsound and often environmentally hazardous facilities.

According to one government commenter, repeal of waste flow control would benefit those entities that have made the least effort in pursuing and implementing balanced and environmentally correct solid waste solutions. In contrast, flow control rewards those striving to meet environmental objectives.

The City of Tacoma, Washington believes that flow controls can play an important role in funding the clean up of Superfund sites. In Tacoma, solid waste rates approximately doubled between 1989 and 1993 in order to pay for debt service on the revenue bonds used to fund remediation activities at a Tacoma Superfund site. Without flow control, funding the remediation activities would have been extremely difficult and complete remediation would not have been accomplished as rapidly as it was.

Six state and local governments feel that limitations of the use of flow control impinge on government's rights. They believe that if local governments are ultimately responsible for the waste in their jurisdiction, they should be allowed to decide how and where that waste is disposed. If flow control is the most suitable method for ensuring that waste is disposed in the safest way possible, municipalities should be allowed to implement it.

Two commenters stated that illegal dumping occurs in the absence of flow control and that flow control would provide the authority to reduce backyard dumping.

Waste Management Industry

Twenty representatives of the waste management industry addressed the impact of flow controls on human health and the environment. Seventeen opposed flow control, while three supported it.

Ten commenters believe that flow control is unnecessary as a means of protecting human health and the environment. They stated that RCRA's Subtitle D Rule for municipal landfills, once implemented, would provide adequate protection and therefore, environmental protection is not a valid justification for flow controls. One commenter suggested that stricter enforcement of existing rules and regulations governing waste disposal sites would achieve greater environmental protection without loss of competition.

Two commenters, a solid waste collector in Mercer County, New Jersey, where flow controls presently exist, and the National Solid Wastes Management Association (NSWMA), oppose flow control stating that it leads to illegal dumping. Since residents are not willing to pay more to have their trash removed, they find other means of disposal such as backyard burying or dumping. This illegal dumping damages soils and contaminates ground water. According to NSWMA, illegal dumping already occurs in some localities such as Saint Lawrence County, New York, where flow controls currently are in place.

Another concern, voiced by two commenters, the National Solid Wastes Management Association (NSWMA) and United States Pollution Control Inc., is that flow control actually will channel waste to environmentally unsound disposal sites or possibly even to known Superfund sites. According to NSWMA, flow controls forced Rhode Island Solid Waste Management Corporation to haul waste to a known Superfund site. The commenters fear that all residents and organizations that used the environmentally unsound facility will be responsible for cleanup costs through increased rates.

Four commenters maintained that flow control does not protect human health and the environment. One commenter, York Disposal Services, stated that flow control can actually

damage the environment when it forces private haulers to carry waste long distances, increasing fuel use and air pollution. York feels that if flow control is potentially harmful to the environment, it is not a reasonable solution to the waste problem.

Finally, three proponents of flow control expressed concern that without flow control laws, local governments cannot properly manage waste disposal and ensure human health and environmental safety. If local governments are to be held responsible for waste within their jurisdictions, they must be armed with all available tools to prevent the mismanagement of that waste.

Recycling Industry

Eight recyclers commented on the impacts of flow control on human health and the environment. All eight either stated explicitly or implied that flow control does not provide benefits to human health and the environment. Two of the eight commenters specifically oppose flow control of recyclables, which in their view have no hazardous effects on health or safety. The California Resource Recovery Association cited a study of over 600 recycling facilities by the California Integrated Waste Management Board (CAIWMB) entitled, "Effects to Human Health and the Environment of Recycling Facilities and the Manner in Which These Facilities are Regulated." The analysis showed that the environmental impacts of processing source separated materials are minimal, so they could be excluded from flow controls without great risk to the public.

One recycler stated that flow controls cause problems with illegal dumping. When fees increase, people try to avoid them by dumping waste illegally. Another recycler claimed that in the past, flow controls have directed waste to sites known to be environmentally unsound.

Environmental Groups and Individuals

The six environmental groups and individuals commenting on the impact of flow controls on human health and the environment oppose the use of flow control. Two feel that flow control impinges on the generators' right to choose the most environmentally protective waste management facility. In effect, the waste generator loses control of the management of his or her waste but retains liability for any mismanagement. According to the American Automobile

Manufacturers Association (AAMA), "If a waste generator were limited by a flow control statute or regulation to manage waste at certain facilities, and these facilities subsequently became Superfund sites, the generator should be relieved of CERCLA liability with respect to response costs at these facilities. In such a case, it would be Congress, EPA, or the local government and not the generator that actually 'arranged for disposal' of the material."

Another commenter described a case in New York where flow control forced waste to be disposed in an environmentally inferior facility. This commenter stated that, "[d]espite the presence of a state of the art waste-to-energy plant in the neighboring Town of Hempstead, the Town of North Hempstead invoked its flow control authority to direct all commercial, industrial, and residential solid waste generated within its boundaries to an unpermitted Town transfer facility for out-of-state export."

Finally, one commenter, the Californians Against Waste Foundation, stated that preliminary evidence shows that the majority of problems occur with facilities that process mixed solid waste. Hence, recycling facilities should not be penalized with flow controls when they are not causing environmental problems. The Californians Against Waste Foundation suggested that the degree of regulation should be proportional to the degree of environmental impact.

VI. ALTERNATIVES TO FLOW CONTROLS

State and Local Governments

Most of the 13 state and local governments that suggested alternatives either stated explicitly or implied that waste management policy goals could not be achieved without flow control. Consequently, governments suggested alternatives cautiously, often warning that they were not completely feasible.

Contracts or Franchising Agreements. The most popular alternative (suggested by 7 commenters) was government contracts with the private sector to guarantee adequate flow of waste to planned facilities. Though effective in the short run, one commenter stated that contracts do not provide any means of financing future capacity or for funding landfill closure and remediation. Another commenter pointed out that contracts are really a form of flow control since they restrict competition and limit opportunities for small rubbish haulers.

Three commenters suggested that if legislative authority exists, local governments could establish franchises. With franchises, instead of entering into contracts, municipalities could give a limited number of haulers franchise agreements or the right to enter into private contracts in a specified district.[9] The United States Conference of Mayors stated that both contracts and franchise agreements are "less flexible" and "more cumbersome" than flow controls and may involve higher costs to consumers. The United States Conference of Mayors also stated that these alternatives disrupt competition more than flow controls do because they limit the destination of waste as well as the opportunity to haul it.

Taxation. Two commenters suggested increasing local or state property taxes. However, according to the Pennsylvania Department of Environmental Resources, most entities do not have the enabling authority. In addition, increased taxation is politically difficult to implement.

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[9] A franchise is the right or license granted to a person to market a company's services within a particular territory. Franchises are often awarded through a competitive bidding process. Franchises could limit the number of waste management or recycling companies within a jurisdiction. As part of this franchise agreement, a company may sign a contract requiring that municipal solid waste or recyclables be collected and delivered to specific management facilities.

Alternative Bonds. The United States Conference of Mayors suggested replacing revenue bonds with general obligation bonds which rely on the taxing authority of the local government to provide financing.

Fee Systems. Four commenters considered the possibility of levying a fee on residences, businesses, and apartments to pay for growth and expansion of solid waste management facilities. This fee would subsidize facilities. According to the commenters, one problem with this approach is that it does not encourage the internalization of the true costs of waste disposal. Hence, generators lack incentives to reduce waste.

Another possibility (suggested by Minnesota) is to create landfill surcharges for future closure/post-closure care and possible remediation costs. This approach forces greater internalization of the true costs of landfilling and reduces some of the differences in tipping fees between landfills and other waste management facilities.

One commenter stated that local governments could establish license fees for waste haulers, charging them for their licenses to operate such that the fees would cover the basic costs of operating a waste management facility. Operators then could charge minimal tipping fees.

Increased Government Involvement. Five commenters suggested complete government ownership and operation of all elements of the waste disposal industry. This approach would ensure both the financial viability of facilities and effective waste management; however, it would remove the free market from the system altogether and would be extremely complicated and expensive to implement. Another difficulty mentioned by the commenters is that government displacement of private waste companies might cause undesired disruption of the flow of commerce.

Another suggested alternative was to force landfills to upgrade and set aside funds for cleanup, closure, and post-closure care.[10] This alternative would be similar to the landfill surcharge suggestion. Again, landfills would be forced to internalize the true costs of waste disposal and would have to increase fees. As a result, state-of-the-art facilities with higher fees would be better able to compete.

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10 This alternative already is required under RCRA's Subtitle D.

Waste Management Industry

Contracts or Franchising Agreements. Five of the 8 waste management industry firms commenting on alternatives to flow control suggested that municipalities contract with disposal services to ensure waste flow. Through contracts, government-owned facilities still would have guaranteed waste flow without the monopolistic environment created by flow controls. Another firm suggested franchising waste collection using a competitive bidding process.

Taxation. One firm suggested raising taxes to finance facilities.

Alternative Bonds. The following bond alternatives were suggested by a waste management company:

- General obligation bonds;
- Pollution control revenue bonds;
- Leveraged leasing; and
- Industrial bonds.

Unfortunately, no discussion accompanied the suggested alternatives.

Increased Government Involvement. The National Solid Wastes Management Association (NSWMA) advocated the establishment of increased partnerships between the government and private waste service firms.

Recycling Industry

Seven of the 8 recycling firms commenting on alternatives to flow control either stated that competition was the best option or mentioned that free market options in general should be explored in greater depth. The following alternatives were offered:

Contracts or Franchising Agreements. Four commenters suggested the use of contracts or franchising agreements as competitive alternatives to flow control.

One commenter suggested establishing government and recycler alliances. Through the alliances, recyclables are either separated from municipal solid waste or reclaimed after collection but before disposal. The alliances allow recyclers to access recyclable material while still appeasing the health and safety concerns of local governments.

Taxation. Individual recycling companies stated that taxes could provide an alternative to flow controls. State or local governments could levy permit taxes on all vehicles transporting waste and/or finance new facilities through the creation of new taxes.

Fee Systems. Two commenters suggested establishing system fees to create recycling incentives.

Increased Government Involvement. The California Resource Recovery Association (CRRA) suggested each of the following alternatives:

- Promote the expertise and investment of existing recyclers to provide reuse, recycling and composting services to generators;
- Build smaller MRFs that encourage (or at least allow) independent recyclers to continue recycling. Instead of building facilities that handle all recyclables, CRRA proposed designing facilities that target only the recyclables that the private sector cannot handle;
- Finance MRFs with flow control of solid waste only (i.e., not including source separated materials);
- Have state or local governments establish a license and reporting system for independent recyclers;
- Ban recyclable or compostable materials from landfills (as San Diego is doing with a mandatory recycling ordinance). This ban would achieve the same objectives of flow control of recyclable materials; and
- Require generators who do not meet recycling goals to develop comprehensive waste reduction plans.

Financial Institutions

Standard and Poors was the only financial institution to comment on alternatives.

Taxation. Standard and Poors raised the possibility of using ad valorem taxes (property taxes) to fund projects.

Increased Government Involvement. They also suggested special assessments, which may accomplish the same effect as legal flow controls. A system can levy an assessment on all residents and businesses and charge no or low tipping fees at the waste management facility, creating the equivalent of an economic monopoly without waste flow laws. The assessment would provide credit strength and allow local governments to obtain financing for waste management facilities.

Environmental Groups and Individuals

Increased Government Involvement. One reason for flow controls is to meet state recycling goals. However, instead of establishing flow controls, one commenter suggested that governments begin mandatory recycling programs, which, with better record keeping and monitoring requirements, would obtain the same results.

LIST OF COMMENTERS

STATE AND LOCAL GOVERNMENT COMMENTERS

State Governments

Connecticut Department of Environmental Protection, Hartford, Connecticut

Delaware Solid Waste Authority, N.C. Vasuki, Chief Executive Officer, Dover, Delaware

Florida Department of Environmental Protection, William Hinkley, Chief, Bureau of Solid and Hazardous Waste, Tallahassee, Florida

Illinois Environmental Protection Agency, Mary Gade, Director, Springfield, Illinois

Maine Waste Management Agency, Sherry Huber, Executive Director, Augusta, Maine

Massachusetts Office of the State Auditor, Division of Local Mandates, Joseph DeNucci, Auditor, Boston, Massachusetts

Michigan Department of Natural Resources, Jim Sygo, Chief, Waste Management Division, Lansing, Michigan

Minnesota Legislative Commission on Waste Management, MN Office of Waste Management, MN Pollution Control Agency, and MN Attorney General

Nebraska Department of Environmental Quality, Joe Francis, Assistant Director, Lincoln, Nebraska

New Jersey Department of Environmental Protection and Energy, Office of Recycling and Planning, Gary Sondermeyer, Assistant Director

Ohio Environmental Protection Agency, Kate Bartter, Deputy Director for Policy and Legislation, Columbus, Ohio

Pennsylvania Department of Environmental Resources , Arthur Davis, Secretary

Local Governments and Organizations Representing Local Governments

American Public Works Association, Ray Reurket, Director, Federal Programs, Washington, D.C.

Association of Minnesota Counties, Barbara Johnson, Attorney (represents 86 of the 87 counties in Minnesota)

Board of Hennepin County Commissioners, Minnesota, Randy Johnson, Commissioner

Bristol Resource Recovery Facility Operating Committee and Tunxis Recycling Operating Committee, Jonathan Bilmes, Connecticut

Cape May County Municipal Utilities Authority, New Jersey

City and County of Honolulu, Hawaii, Department of Public Works, Robert Young

City of New York Department of Sanitation, Jane Levine, Deputy Commissioner for Legal Affairs

City of Springfield, Missouri, Jim O'Neal, Councilman

City of Sunnyvale, California, Mark Bowers, Solid Waste Program Manager

City of Tampa, Florida, Sandra Freedman

City of Urbana, Illinois, Tod Satterthwaite, Mayor

City of Houston, Texas, Department of Solid Waste Management, Everett Bass, Director

City of Milwaukee, Wisconsin, Department of Public Works, Steven Brachman, Resource Recovery Manager,

City of Tacoma, Washington, Department of Public Works, Phillip Ringrose, Public Works Division Manager

Clay-Owen-Vigo Solid Waste Management District, Indiana, Donna Klewer, Director

Clinton County, Michigan, Department of Waste Management, Ann Mason

Concord Regional Solid Waste/Resource Recovery Cooperative, New Hampshire, James Presher, Director, (represents 27 municipalities)

Connecticut Conference of Municipalities, New Haven, Connecticut

County of Lehigh Department of Planning and Development, Office of Solid Waste Management, Allentown, Pennsylvania, Julia Stamm, Solid Waste Coordinator

County of San Diego, California, Scott Peters, Deputy County Counsel

County of Ventura, California, Solid Waste Management Department, Kay Martin, Director

Delaware County Council, Media, Pennsylvania

Greater Detroit Resource Recovery Authority (represents 21 municipalities)

Greater Lebanon Refuse Authority, Lebanon County, Pennsylvania, Michael Pavelek II, Executive Director .

Joint Comments on behalf of City of Indianapolis, Indiana; Davis County Solid Waste Management and Energy Recovery Special Service District; Delaware County Solid Waste Authority; Eastern Renssalaer County Solid Waste Management Authority; Greater Detroit Resource Recovery Authority; Marion County, Oregon; Minnesota Resource Recovery Association; National Institute of Municipal Law Officers; Onondaga County Resource Recovery Agency; Resource Authority in Sumner County, Tennessee; Solid Waste Authority of Central Ohio; Town of North Hempstead, New York; Wisconsin County Solid Waste Management Association; and York County Solid Waste and Refuse Authority

King County Solid Waste Division, Department of Public Works, Seattle, Washington, Rodney Hansen, Manager

Lackawanna County Solid Waste Management Authority, Pennsylvania

La Crosse County, Wisconsin, Brian Tippetts, Solid Waste Manager

Lancaster County Solid Waste Management Authority, Pennsylvania, Herbert Flosdorf, Executive Director

Latah County, Idaho, Board of Latah County Commissioners

Law Firm of DeCotiis & Pinto for 7 of the 22 solid waste management districts in New Jersey, Hackensack, New Jersey

Law Firm of Fulbright & Jaworski for the Incorporated Villages of Westbury, Mineola, and New Hyde

Park, New York; The New York State Conference of Mayors and Municipal Officials; and American Ref-Fuel Company of Hempstead, New York

Law Firm of McManimon & Scotland for the Mercer County Improvement Authority, New Jersey
Law Firm of Michael D. Diederich, Jr. for the County of Rockland Department of Solid Waste Management

Law Firm of Tock and Miller, LTD. for the Intergovernmental Organization in Champaign County, Illinois

League of California Cities, Yvonne Hunter, Legislative Representative, Sacramento, California (represents 468 incorporated cities in California)

Lycoming County Planning Commission and Lycoming County Solid Waste Department, Pennsylvania, Jerry Walls, Executive Director

Marion County, Oregon, Department of Solid Waste Management, James Sears, Director, Salem, Oregon

Medina County Sanitary Engineering Department, Ohio, K.W. Hutz, County Sanitary Engineer

Metro Dade Solid Waste Management, Miami Florida, Paul Mauriello, Solid Waste Management Planner

Monmouth County Planning Board, New Jersey, Lawrence Zaayenga, Solid Waste Coordinator

National Association of Counties, Washington, D.C.

Newark, New Jersey, Sharpe James, Mayor

Northeast Indiana Solid Waste Management District, Brian Miller, Executive Director

Organization of Solid Waste Districts of Ohio, Michael D. Long, Executive Director of the Solid Waste Authority of Central Ohio (Mr. Long's comments represent the opinion of the Organization of Solid Waste Districts of Ohio which is comprised of 40 of Ohio's 48 solid waste management districts.)

Pollution Control Financing Authority of Warren County, Oxford, New Jersey, Bart Cahart, Executive Director

Prince Georges County, Maryland, Dept of Environmental Resources, Eugene Lauer, Director

Regional Waste Services, Inc., Portland, Maine, Gary Lorfano, Chairman of the Board of Directors (Regional Waste Services represents 21 municipalities)

Solid Waste Association of North America, John Abernethy, Vice President, (also Public Works Director, Sacramento County, California) Mr. Abernathy's comments represent SWANA's opinions regarding the flow control issue.

Solid Waste Association of North America, Durwood Curling, International Secretary (also Executive Director of Southeastern Public Service Authority of Virginia) Mr. Curling's comments represent SWANA's opinion on the flow control issue.

Solid Waste Association of North America, Curt Kemppainen, President (also Public Works Director, Kent county, Grand Rapids, Michigan) Mr. Kemppainens' comments represent SWANA's opinions regarding the flow control issue.

Solid Waste Association of North America's "Response to Questions Raised by the USEPA for Their Flow Control Public Meetings"

Solid Waste Authority of Central Ohio, Jack Foulk, President of the Franklin County, Ohio Board of Commissioners and Chairman of the Solid Waste Authority of Central Ohio Finance Committee. Mr. Foulk's comments represent the Solid Waste Authority of Ohio's opinions regarding the flow control issue.

Minnesota Solid Waste Management Coordinating Board, Paul McCarron, County Commissioner (represents the 7 counties that surround and include Minneapolis and St. Paul)

Southeastern Public Service Authority of Virginia, John Hadfield, Deputy Executive Director (represents 8 communities)

Spokane, Washington, Sheri S. Barnard, Mayor (on behalf of herself and other concerned citizens)

Spokane Regional Solid Waste Management System, Washington, Phil Williams, Executive Director

Town of Hamden, Connecticut, Mayor Lillian D. Clayman

Town of Wallingford, Connecticut, Philip Hamelm, Jr., Resource Recovery Project Coordinator (represents 5 counties)

Union County Utilities Authority, Linden, New Jersey, Jeffrey Callahan, Executive Director

United States Conference of Mayors, Washington, D.C., J. Thomas Cochran, Executive Director

Winnebago County Solid Waste Management Board, Wisconsin, Leonard Leverence, Director of Solid Waste

WASTE MANAGEMENT INDUSTRY COMMENTERS

Alliance Environmental Services, Inc., Milwaukee, Wisconsin

Allied Waste Industries, Inc., Apache Junction, Arizona

Arena Trucking Co., Inc., Rice, Virginia

Attwoods Inc., Coconut Grove, Florida

Browning-Ferris Industries, Inc., Houston, Texas

C&R Sanitation Co., Inc. Collection & Recycling, Newington, Connecticut

California Refuse Removal Council, Sacramento, California

California Waste Removal Systems, Lodi, California

CDT Landfill Corporation, Joliet, Illinois

Cedar Disposal Inc., Menomonee Falls, Wisconsin

Chambers Development Co., Inc., County of Anson, North Carolina

Commercial Disposal Co., Inc., West Springfield, Massachusetts

Council of Trade Waste Association, Inc., Flushing, New York

CSX Transportation, Jacksonville, Florida

Daneco, Inc., Minneapolis, Minnesota

E&K General Hauling Inc. (President), Sheboygan, Wisconsin

E&K General Hauling Inc. (Vice President), Sheboygan, Wisconsin

Energy Answers Corporation, Albany, New York

Expert Disposal Service, Inc., Hartland, Wisconsin

Frank Perrotti & Sons, Inc., Woodbridge, Connecticut

Grand Central Sanitation, Pen Argyl, Pennsylvania

Handy Dump Waste Diverting Technologies, Inc., Roanoke, Virginia

Hechimovich Sanitary Landfill, Inc., Horicon, Wisconsin

Knutson Services, Inc., Rosemount, Minnesota

Laidlaw Waste Systems, Inc., Burlington, Ontario

McCaughey Standard, Inc., Pawtucket, Rhode Island

McGuire, Woods, Battle, & Boothe REP: Container Corporation of Carolina, Inc., Fort Mill, South Carolina

Mid-American Waste Systems, Inc., Canal Winchester, Ohio

Minnesota Resource Recovery Association, Trudy Gasteazoro, Executive Director, St. Paul, Minnesota (represents waste-to-energy facilities serving 29 counties and 2 cities. Other members of the Association include Dakota county, Northern States Power Company, United Power Association, Quadrant Company and Richards Asphalt

Multi Material Management & Marketing, Oakland, California

National Serv-All, Inc., Ft. Wayne, Indiana

National Solid Wastes Management Association, Washington, D.C. (represents 2500 member companies in the U.S. and Canada)

Norcal Waste Systems, Inc., California

Ogden Martin Systems, Inc., Arlington, Virginia

Paine's Inc. Recycling and Rubbish Removal, Simsbury, Connecticut

PASCO (Palo Alto Sanitation Co.), Palo Alto, California

Richmond Sanitary Service, Richmond, California

Ritters Sanitary Service Inc., Lyon County, Minnesota

Rumpke Waste Systems, Cincinnati, Ohio

Santek Environmental, Inc., Cleveland, Tennessee

Sawyer Environmental, Hampden, Maine

Semass Partnership, Rochester, Massachusetts

South Coast Refuse Corp., Irvine, California

Superior Environmental Services (President), West Allis, Wisconsin

Superior Environmental Services (Chief Executive Officer), West Allis, Wisconsin

Testimony of a Solid Waste Collector in Mercer County, New Jersey

United States Pollution Control, Inc.

Upper Valley Disposal Service, St. Helena, California

Valley Sanitation Co., Inc. (Vice President), Fort Atkinson, Wisconsin

Valley Sanitation Co., Inc. (General Manager, Leonard Cerrentano), Fort Atkinson, Wisconsin

Valley Sanitation Co., Inc. (President), Fort Atkinson, Wisconsin

Valley Sanitation Co., Inc. (General Manager, Deborah Vaughn), Fort Atkinson, Wisconsin

Virginia Waste Industries Association, Richmond, Virginia

Vogel Disposal Services, Mars, Pennsylvania

Waste Material Trucking Company, Inc., Southington, Connecticut

Waste Industries, Inc., Raleigh, North Carolina

Waste Systems Corporation, Minnesota

Waste-Stream Inc., Potsdam, New York

WMX Technologies, Inc., Oak Brook, Illinois

York Waste Disposal, Inc., York, Pennsylvania

RECYCLING INDUSTRY COMMENTERS

American Forest & Paper Association, Washington, D.C.

Automated Material Handling, Kensington, Connecticut

C.F. Justice, Hesperia, California

California Wastepaper Dealers Association, Baldwin Park, California

California Resource Recovery Association, Loomis, California

Chicago Paperboard Corporation, Chicago, Illinois

E. L. Harvey & Sons, Westboro, Massachusetts

Free-Flow Packaging Corporation, Redwood City, California

Independent Recycler's Association, Oakland, California

Institute of Scrap Recycling Industries: Chicago Chapter, Chicago, Illinois

Institute of Scrap Recycling Industries, Inc., Washington, D.C.

Institute of Scrap Recycling Industries: Southwestern Chapter, California

IVEX Packaging Corporation, Lincolnshire, Illinois

Jefferson Smurfit Corporation, St. Louis, Missouri

Marin Recycling and Resource Recovery Association, San Rafael, California

National Recovery Technologies, Inc., Nashville, Tennessee

Northern California Recycling Association, Berkeley, California

Omni Recycling Paper Recycling Coalition, Westbury, New York

Recycling Products of Rockland, New York

Recycling Products of Rockland and C & A Carbone, New York

Sonoco Product Company, Hartsville, South Carolina, for Paper Recycling Coalition (a group of 11 companies that operate paper mills which exclusively use recovered paper as raw material)

Southeastern Paper Manufacturing Company, Dublin, Georgia, for the Recycling Paper Coalition (PRC)

The Pick Up Artists, Culver City, California

The Business Recyclers Educational Assistance Link, Loomis, California (a technical council of the California Resource Recovery Association formed to specifically address generator's issues regarding source reduction, resource recovery and recycling)

Tidewater Fibre Corporation, Chesapeake, Virginia

Urban Ore, Inc., Richmond, California

Waste Recovery Systems, Inc., Newport Beach, California and Franklin, Tennessee

Weyerhauser Company, Tacoma, Washington

Winzinger Incorporated, Hainesport, New Jersey

FINANCIAL INSTITUTION COMMENTERS

Paine Webber, Inc., New York, New York

Standard & Poor's Corporation, New York, New York

ENVIRONMENTAL GROUPS AND INDEPENDENT COMMENTERS

American Automobile Manufacturers Association, Detroit, Michigan

Bio-Fuels Engineering Corp., Kalama, Washington

Californians Against Waste Foundation, Sacramento, California

Charlotte Zieve, PhD., Institute for Environmental Studies, Madison, Wisconsin

Citizens Coordinating For Clean Water, Lebanon, Pennsylvania

Dirk Plessner, Esq., Eastman & Smith, Toledo, Ohio

John Pugliaresi, Waste Resource Technologies, California

John McCabe, Independent Waste Management Consultant, Palo Alto, California

Lawrence R. Schillinger Environmental Consultants, Albany, New York

Ohio Chamber of Commerce, Columbus, Ohio

Pennsylvania Chapter of the Sierra Club, Harrisburg, Pennsylvania

Rufus C. Young, Jr. of Burke, Williams & Sorensen, Los Angeles, California (this attorney and his firm have represented California municipalities on solid waste management issues; however, the comments submitted were not on behalf of any specific municipality.)

Tammie Wallace, Fort Myers, Florida

W. Dexter Bellamy, PhD, Fort Myers, Florida

APPENDIX I-B

Legal Decisions Concerning Municipal Solid Waste Flow Controls

This appendix describes recent litigation over flow controls and provides synopses of several important court decisions related to flow control. The discussion of each decision highlights the legal issues raised, describes the laws/ordinances challenged, and summarizes the case and decision reached. This appendix concludes with a summary matrix describing the flow control mechanism, materials covered by the flow controls, facilities affected, issues raised, decision, and rationale in each case.

LITIGATION OVER FLOW CONTROLS

Although many jurisdictions have used flow controls and related mechanisms for a number of years, legal challenges continue to occur. Flow control laws have been challenged primarily on the following 3 issues:

(1) **Antitrust** claims concerning the creation of monopolies,

(2) **Takings** claims concerning the unlawful taking of private property for public use, without just compensation, and,

(3) **Commerce Clause** claims regarding discrimination against interstate commerce.

This section summarizes recent litigation over flow controls.

ANTITRUST CLAIMS

From the late 1970s till the mid-1980s, a major challenge to flow controls was on antitrust grounds. Haulers claimed that requiring waste to be disposed at a municipally-designated facility violated federal antitrust laws because the local government acted in a monopolistic fashion. The leading case on this issue is *Hybud Equipment Corp. v. City of Akron.*[11] The United States

[11] 654 F.2d 1187 (6th Cir. 1981), *vacated and remanded on other grounds*, 455 U.S. 931 (1982), *on remand*, 742 F.2d 949 (6th Cir. 1984), *cert. denied*, 471 U.S. 1004 (1985).

Court of Appeals for the Sixth Circuit reviewed an Akron ordinance that required all collected MSW, including recyclables, to be delivered to a city-operated WTE facility. The ordinance also barred haulers from removing recyclables at transfer stations and delivering the remaining solid waste to other management facilities. Trash haulers challenged the city ordinance as a violation of the Sherman Antitrust Act.[12] The Court held that the federal antitrust laws were not applicable because the City was acting to implement a State policy designed to substitute competition with monopoly public service. Since the mid-1980s, antitrust challenges have not been successful, because federal appellate courts consistently have determined that flow control laws comply with antitrust requirements where States have authorized local governments to be involved in solid waste management.[13]

TAKINGS CLAIMS

Opponents of flow controls also have made claims based on the Takings Clause of the Fifth Amendment to the United States Constitution: "nor shall private property be taken for public use, without just compensation." With regard to the takings issue, the court in the *Hybud* case held that control of sanitation was a proper exercise of police power, similar to fire and police protection.[14] Therefore, this exercise of police power did not legally result in a taking requiring compensation even if the city in fact appropriated some valuable materials, because the control of MSW was such a significant public function.

In 1994, a takings claim was made in a case involving the authority of a city to control the flow of recyclable materials. In this California case, a recycler claimed that the exclusive franchise for solid waste handling services was invalid and caused a taking when applied to recyclable

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[12] The haulers also made claims that the ordinance violated the Commerce Clause and was a taking of property without just compensation.

[13] The general purpose clauses of State solid waste management statutes provide sufficient authorization for anticompetitive activities by local governments. This authorization also may be inferred (e.g., planning requirements that encourage local governments to join together to provide management facilities for solid waste). *Central Iowa Refuse System v. Des Moines Metro Solid Waste Agency*, 715 F.2d 419, 426-27 (8th Cir. 1983), *cert. denied*, 471 U.S. 1003 (1985).

[14] *Hybud Equipment Corp. v. City of Akron*, 654 F.2d 1187 (6th Cir. 1981), *vacated and remanded on other grounds*, 455 U.S. 931 (1982), *on remand*, 742 F.2d 949 (6th Cir. 1984), *cert. denied*, 471 U.S. 1004 (1985).

materials that had not been discarded as waste.[15] Although the California Integrated Waste Management Act of 1989 (AB 939) authorizes cities to grant exclusive franchises for the provision of solid waste handling services, the California Supreme Court decided that, because recyclable materials have some economic value, they are not solid waste as defined by AB 939. The Court concluded that owners of undiscarded recyclable materials cannot be required to transfer these materials to the holder of an exclusive franchise. The Court, however, did not explicitly state that such an involuntary transfer would be a taking. The Court noted that once recyclable materials were discarded, they were subject to the exclusive franchise. For example, if an owner puts recyclable material at the curb, the owner discards or abandons the property and thereby renders it waste that is subject to the exclusive franchise.

COMMERCE CLAUSE CLAIMS

As State and local governments successfully defeated antitrust challenges to their authority to direct the flow of MSW, other challenges arose, based on the Commerce Clause of the United States Constitution. The United States Supreme Court decided in *City of Philadelphia v. New Jersey* that solid waste should be considered an article of commerce, and its interstate movement is therefore protected by the Constitution from undue interference by the States.[16] This decision allowed parties to challenge flow controls on the grounds that mandating waste management at designated facilities discriminates against interstate commerce (e.g., out-of-State landfills could not compete to obtain in-State waste).

The applicability of the Commerce Clause to flow control laws depends upon the facts of each particular situation. During the early to mid-1980s, courts often upheld flow controls against challenges that those laws discriminated against interstate commerce. In many of these cases, the courts decided that the flow controls did not discriminate because the laws legitimately served the public interest (e.g., assuring proper disposal of MSW, reducing truck traffic) and applied evenly

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[15] *Waste Management of the Desert, Inc. v. Palm Springs Recycling Center, Inc.*, 28 Cal. Rptr.2d 461, 869 P.2d 440 (1994). The city ordinance authorized an exclusive franchise for all solid waste and recyclable materials between the City of Rancho Mirage and Waste Management of the Desert.

[16] 437 U.S. 617 (1978).

to in-State and out-of-State waste. In addition, flow controls did not result in sufficient economic injury to out-of-State interests.[17]

More recent court decisions, on the other hand, have found that flow control laws do discriminate against interstate commerce. In May 1994, the United States Supreme Court decided in *C & A Carbone, Inc. v. Town of Clarkstown*[18] that a flow control ordinance unfairly gave a designated waste management facility a competitive advantage over out-of-state facilities.[19] The Court also determined that the town did not lack other means to achieve its waste management goals. The Court mentioned, for example, that the town can address health and safety concerns by enacting more stringent environmental protection standards. To raise revenue, the town could increase taxes or issue municipal bonds. The Court concluded that ensuring the financial viability of a publicly-owned facility was not a sufficiently compelling State interest justifying interference with interstate commerce.

SUMMARY OF COURT CASES

UNITED STATES SUPREME COURT DECISIONS

Case: C&A Carbone, Inc. v. Town of Clarkstown

Court: U.S. Supreme Court
114 S.Ct. 1677, 128 L.Ed.2d 399 (1994)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: A Clarkstown flow control ordinance required that all solid waste originating in the town, as well as out-of-town waste processed in the town, be processed at the town's designated solid waste transfer facility. This ordinance did not cover recyclable materials.

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[17] *Hybud Equipment Corp. v. City of Akron*, 654 F.2d 1187 (6th Cir. 1981), *vacated and remanded on other grounds*, 455 U.S. 931 (1982), *on remand*, 742 F.2d 949 (6th Cir. 1984), *cert. denied*, 471 U.S. 1004 (1985); *J. Filiberto Sanitation, Inc. v. New Jersey Department of Environmental Protection*, 857 F.2d 913 (3d Cir. 1988); *Harvey & Harvey, Inc. v. Delaware Solid Waste Authority*, 600 F.Supp. 1369 (D.Del. 1985).

[18] 114 S.Ct. 1677, 128 L.Ed.2d 399 (1994).

[19] The Clarkstown ordinance required that all solid waste originating in the town, as well as out-of-town waste processed in the town, be processed at the town's designated solid waste transfer facility. Haulers could not deliver waste directly to cheaper out-of-state waste management facilities.

Summary of Case: C&A Carbone, a waste hauler, operated a recycling center. While the flow control ordinance allowed recyclers, such as Carbone, to continue receiving solid wastes, it required that non-recyclable residues be brought to the designated transfer station. The tipping fee at the transfer station exceeded the disposal cost of solid waste on the private market. Carbone separated recyclable materials from solid waste and sent non-recyclable residues out-of-state rather than to the transfer station. Clarkstown filed a lawsuit in State court seeking an injunction requiring that Carbone send its waste to the transfer station. Carbone responded by suing in federal court, claiming that the local law violated the Commerce Clause, because it prohibited the shipment of solid waste to out-of-state facilities.

Decision: Overturned flow control ordinance.

The Supreme Court overturned Clarkstown's flow control ordinance on the basis that it both regulates and discriminates against interstate commerce. The Court held that the ordinance deprives out-of-state businesses access to local markets because only the favored local operator can process waste in the town.

The Court determined that the town does not lack other means to achieve its goals; for example, the town can address health and safety concerns by enacting more stringent standards, or, to raise revenue, the town could increase taxes or issue municipal bonds.

Case: City of Philadelphia v. New Jersey
437 U.S. 617 (1978)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: New Jersey law banned disposal of out-of-state waste at all in-state landfills.

Summary of Case: Philadelphia challenged New Jersey's authority to ban the disposal of out-of-state waste at in-state landfills as a violation of the interstate Commerce Clause.

Decision: Overturned law.

Supreme Court held that solid waste is an article of interstate commerce and its interstate movement is constitutionally protected from interference by the States.

Supreme Court held that legislative intent to conserve in-state capacity and to protect the environment is not a sufficient reason to discriminate against out-of-state waste.

Therefore, the New Jeresy law violated the Commerce Clause as an economic protectionist measure.

Case: Fort Gratiot Sanitary Landfill v. Michigan Department of Natural Resources
504 U.S. ____,[a] 112 S.Ct. 2019 (1992)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: Michigan law required private landfill operators to limit their business to accepting wastes only from the county in which the landfill is located unless a county's State-approved solid waste management plan authorized otherwise.

Summary of Case: The county solid waste planning committee denied a landfill operator's petition to accept out-of-state waste at its landfill. The landfill operator claimed that the Michigan MSW import restrictions violated the Commerce Clause because they discriminated against the free flow of goods and services across state lines.

Decision: Overturned law.

Although the law applied evenly to all out-of-county (both in-state and out-of-state) waste, the Supreme Court held that the law discriminated against interstate commerce. In order to render its law constitutional, Michigan had the burden of proving that the law furthered health and safety concerns and that these concerns could not be served by nondiscriminatory alternatives.

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[a] Page cite not available as of November 1994.

UNITED STATES COURT OF APPEALS' DECISIONS

Case: Hybud Equipment Corp v. City of Akron
654 F.2d 1187 (6th Cir. 1981), vacated and remanded on other grounds, 455 U.S. 931 (1982), on remand, 742 F.2d 949 (6th Cir. 1984), cert. denied, 471 U.S. 1004 (1985)

Issue Raised: Antitrust, Commerce Clause, and taking of property.

Law/Ordinance Challenged: Akron ordinance directed that all collected MSW, including recyclables, be delivered to a city-operated waste-to-energy facility. The ordinance also barred haulers from removing recyclables at transfer stations and delivering the remaining solid waste to other management facilities.

Summary of Case: Trash haulers challenged the city ordinance as a violation of the Sherman Antitrust Act, the Commerce Clause, and a taking of property without just compensation.

Decision: Upheld flow control ordinance.

The court held that the federal antitrust laws were not applicable, because the city was acting to implement a State policy designed to substitute competition with monopoly public service.

The court also found that the ordinance primarily burdened residents of Akron, and any impact on interstate commerce was incidental. Therefore, no violation of the Commerce Clause occurred.

With regard to the "taking" issue, the court held that control of sanitation was a proper exercise of police power, similar to fire and police protection. The exercise of the police power does not result in a taking even if the city appropriates some valuable materials, because the control of MSW is such a significant public function.

Case: J. Filiberto Sanitation, Inc. v. New Jersey Department of Environmental Protection
857 F.2d 913 (3d Cir. 1988)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: State flow control regulation required that all waste originating within a county be transported to a county transfer station to be processed before disposal outside the State.

Summary of Case: J. Filiberto Sanitation, Inc. wanted to transport waste directly to an out-of-state landfill without stopping at the designated transfer station. Filiberto argued that the cost of disposal at out-of-state landfills was approximately half the cost of the tipping fee charged by the county transfer station. Filiberto claimed that the State regulation was unconstitutional because it discriminated against interstate commerce.

Decision: Upheld flow control regulation.

The U.S. Court of Appeals held that the State regulation did not discriminate against interstate commerce because the regulation applied

evenly to in-state and out-of-state waste, and did not result in sufficient economic injury to out-of-state interests. In addition, the court concluded that the regulation legitimately served the public interest (e.g., assuring proper disposal of trash, reducing truck traffic).

UNITED STATES DISTRICT COURTS' DECISIONS

Case: Harvey & Harvey, Inc. v. Delaware Solid Waste Authority
600 F.Supp. 1369 (D. Del. 1985)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: Delaware Solid Waste Authority flow control ordinance required that all solid waste within the State, whether it originated in-state or out-of-state, must be transported and managed at Delaware Solid Waste Authority-operated facilities.

Summary of Case: Harvey & Harvey, Inc. transported commercial and industrial solid waste to disposal sites located both inside and outside of Delaware. To take advantage of lower tipping fees, the company disposed out-of-state 95 percent of the solid waste collected at its transfer station. Harvey & Harvey challenged the ordinance under the Commerce Clause and claimed that it discriminated against interstate commerce.

Decision: Upheld flow control ordinance.

The court held that since the regulations apply equally to all generators and transporters of solid waste, both in-state and out-of-state, the requirements did not significantly discriminate against out-of-state economic interests. The regulations also served the legitimate State interest of protecting human health and the environment.

Case: Stephen P. DeVito, Jr. Trucking, Inc. v. Rhode Island Solid Waste Management Corporation
770 F. Supp. 775 (D.R.I. 1991), aff'd, 947 F.2d 1004 (1st Cir. 1991)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: State flow control regulation directed that all solid waste generated or collected in Rhode Island must be managed at in-state facilities.

Summary of Case: Prior to the enactment of the regulation, DeVito transported solid waste generated or collected in Rhode Island to waste management facilities in Maine and Massachusetts, because the tipping fees charged by out-of-

state facilities were lower than the fees charged by the Rhode Island facility. Stephen P. DeVito, Jr. Trucking, Inc. sought injunctive relief, claiming that the regulation was an unreasonable interference with interstate commerce.

Decision: Overturned flow control regulation.

The U.S. District Court held that the regulation resulted in a positive advantage to in-state economic interests at the expense of interstate commerce. Revenues at in-state facilities were increased, because commercially-generated waste could not be transported out-of-state.

The court also decided that Rhode Island failed to demonstrate the compelling need for the flow control regulation or that less burdensome alternatives did not exist. The court concluded that health and safety could be achieved by inspections and that a financially viable waste management system could be achieved by local taxation.

Case: Waste Systems Corp. v. County of Martin, et al
784 F. Supp. 641 (D. Minn. 1992), aff'd, 985 F.2d 1381 (8th Cir. 1993)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: A flow control ordinance enacted by Martin and Faribault counties in Minnesota required all locally generated wastes to be disposed at a publicly-owned and operated composting facility.

Summary of Case: Waste Systems Corp. operated a landfill in Iowa that had been receiving about two-thirds of the MSW generated in the bi-county area. Waste Systems argued that the ordinance was a violation of the Commerce Clause and also violated their civil rights (e.g., protection against discrimination by the government).

Decision: Overturned flow control ordinance.

The U.S. District Court ruled that ensuring the financial viability of a publicly-owned waste handling facility was not a sufficiently compelling State interest to justify interference with interstate commerce. The court noted that less discriminatory means existed to maintain the financial viability of the project, such as community taxes to lower the price of disposal and attract waste on an economic rather than compulsory basis.

The court concluded that the flow controls resulted in giving the publicly-owned facility a "competitive advantage" over out-of-state facilities.

Case: Waste Recycling, Inc. v. Southeast Alabama Solid Waste Disposal Authority
814 F.Supp. 1566 (M.D. Ala. 1993)

Issue Raised: Commerce Clause

Law/Ordinance Challenged: Municipal flow control ordinances restricted the disposal of solid waste in a four-county area to a regional publicly-owned disposal facility.

Summary of Case: Approximately 36 local governments created a regional solid waste management authority and enacted flow control ordinances to assist the Southeast Alabama Solid Waste Disposal Authority (Authority) in financing a regional landfill and several transfer stations.

Waste management companies that collect, haul, and dispose of solid waste argued that the ordinances violated the Commerce Clause.

The cities and the Authority defended the ordinance and the regional operations as market participation (where the Authority operates as a commercial business), arguing that government conduct is exempted from Commerce Clause scrutiny where it is similar to private sector trading or business activity.

Decision: Overturned flow control ordinances.

The United States District Court found that the ordinances clearly discriminated against interstate commerce and did not result in market participation; rather, the ordinances resulted in market regulation. The ordinances restricted the ability of private companies to compete with the regional publicly-owned disposal facility.

The court concluded that the ordinances represented a significant barrier to the free flow of wastes through interstate commerce and decided that the Authority had failed to substantiate any interest besides local economic protectionism.

Though the purpose of the ordinances was to ensure an adequate flow of waste to the facility, the Authority failed to demonstrate that the ordinances were the least restrictive alternatives. The court suggested several alternatives to ensure the economic viability of the facility, including charging competitive rates and financing the facility through bank loans, property taxes, private investors, or utility bill assessments. The court also cited the Authority's failure to justify the ordinance based on health and safety concerns.

STATE COURT DECISIONS

Case: Waste Management of the Desert, Inc. v. Palm Springs Recycling Center, Inc.

Court: California Supreme Court
28 Cal. Rptr. 2d 461; 869 P.2d 440 (1994)

Issue Raised: Taking of Private Property

Law/Ordinance Challenged: A city ordinance authorized an exclusive franchise between the City of Rancho Mirage and Waste Management of the Desert, Inc. to provide handling and disposal services for all residential and commercial solid waste and recyclables.

Summary of Case: The City of Rancho Mirage awarded an exclusive franchise to Waste Management for all solid waste and recyclables services and asserted that all recyclable materials in the City were covered under this agreement. Waste Management and the City took legal action to stop a competing recycler, Palm Spring Recycling Center, from collecting recyclable materials from commercial clients. The California Supreme Court considered whether the State authorized cities to prohibit owners of recyclable materials from selling these materials to someone other than the exclusive franchisee.

Decision: Overturned ordinance.

The California Supreme Court held the exclusive franchise between the City and Waste Management invalid and unenforceable when applied to recyclable materials that have not been discarded by the generator as waste.

The California Integrated Waste Management Act of 1989 (AB 939) allows cities to grant exclusive rights (e.g., franchisees to private haulers) for the provision of solid waste handling services. The Court found that because recyclable materials have some economic value, they are not solid waste as defined by the Act. The Court concluded that owners of undiscarded recyclable material cannot be required to transfer these materials to the holder of an exclusive franchise.

Once materials are "discarded", however, they are subject to the exclusive franchise.

LEGAL DECISIONS CONCERNING MUNICIPAL SOLID WASTE FLOW CONTROLS

NAME OF CASE	FLOW CONTROL MECHANISM	SCOPE OF MATERIALS COVERED[1]	TYPES OF FACILITIES	ISSUES RAISED			DECISION		RATIONALE FOR DECISION
				ANTITRUST[2]	COMMERCE CLAUSE[3]	TAKING[4]	FLOW CONTROL OVER-TURNED	FLOW CONTROL UPHELD	
U.S. SUPREME COURT DECISIONS									
C&A Carbone, Inc., et al. v. Town of Clarkstown 114 S.Ct. 1677, 128 L.Ed.2d 299 (1994)	Local ordinance	MSW, excluding recyclables	Transfer Station		✓		✓		A local ordinance that required delivery of out-of-state waste to designated facility at an additional cost discriminates against out-of-state businesses.
City of Philadelphia v. New Jersey 437 U.S. 617 (1978)	State statute	MSW sent to landfills	Landfills		✓		✓		Solid waste is an article of interstate commerce; and state law that bans disposal of out-of-state MSW into in-state landfills violates the Commerce Clause because it discriminates against the import of out-of-state waste without a legitimate local concern.

LEGAL DECISIONS CONCERNING MUNICIPAL SOLID WASTE FLOW CONTROLS

NAME OF CASE	FLOW CONTROL MECHANISM	SCOPE OF MATERIALS COVERED[1]	TYPES OF FACILITIES	ISSUES RAISED			DECISION		RATIONALE FOR DECISION
				ANTITRUST[2]	COMMERCE CLAUSE[3]	TAKING[4]	FLOW CONTROL OVER-TURNED	FLOW CONTROL UPHELD	
Fort Gratiot Sanitary Landfill, Inc. v. Michigan Department of Natural Resources 504 U.S.___, 112 S.Ct. 2019 (1992)	State statute	MSW	Landfill		✓		✓		Requirement that a person not accept solid waste that is generated outside the county where the facility is located violates the Commerce Clause because nondiscriminatory alternatives existed.
FEDERAL COURT OF APPEALS DECISIONS									
Hybud Equipment Corp. v. City of Akron 654 F.2d 1187 (6th Cir. 1981), vacated and remanded on other grounds, 455 U.S. 931 (1982), on remand, 742 F.2d 949 (6th Cir. 1984), cert. denied, 471 U.S. 1004 (1985)	City ordinance	MSW, including recyclables	Waste-to-energy plants	✓	✓	✓		✓	City ordinance that monopolized solid waste collection and disposal and required private disposal firms to transport all waste to a city-sponsored facility does not interfere with interstate commerce, violate federal antitrust laws, or constitute a taking.

LEGAL DECISIONS CONCERNING MUNICIPAL SOLID WASTE FLOW CONTROLS

NAME OF CASE	FLOW CONTROL MECHANISM	SCOPE OF MATERIALS COVERED[1]	TYPES OF FACILITIES	ISSUES RAISED			DECISION		RATIONALE FOR DECISION
				ANTITRUST[2]	COMMERCE CLAUSE[3]	TAKING[4]	FLOW CONTROL OVER-TURNED	FLOW CONTROL UPHELD	
J. Filiberto Sanitation, Inc. v. New Jersey Department of Environmental Protection 857 F.2d 913 (3d Cir. 1988)	State regulation	MSW	Transfer station		✓			✓	State regulation that required that all waste, whether originating in-state or out-of-state, be processed at an in-county transfer station does not discriminate against interstate commerce.
FEDERAL DISTRICT COURT DECISIONS									
Harvey & Harvey, Inc. v. Delaware Solid Waste Authority 600 F. Supp. 1369 (D.Del. 1985)	Authority ordinance	MSW	State-operated landfills, recycling centers, and waste-to-energy facilities		✓			✓	Flow control ordinance that required all MSW to be managed at state-operated facilities does not violate the Commerce Clause because it treats all interests, both in-state and out-of-state, equally.

LEGAL DECISIONS CONCERNING MUNICIPAL SOLID WASTE FLOW CONTROLS

NAME OF CASE	FLOW CONTROL MECHANISM	SCOPE OF MATERIALS COVERED[1]	TYPES OF FACILITIES	ISSUES RAISED			DECISION		RATIONALE FOR DECISION
				ANTITRUST[2]	COMMERCE CLAUSE[3]	TAKING[4]	FLOW CONTROL OVER-TURNED	FLOW CONTROL UPHELD	
Stephen P. DeVito, Jr. Trucking, Inc. v. Rhode Island Solid Waste Management Corp. 770 F.Supp. 775 (D.R.I. 1991), aff'd, 947 F.2d 1004 (1st Cir. 1991)	State regulation	MSW	Landfill and proposed waste-to-energy facility		✓		✓		State regulation that directed all solid waste to be managed at state-operated facilities discriminates against interstate commerce because the state failed to demonstrate a compelling need or the absence of less burdensome alternatives.
Waste Systems Corp. v. County of Martin, et al 784 F.Supp. 641 (D.Minn. 1992), aff'd, 985 F.2d 1381 (8th Cir. 1993)	Bi-county ordinance	MSW	MSW Composting facility		✓		✓		Bi-county ordinance that directed all MSW to be managed at a public composting facility discriminates against interstate commerce because the ordinance's primary interest is in ensuring the financial viability of a publicly-owned management facility.

LEGAL DECISIONS CONCERNING MUNICIPAL SOLID WASTE FLOW CONTROLS

NAME OF CASE	FLOW CONTROL MECHANISM	SCOPE OF MATERIALS COVERED[1]	TYPES OF FACILITIES	ISSUES RAISED			DECISION		RATIONALE FOR DECISION
				ANTITRUST[2]	COMMERCE CLAUSE[3]	TAKING[4]	FLOW CONTROL OVER-TURNED	FLOW CONTROL UPHELD	
Waste Recycling, Inc. v. Southeast Alabama Solid Waste Disposal Authority 814 F. Supp. 1566 (M.D. Ala. 1993)	Municipal ordinances	MSW	Landfill and transfer stations		✓		✓		Municipal ordinances that directed all waste to publicly-owned facilities result in economic protectionism and violate the Commerce Clause.
STATE COURT DECISIONS									
Waste Management of the Desert, Inc. v Palm Springs Recycling Center, Inc. 28 Cal.Rptr. 2d 461; 869 P.2d 440 (1994)	City ordinance	MSW, including residential and commercial recyclables	Landfills and recycling centers			✓	✓		City ordinance that restricted access to the collection and removal of recyclable materials is void, because these materials are not considered a solid waste under State law until they have been discarded by their owners.

1. MSW refers to municipal solid waste and does not necessarily include recyclables unless specifically noted.
2. Antitrust refers to the Sherman Antitrust Act which restricts monopolies.
3. The Commerce Clause is the provision of the United States Constitution which gives Congress the exclusive power to regulate interstate commerce.
4. A taking is an unlawful taking of property in violation of a person's due process rights.

APPENDIX II-A

Summary Matrix of State Flow Control Authorities

This Appendix contains a summary matrix of flow control authorities for all 50 States, the District of Columbia, and the Virgin Islands. The purpose of this matrix is to provide Congress with a comparative review of States with and without flow control authorities. The matrix demonstrates that State flow control laws vary in the degree of authority and discretion given to local governments. Flow controls also differ in the types of wastes or recyclable materials covered.

The matrix is divided by State or territory into the following major sections:

- **State recycling goals** list the source reduction and recycling goals established by State legislatures.[20]
- **Responsibility for MSW Planning** provides the statutory and/or regulatory title and citation along with the governmental entity responsible for solid waste management planning.
- **Specific Delegation of Flow Controls** identifies those States or territories that explicitly authorize flow controls by statute or regulation. A footnote explains the flow control authority in those States that do not authorize flow control directly but have established other mechanisms such as home rule authority, the power to award franchises, or the local solid waste management planning process.
- **Scope of Materials Covered by Flow Controls** lists the types of wastes or recyclable materials that may be flow controlled.
- **Comments** discuss the State solid waste management planning or flow control authorities in further detail.

[20] Information on source reduction and recycling goals obtained from Robert Steuteville, "The State of Garbage in America: Part II," *BioCycle*, May 1994, pp. 30-36. The Steuteville survey includes States where the goals were established by statute as well as States where the source reduction and recycling goals were established by other means, such as executive orders by State governors.

How Flow Controls Are Implemented

State and local governments use flow controls to require that wastes and/or recyclable materials be delivered to designated facilities such as WTE facilities, MRFs, landfills, composting facilities, and transfer stations. State statutes explicitly may require that municipal solid waste be sent to a designated facility or may authorize award of contracts or franchises that mandate delivery to a specific facility.

State flow control laws vary in the degree of authority and discretion given to local governments to control the flow of MSW within their political jurisdictions. For example, the States of Rhode Island and Delaware (and not their local governments) have the authority to develop flow controls. Most other States that allow flow controls authorize local governments and regional solid waste management districts to implement flow controls.

Local governments in some States also must address administrative requirements prior to implementing flow controls. Mississippi and Tennessee require a solid waste management authority to demonstrate the necessity of implementing mandatory flow controls (e.g., after considering the use of existing facilities and examining other alternatives). Other administrative hurdles include holding public hearings prior to establishing flow controls (e.g., Colorado, Minnesota), attempting to develop a contractual agreement with haulers as an alternative to using flow controls, and requiring each municipality that wants to implement flow controls to seek specific State legislative authorization.

Flow control laws may cover a wide range of solid wastes and materials, such as:

- Commercial and residential waste;
- Mixed waste;
- Recyclables in mixed waste;
- Curbside and drop-off center commingled recyclables; and
- Source separated recyclables.

Twenty-three (23) States (and the District of Columbia) that authorize flow controls limit the recyclable materials or MSW that may be controlled. For example, Mississippi, Montana, and New Jersey do not authorize flow controls for source separated recyclable materials.

METHODOLOGY

To collect information on State flow control authorities, EPA reviewed information from the following sources:

- State statutes and regulations;
- Public comments and materials submitted to the RCRA docket;
- Discussions and citations from court decisions and legal briefs; and
- Contacts with knowledgeable sources.

Federal, State, and local government personnel familiar with the flow control issue corroborated the information obtained by the statutory and regulatory reviews.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Alabama (25% by 1991)	Solid Waste Disposal Act, Ala. Code §22-27-45, §22-27-47(a) (State, county and municipality)	Solid Waste Disposal Act, Ala. Code §22-27-3(a), §22-27-5(b) (county or municipality)	MSW	• Local government has responsibility to assure proper management of solid wastes; • Local government may require mandatory participation in solid waste management services; • Local government may establish service fees, enter into contracts, or assign territories for waste management services.
Alaska (No Goal)	Solid Waste Management Regulations, Alaska Admin. Code tit.18, §60.015(b) (individuals who manage facilities open to the public (e.g., restaurants, stores))			• Person who manages facilities open to the public (e.g., campgrounds, shopping centers, schools) must dispose of solid waste at an approved management facility or contract for proper management of waste.
Arizona (No Goal)	Solid Waste Management Law, Ariz. Rev Stat §§49-721 and 49-741; Solid Waste Management Regulations, Ariz Comp. Admin. R. and Regs. §18-8-402 (State, in cooperation with local governments or management planning regions)			• Local government must provide or contract for safe and sanitary disposal; • Municipality must not prohibit or "unreasonably" restrain a private enterprise from providing commercial or industrial recycling or solid waste management services (may limit number of service companies); • When set out for collection and upon acceptance, MSW becomes property of the management agency or public facility.

[2] Information on recycling and source reduction goals obtained from Robert Steuteville, "The State of Garbage in America: Part II," *Biocycle*, May 1994. pp. 30-36.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Arkansas (40% by 2000)	Solid Waste Management Act, Ark. Stat. Ann. §8-6-210 - 8-6-212 (municipalities and counties)	Ark. Stat. Ann. §8-6-704	MSW	• Responsibility of county or municipality to adequately provide for solid waste management; • Solid Waste District can authorize movement of waste in/out of district with notification to the State.
California[3] (50% by 2000)	Cal. Pub. Res. Code §40002; §§40900 - 41903; §41750, Countywide Integrated Waste Management Plans; §41780			• Counties and cities may grant franchises for solid waste management; • Franchises may be exclusive.
Colorado (50% by 2000)	Solid Waste Disposal Sites and Facilities Law, Col. Rev. Stat. §30-20-100.5(d) (State and local governments)	Solid Waste Disposal Sites and Facilities Law, Col. Rev. Stat. §30-20-107 (county or municipality)	MSW	• County or municipality may designate specific waste management facility as its exclusive facility; • Flow control authority applies to "solid waste disposal sites and facilities," but these facilities may include recycling operations; • Prior to designation, a public hearing must be held.
Connecticut (40% by 2000)	Solid Waste Management Act, Conn. Gen. Stat. §22a-211 (State); §22a-220 (municipality)	Solid Waste Management Act, Conn. Gen. Stat. §22a-220a (municipality)	MSW including only specific recyclable materials	• Municipality may designate where solid waste must be managed; • Municipality may also designate where the following residential recyclables must be processed or sold: cardboard; glass food and beverage containers; leaves; metal food and beverage containers; newspapers; storage batteries; waste oil; and plastic food and beverage containers; • Recyclables are not solid waste until they are discarded or prepared for collection.

[3] California provides authority to grant exclusive franchises (Cal. Pub. Res. §40059; §§49200 - 49523). These franchises may cover MSW including recyclable materials that have been discarded.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Delaware (21% by 2000)	Solid Waste Authority Act, Del. Code Ann. tit. 7, §§6404 and 6452 (Del. Solid Waste Authority)	Solid Waste Authority Act Del. Code Ann. tit. 7, §6406 (31) (Del. Solid Waste Authority)	MSW including only specific recyclable materials	• The Authority may divert solid waste generated within the State to designated Authority-owned waste management facilities; • Solid waste generated outside of the State may not be managed at State facilities; • The Authority may divert the following recyclable materials: newsprint; computer paper; white paper; corrugated and other cardboard; plastics; ferrous metals; nonferrous metals; white goods; organic yard waste; used motor oil; asphalt; batteries; and household paint, solvent, pesticide, and insecticide containers; • Based on State comments, source separated recyclables can be recycled or reused without government interference or direction; • Based on State comments, the Authority encourages private activities in the collection and recycling of cardboard, beer containers used in restaurants and bars, computer printout, office paper, used motor oil, scrap metal, yard trimmings, tires, asphalt, and concrete; • Recyclables separated at the point of generation are not subject to flow controls.
District of Columbia (45% by 1995)	Solid Waste Management and Multi-Material Recycling Act, D.C. Code Ann. §6-3404 (Mayor)	Solid Waste Law, D.C. Code Ann. §6-507 (Mayor)	MSW except for source separated recyclable material	• Flow controls may require that all combustible refuse be delivered to designated combustors; • Persons (e.g., owners of hotels or apartment buildings) may dispose of their solid waste in their own incinerators; • The right of an individual to donate, sell, or otherwise dispose of his or her recyclables may not be limited.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Florida (30% by 1995)	Solid and Hazardous Waste Management Act, Fla. Stat. Ann. §403.705 (State); §403.706 (county)	Solid and Hazardous Waste Management Act, Fla. Stat. Ann. §403.713 (county or municipality)	MSW except for commercial source separated recyclable materials	• Flow controls may only be used to ensure resource recovery facility receives adequate supply of MSW from waste generated within the jurisdiction; • Flow controls do not apply to commercial source separated recyclables; • Flow controls do not extend to recovered materials, whether separated at the point of generation or after collection, that are intended to be held for the purposes of recycling.
Georgia (25% by 1996)	Comprehensive Solid Waste Management Act, Ga. Code Ann. §12-8-31 (State, in cooperation with local governments); §12-8-31 (local government)	Comprehensive Solid Waste Management Act, Ga. Code Ann. §12-8-51(b) (regional solid waste management authorities)	MSW except for recyclable materials	• The State solid waste management plan will serve as a guide for the development of local and regional plans for solid waste management.
Hawaii (50% by 2000)	Integrated Solid Waste Management, Haw. Rev. Stat. Chap. 342G; Solid Waste Management, Chap. 342H	Solid Waste Disposal Act Haw. Rev. Stat. §340A-3 (county)	MSW except for source separated recyclable materials and agricultural solid waste	• The county may require that all solid waste transported by the county agency, collectors, businesses, or individuals be disposed in designated facilities.
Idaho[4] (25% by 1995)	Counties and Counties Law, Idaho Code §§31-4401 - 31-4403 (county)			• Duty of county to acquire, maintain, and operate a solid waste management system (including collection, storage, recycling, and disposal facilities); • County is authorized to enter into contracts or award franchises for solid waste management with or without competitive bidding.

[4] Idaho authorizes counties to award franchises with or without competitive bidding and these franchises can require that MSW be managed at designated facilities.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Illinois (25% by 2000)	Solid Waste Planning and Recycling Act, Ill. Rev. Stat. tit. 85, §4 (counties and municipalities)	Counties Law, Ill. Rev. Stat. tit. 34, §5-1047 (counties)[5]	MSW; scope of covered material determined by each jurisdiction	• A county that has prepared a solid waste management plan may require that all solid waste be managed at a designated facility; • Each jurisdiction has the authority to decide what materials to include under flow control in their plans.
Indiana[6] (50% by 2000)	Solid Waste Management Act, Ind. Code Ann. §13-9.5 (State and solid waste management districts)	Collection and Disposal of Waste in Indianapolis, Ind. Code. Ann. §36-9-31-3 & 4 (City of Indianapolis only)	City of Indianapolis only: MSW except for waste that is to be reused or reclaimed as salvage	• A district solid waste management plan, to the extent constitutional, may restrict or prohibit the disposal of out-of-state solid waste; • City of Indianapolis may require all wastes to be deposited at specific sites.
Iowa (50% by 2000)	Environmental Quality Act, Iowa Code Ann. §455B.302 (cities and counties)	Solid Waste Monopoly Act, Iowa Code Ann. §28G.4 (local government)	MSW	• Local government must implement a comprehensive solid waste reduction program and sanitary disposal project (may contract for services); • Local government may designate a specific facility for solid waste management, but designation may not require the incineration of recyclable materials.

[5] No local government has implemented flow control.

[6] Indiana specifically authorizes the city of Indianapolis to use flow controls for MSW except for waste that is to be reused or reclaimed as salvage (Ind. Code Ann. §36-9-31-3 & 4). For the rest of the State, Indiana does not empower solid waste management districts to use solid waste flow controls unless the governmental entity within the district, at the time of district formation, is already a party to a flow control contract; in such cases, the district can renew.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Kansas (No Goal)	Solid Waste Management Act, Kan. Stat. Ann. §65-3406(5) (State); §65-3405, (county or city)			• Any county having a solid waste management plan may restrict disposal of solid waste coming from outside of planning area; • Title to solid waste vests in the owner of the management facility upon delivery; • Private waste collectors may extract recyclables prior to delivery to the resource recovery facility.
Kentucky[7] (25% by 1997)	Waste Management Act, Ky. Rev. Stat. Ann. §224.43-310 (State); §224.43-340 (counties or waste management districts)			• Counties must provide universal collection for MSW; • Collection services may be provided by the county, by contract, or by franchise.
Louisiana (25% by 1992)	Solid Waste Management and Resource Recovery Law, La. Rev. Stat. Ann. §2154 (State)	Resource Recovery and Development Act, La. Rev. Stat. Ann. §30:2302 (La. Resource Recovery and Development Authority)	MSW including discarded recyclables	• Resource Recovery and Development Authority may require persons to use designated facilities for solid waste management; • Flow control applies to recyclables that have been discarded.
Maine (50% by 1994)	Refuse Disposal District Enabling Act, Me. Rev. Stat. Ann. tit. 38, §1731 (disposal districts)	Hazardous Waste Septage and Solid Waste Management Act, Me. Rev. Stat. Ann. tit. 38, §1304-B(2) (municipalities); §2103(K and L) (State)	MSW except for specified recyclables	• Municipality may require delivery of solid waste to a designated disposal or reclamation facility; delivery of yard trimmings to a compost facility; and/or may designate certain materials as recyclables and exempt them from flow control; • Recyclables that have been abandoned or discarded by the owner are defined by Maine law as solid waste regardless of their potential value.

[7] Kentucky allows counties and waste management districts to grant franchises for MSW management.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Maryland[8] (20% by 1994 for counties over 100,000 population and 15% for counties under 100,000)	County Waste and Sewerage Plans, Md. Env. Code Ann. §§9-503 and 9-505 (counties); Northeast Maryland Waste Disposal Authority Act, Md. Nat. Res. Code Ann. §3-903 (Northeast Maryland Waste Disposal Authority)			• Each county plan and the Northeast Maryland Waste Disposal Authority plan must provide for facilities that are adequate to treat, recover, or dispose of solid waste; • Each county or the Authority must also develop recycling plans; • Under home rule authority, local governments can authorize flow controls.
Massachusetts[9] (46% by 2000)	Solid Waste Disposal Law, Mass Gen. Laws. Ann. ch.16, §21 (State)			• Cities or towns may prepare local solid waste management plans to assist the State in developing the State plan; • Under home rule authority, local governments can authorize flow controls.
Michigan[10] (25% recycling, 10% composting, 10% source reduction, and 5% reuse by 2005)	Solid Waste Management Act Mich. Comp. Laws §299.427 (State); §299.425 (municipality or county)			• A solid waste management plan must include an enforceable program and process to assure that solid waste is properly managed.

[8] Although Maryland does not have a State statute authorizing the use of flow controls, Prince George's County, under home rule authority, established a flow control ordinance to designate where MSW must be managed (Prince George's County Code §21-103.1).

[9] Similar to Maryland, Massachusetts does not have a State statute authorizing the use of flow controls, but is a home rule State. Under home rule authority, local governments may establish MSW flow controls.

[10] MSW planning documents determine capacity and flow control for local jurisdictions. Plans also specify import/export requirements between counties. If flow control is implemented, source separated materials are excluded.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Minnesota (30% by 1996 for greater Minnesota and 45% by 1996 in the 7 county Twin Cities area)	Waste Management Act, Minn Stat. Ann. §115A.46, (county or solid waste management district)	Waste Management Act, Minn. Stat. Ann. §115A.80-115A.893, (county and solid waste management district)	MSW; however waste designation may not be applied to source separated recyclables or to waste currently being managed at a facility that uses a method that occupies the same or higher place on the State's waste management hierarchy.	• A county or district must submit a plan to designate a facility, demonstrate that (1) the designation is necessary and (2) prudent alternatives do not exist; • A public hearing must be held and for 90 days afterward, the county or district must attempt to negotiate contracts with waste collectors in the area in an attempt to avoid using designation; • The State will not authorize use of flow controls for waste that is being managed at a facility using a method that occupies the same or higher place on the State's waste management hierarchy (e.g., flow controls could not be applied to MSW currently being managed at a waste-to-energy facility in order to send the waste to a landfill); • After a designation ordinance is in effect, a party may apply for an exclusion for waste to be delivered to a processing facility other than the designated facility; • Based on comments submitted by the Minn. Legislative Commission on Waste Management, designation may not apply to materials processed at a resource recovery facility in operation at the time the designated plan is approved.
Mississippi (25% by 1996)	Solid Waste Disposal Act, Miss. Code Ann. §§17-17-325 and §17-17-315 (local plan)	Regional Solid Waste Management Authority Act, Miss. Code Ann. §17-17-319 (regional solid waste management authority)	MSW except for source separated recyclables or materials that collectors of MSW recycle from the waste stream	• The authority must demonstrate the necessity of mandatory flow controls to ensure viability of facility (e.g., consider the use of existing management facilities); • MSW becomes property of the local government upon collection or upon delivery to a disposal facility.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Missouri (40% by 1998)	Solid Waste Rules, Mo. Code Regs. tit. 10, §80-6.010 (city or county)	Solid Waste Law, Mo. Rev. Stats. §§260,201,and 202 (city or county)	MSW except for paper fibers, plastic, glass, or metals to be reused or residue from timber harvest or production	• A city or county that has voted to increase service fees to finance a waste management facility may use flow controls; • Cities and counties have responsibility for solid waste management planning and implementation.
Montana (25% by 1996)	Solid Waste and Litter Control Act, Mont. Code Ann. §§75-10-111 and 75-10-112 (State in conjunction with local governments)	Solid Waste and Litter Control Act, Mont. Code Ann. §75-10-112 (local governments)	MSW except for marketable by-products	• A local government may control the disposition of solid waste generated within its jurisdiction.
Nebraska (50% by 2002)	Solid Waste Management Plan, Neb. Rev. Stat. §§81-15, 166 (State), Integrated Solid Waste Management Act, Neb. Rev. Stat. §§13-2001 - 13-2043	Integrated Solid Waste Management Act, Neb. Rev. Stat. §§13-2026, §13-2033 - 13-2034 (municipalities, counties, and natural resource districts acting alone or in cooperation under the Inter-local Cooperation Act)	MSW, may cover recyclables	• Comprehensive Solid Waste Management Plan developed by the State to assist political subdivisions in the planning and implementation of their individual, joint, or regional solid waste management systems; • Counties and municipalities required to develop and submit to State for approval an integrated solid waste management plan. Minimum requirements that must be addressed in each plan include information pertaining to facility and system capacity for a twenty year period, and implementation of waste reduction and recycling programs with emphasis on meeting waste disposal reduction goals and managing certain land-banned items; • Counties, municipalities, and agencies may govern solid waste management within their jurisdictions including the establishment of conditions to assure that a specified amount and type of solid waste will be delivered to a specific facility; • Flow controls may cover recyclable materials.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Nevada (25% by 1994)	Solid Waste Disposal Law, Nev. Rev. Stat. §444.510 (municipality or district board of health); §444.570 (State in cooperation with municipalities)			• When recyclable materials are placed at curbside or at a designated site for collection, the materials become the property of the private recycling company or the person designated by the local government to collect recyclables.
New Hampshire (40% by 2000)	Solid Waste Management Law, N.H. Rev. Stat. Ann. §149-M:1(State); §149-M:17(towns); §149-M:18 (solid waste management districts)	N.H. Rev. Stat. Ann. §47:17, XIV; §§147: 43, 46, and 47; and §§149M: 13 and 21	MSW	• State policy holds that solid waste management competition and enterprise may be displaced or limited by towns, counties, and districts.
New Jersey (60% by 1995)	Solid Waste Management Act, N.J. Stat. Ann. §§13:1E-2(b)(2) and 13:1E-20 (counties and Hackensack/Meadowlands district); §31:1E-2(b)(6) (State)	Solid Waste Act, N.J. Stat. Ann. §§ 13:1E-22 and 48:13A-5; Solid Waste Management Regulations, Admin. Code §7:26-6 (State)	MSW except for source separated recyclable materials	• The State has the authority to direct the flow of solid waste; • Flow controls are modified each year to reflect changes in county plans as well as waste flow modifications; • The State may award exclusive franchises for the disposal of solid waste; • Franchises may not be awarded for recyclable materials whenever markets are available.
New Mexico (50% by 2000)	Solid Waste Act, NM Stat. Ann. §74-9-4 (State)			• In preparing the State plan, the State will request information from each county and municipality; • State will establish solid waste districts; • The State and each municipality must provide a means to dispose of solid waste generated within its jurisdiction.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
New York (50% by 2000)	Solid and Hazardous Waste Management Laws, N.Y. Envtl. Conserv. Law §27-0103 (State), §27-0107 (county or solid waste authority)	N.Y. Pub. Auth. Law, or Chapter law (laws passed during regular legislative session)	MSW including source separated recyclable materials	• County or public authority must seek State legislative authorization for specific flow control; • The State legislature has granted this authority to 38 counties or public authorities; • Flow controls may place reasonable limitations on competition.
North Carolina (40% by 2001)	Solid Waste Management Act, N.C. Gen. Stat. §130A-309.06(1) (State)	Solid Waste Management Act, N.C. Gen. Stat. § 130A-294 (local government)	MSW except for source separated recyclable materials	• Flow controls may not prohibit source separation or limit access to recyclable materials; • If its solid waste management plan is approved by the State, a local government may adopt flow control ordinances.
North Dakota (40% by 2000)	Solid Waste Management Act, N.D. Code §23-29-06(9) (State); §23-29-06(8) (solid waste management districts);	Solid Waste Management Act, N.D. Code §23-29-06(6) (solid waste management districts)	MSW	• Solid waste must be managed at facilities identified in the district's solid waste management plan.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Ohio (25% by 1994)	Solid Waste Management Act, Ohio Rev. Code Ann. §3734.50 (State); Ohio Rev. Code Ann. §3734.53 (county or solid waste management district)	Solid Waste Management Act, Ohio Rev. Code Ann. §3734.53 (12); §343.01; §343.013, §343.014; §343.015 (county or solid waste management district)	MSW[11]	• Solid waste management districts must identify solid waste disposal, transfer, and resource recovery facilities and recycling activities for purposes of capacity planning. Districts may designate facilities and activities for purposes of restricting or directing the flow of waste generated within or outside the district; • Designation of publicly-owned facilities with outstanding public debt may be done at any time by resolution; flow control to such facilities expires when public debt is retired. Flow control to any other facilities can be initiated only through a multiple-resolution procedure requiring extensive public notice and comment. Enforcement of district flow control is a local responsibility; • The State may override local flow control restrictions to allow the temporary disposal of waste from other Ohio districts in specific cases of emergency disposal capacity shortfall.
Oklahoma (No Goal)	Solid Waste Management Act, Okla. Stat. tit. 63, §1-2412(a) (cities and towns); §1-2413(A) (counties)	Solid Waste Management Act, Okla. Stat. tit. 63, §1-2412 (c) (cities and towns)	MSW, except for source separated materials	• Cities and towns may control the collection, transportation, storage, and disposal of solid waste generated or existing within the jurisdiction; • Flow control may require delivery of solid waste only to facilities in compliance with State requirements.

[11] Ohio EPA issued guidance in 1990, stating that separated and abandoned materials (e.g., curbside recyclables) are considered solid waste for the purposes of flow control; materials separated but not abandoned are not subject to flow control.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Oregon (50% by 2000)	Solid Waste Control Law, Or. Rev. Stat. §459.017(1)(b) (local government)	Metropolitan Service Districts, Or. Rev. Stat. §268.317(3) & (4) (metropolitan service districts)	MSW	• A metropolitan service district may require generators and/or collectors of solid waste to make use of designated disposal, transfer, or resource recovery facilities; • Local governments have the primary responsibility for solid waste management.
Pennsylvania (25% by 1997)	Municipal Waste Planning, Recycling, and Waste Reduction Act, Pa. Stat. Ann. tit. 53, §4000.303 (counties)	Municipal Waste Planning, Recycling, and Waste Reduction Act, Pa. Stat. Ann. tit. 53, §4000.303, §4000.502 and §4000.513 (counties)	MSW except for source separated recyclable materials.	• A county with an approved municipal solid waste management plan must ensure that MSW generated within its boundaries is processed or disposed at facilities selected by the county in its plan. The Act identifies a variety of mechanisms which a county may utilize to meet this duty; • MSW does not include source separated recyclable materials; • Flow controls may not apply to MSW managed in on-site, captive commercial disposal facilities.
Rhode Island (70%)	Solid Waste Management Corporation Act, R.I. Gen. Laws §23-19-11 (solid waste management corporation)	Solid Waste Management Corporation Act, R.I. Gen Laws § 23-19-10(40) (solid waste management corporation)	MSW including curbside recyclables. Does not include waste from federal facilities.	• The solid waste management corporation may control the transportation, storage, and final disposal of all solid waste and designate management facilities.
South Carolina (30% by 1997)	Solid Waste Policy and Management Act, S.C. Code Ann. §44-96-20 (State); §44-96-80(A) (county or regional organization)			• County or regional organization has the responsibility and authority to provide solid waste management; • Local government gains right to recycled material only at time of pickup or delivery; • A generator of source separated recyclable materials may not be prohibited from arranging for transportation of materials to a recycler.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
South Dakota[12] (50% by 2001)	Solid Waste Disposal Act, S.D. Codified Laws Ann. §34A-6-23 (municipalities)	S.D. Codified Laws Ann. §34A-16 (counties and municipalities)	MSW except source separated materials	• Municipality must provide for the disposal of solid waste generated or existing within the jurisdiction; • Municipality may grant and regulate franchises for the purpose of collection and disposal of solid waste; • A municipality must submit the proposition of issuing such a franchise to a vote by the people of the municipality.
Tennessee (25% by 1996)	Solid Waste Management Act, Tenn. Code Ann. §§68-31-813(c) - 815 (MSW planning region)	Solid Waste Management Act, Tenn. Code Ann. §68-31-814 (MSW planning region or solid waste authority)	MSW except for source separated or recovered materials	• Recovered materials include those materials that have been diverted from the waste stream for sale or recycling, whether or not the materials require further processing; • Region or solid waste authority may regulate the flow of MSW generated within the Region; • Prior to adoption of flow controls, the Region or authority must demonstrate the necessity of flow controls (e.g., existing facilities inadequate).

[12] In 1983, legislature approved a special purpose governmental entity that municipalities and counties can form. Legislature allows flow control upon presentation of certain findings to the State. State may approve/disapprove request. No County or municipality has ever used flow controls.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Texas[13] (40% by 1994)	Solid Waste Disposal Act Texas Health and Safety Code Ann. §361.020 (State); Municipal Solid Waste Act, Texas Health and Safety Code Ann. §363.004 (State); §363.063 (local government); §363.062 (planning region)			• Solid waste management has become a matter of State concern and requires State financial assistance to plan and implement solid waste management practices; • Control of solid waste collection and disposal continues to be a responsibility of local government; and • No limits or restrictions may be placed on separating or recovering recyclable materials from solid waste.
Utah[14] (No Goal)	Solid and Hazardous Waste Act, Utah Code Ann. §19-6-104 (State)			• Local government may award exclusive franchises for solid waste management.
Vermont (40% by 2000)	Solid Waste Management Law, Vt. Stat. Ann. §6604 (State); Municipal and County Government Law, Vt. Stat. Ann. tit. 24, §2202a (solid waste management district or regional planning commission)	Municipal and County Government Law, Vt. Stat. Ann. tit. 24, §2203a&b (municipality)	MSW, but may control recyclables only if no adverse effects to existing private recycling centers	• Municipality may designate exclusive solid waste management facilities; • Municipality may exercise control over recyclables if such control does not adversely affect an existing private recycling center.

[13] Cities/counties are authorized to impose MSW flow controls through local planning authority (Comprehensive Municipal Solid Waste Management, Resource Recovery and Conservation Act, Texas Health and Safety Code §363; County Solid Waste Control Act (county)).

[14] Utah authorizes local governments to award franchises for MSW management.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Virginia (25% by 1995)	Solid Waste Management Act, Va. Code Ann. §10.1-1411 (local governments and regional planning districts)	Counties, Cities, and Towns Laws, Va. Code Ann. §15.1-28.01 (counties, cities, and towns)	MSW except for source separated recyclable materials, construction debris, and waste oil.	• Municipality may adopt flow control ordinances, if, after public hearings, the municipality can demonstrate that existing facilities are inadequate or the ordinance is necessary to ensure financing; • The Commonwealth authorizes municipalities to displace or limit solid waste management competition.
Virgin Islands (No Goal)	Solid and Hazardous Waste Management Act, V.I. Code Ann. tit. 19, §1553 (Department of Public Works)	Solid Waste Disposal, Resource Recovery, and Desalination Facility Development Act, V.I. Code Ann. tit. 19, §1570f (territory)	MSW	• All solid waste, however collected, must be delivered to the Solid Waste Disposal, Resource Recovery, and Desalination Facility; • The Department of Public Works is required to develop and implement a solid waste management plan for the territory.
Washington (50% by 1995)	Solid Waste Management Law, Wash. Ann. §70.95.080 (counties, in cooperation with cities)	Cities and Town Laws, Wash. Rev. Code. Ann. §35.21.120-130 (cities and towns); Counties Law, Wash. Rev. Code. Ann. §36.58.040 (counties)	MSW except for commercial recyclables	• Cities, towns, or counties may use a solid waste or recyclable materials collection ordinance to designate management facilities; • Flow controls may not prevent a recycling company or nonprofit entity from collecting recyclable material from a buy-back center, drop box, or a commercial generator; • Flow controls may not apply to commercial recyclables.
West Virginia (50% by 2010)	Solid Waste Management Act, W.Va. Code §§20-9-7 and 20-11-4 (State and county or regional solid waste authority)	Public Service Commission, W. Va. Code Ann. §24-2-1h (Public Service Commission)	MSW	• Public Service Commission may designate where solid waste is processed or disposed; • Flow controls may not cover reuse or recycling of solid waste or disposal of solid waste at a captive facility.

SUMMARY OF STATE FLOW CONTROL AUTHORITIES

States (Recycling Goals)[2]	MSW Authorities		Scope of Materials Covered by Flow Controls	Comments
	Responsibility for MSW Planning	Specific Delegation of Flow Controls		
Wisconsin (No goal)[15]	Environmental Protection Law, Wis. Stat. Ann. §144.437 (State authorizes, but does not require, counties to plan)	Recycling Act, Wis. Stat. Ann. §§159.13 (2), (3), and (11) (municipality)	MSW except for source separated recyclable material	• A municipality may require use of a facility for the recycling of solid waste or for the recovery of resources from solid waste generated within the limits of the municipality; • The statute contains exemptions for certain solid wastes (e.g., source separated recyclable materials); • For 90 days prior to implementing a required use order, a municipality must negotiate and attempt to develop a contractual agreement with persons subject to the required use order; • Additional administrative procedures exist for persons adversely affected (e.g., public hearings, appeals).
Wyoming (No Goal)	Counties Law, Wyo. Stat. §15-1-103 (cities/towns)	Counties Law, Wyo. Stat. §15-1-103 (cities/towns)	MSW	• County or solid waste disposal district may require the disposal of solid waste at designated sites.

[15] Wisconsin's law does not set a specific recycling goal. Instead, it bans disposal of most recyclable and compostable materials and requires "effective recycling programs" at the local level. Program approval creates an exemption from the ban.

APPENDIX II-B

Flow Control Case Studies

FLOW CONTROL CASE STUDIES

The following case studies provide examples of waste management practices both in jurisdictions that use flow controls and in jurisdictions that do not. The case studies represent a snapshot of waste management practices, illustrating the role of flow controls. The case studies do not, however, present a comprehensive analysis of flow control implementation.

CASE STUDY LOCATIONS

USE OF FLOW CONTROL

- Union County, New Jersey
- Spokane County, Washington

PAST USE OF FLOW CONTROL

- Hennepin County, Minnesota

NO FLOW CONTROL

- Montgomery County, Maryland

In developing the four case studies, EPA primarily relied on information provided by commenters during the public meetings, written materials submitted to the RCRA docket, and information obtained for the market analysis (see Chapter III of this Report) for which 35 States submitted State solid waste management plans, recycling plans, waste characterization studies, and related data. Because the materials collected did not contain all of the information necessary to complete the case studies, EPA contacted representatives from each of the four chosen locations for supplemental information.

In selecting the individual locations for the case studies, EPA used the following combination of factors:

- **Information** from the public meetings and materials submitted by public commenters identified potential case study locations.
- **Recommendations** by representatives of State and local governments, waste management industry, trade associations, and other interested parties aided in narrowing the list of candidate case study locations. For example, several parties recommended Montgomery County as a case study location where flow controls are not used.
- **Specific mechanisms** that municipalities used to implement or fund solid waste management programs provided another selection criterion. To give an idea of options available to local governments, EPA chose case study locations using a range of solid waste management mechanisms.

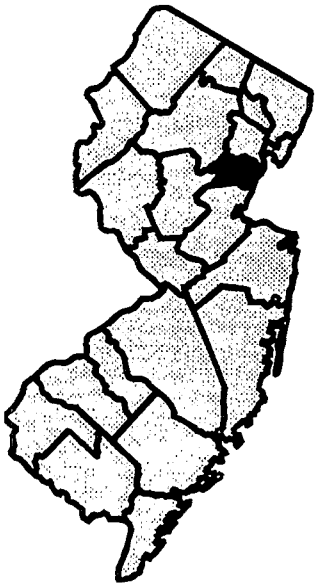
- **Geographical diversity** of candidate sites became the final criterion. In reviewing case study candidates, EPA selected locations that provide geographical diversity.

Each case study is divided into the following major sections:

- **Overview of State structure** describes State waste management planning requirements and State authority for the use of flow controls;
- **Planning and flow control** discusses how the municipality implements its solid waste management plan and the role of flow controls (if the jurisdiction uses flow controls);
- **Municipal solid waste management** provides an overview of the jurisdiction's current management system, including a description of its solid waste disposal facilities and recycling programs; and
- **Funding solid waste management** shows the methods used to support the systems' capital and operating costs, such as tipping fees, recycling fees, State grants, and taxes.

UNION COUNTY, NEW JERSEY

Overview of State Structure



New Jersey uses flow controls throughout the State to direct residential, commercial, and industrial solid waste to be managed at specific waste disposal facilities. The State does not control the movement of source separated recyclable materials.[16] Flow control authority, when combined with data on the amounts and types of solid wastes generated in each municipality, assists the State and its counties in planning and constructing solid waste management facilities. Flow controls ensure that a steady supply of waste is delivered to appropriate processing or disposal facilities. This steady supply, in turn, guarantees that sufficient revenues will be generated to pay debt service and other fixed costs of waste management facilities. New Jersey uses flow controls to achieve its goal of developing self-sufficiency in solid waste disposal capacity.

The New Jersey Department of Environmental Protection and Energy's (NJDEPE) flow control regulations specifically direct that solid waste must be managed at designated facilities. NJDEPE regulates the solid waste management industry as a utility and closely monitors prices to protect consumers and control waste management costs.

OVERVIEW OF UNION COUNTY

Union County is located in northeastern New Jersey and is a densely-populated urban region within the Newark metropolitan area. The county has a population of approximately 493,000.

[16] Recyclable materials are defined as "materials which would otherwise become solid waste and which may be collected, separated or processed and returned to the economic mainstream in the form of raw materials or products." N.J. Admin. Code § 7:26A-1.3. Examples of recyclable materials are newspapers, glass containers, aluminum cans, ferrous cans, plastic containers, corrugated cardboard, mixed paper, car batteries, white goods, used motor oil, roofing materials, and yard trimmings. New Jersey includes more items under its definition of recyclable materials than most other States.

Planning and Flow Control

SOLID WASTE MANAGEMENT PLAN COMPONENTS

- Current solid waste generation and composition;
- Future solid waste generation and composition;
- Inventory of existing solid waste management facilities within the county;
- Analysis of existing collection systems and transportation routes;
- Long-term solid waste disposal strategy;
- Site plans of existing and future facilities needed to accommodate projected solid waste generation; and
- Methods of financing the solid waste management system.

In New Jersey, each county/solid waste management district must establish a solid waste management plan that describes the strategy and means by which waste will be managed over a 10-year planning period. Union County (the "County") uses flow controls to implement its Solid Waste Management Plan and achieve the State's goal for disposal self-sufficiency. Union County also established the Union County Utilities Authority (UCUA)[17] to provide comprehensive solid waste recycling and disposal services.

Implementing the Plan

After review and approval of a county solid waste management plan, NJDEPE incorporates provisions from the plan into the State flow control regulations, which designate specific facilities to manage solid waste. For Union County, the State flow control regulations specifically direct that all processible solid waste must be delivered to UCUA's waste-to-energy (WTE) facility or the municipal landfill. Non-processible waste (i.e., waste that cannot be combusted or recycled) must be disposed in the municipal landfill. The ash from the WTE facility also must be managed in UCUA's disposal system. Source separated recyclable materials are exempt from the flow control regulations.

NJDEPE annually reviews whether revisions to the flow control rules are necessary and holds public hearings on a Statewide or regional basis to accept comments on flow control changes. Because the flow controls are State regulations that NJDEPE enforces, UCUA believes it can implement and fund its solid waste management program more effectively. With direct State support, flow controls readily guarantee the delivery of waste to the designated waste management facilities.

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[17] New Jersey authorizes the creation of public utility authorities and subjects them to statutory and regulatory oversight. N.J. Stat. Ann. §§ 40:1B-1 et seq.

In addition to the flow control authority, NJDEPE awarded UCUA a franchise or exclusive right to control disposal of solid waste generated within Union County.[18] As the holder of the franchise, UCUA is deemed the owner of all of the waste within the County and is responsible for proper management of the waste. The franchise provides UCUA with additional enforcement rights in a court of law against any person who interferes with the franchise, such as haulers transporting waste out of the County without authorization. NJDEPE claims that the franchise right also helps UCUA ensure delivery of waste to specific waste management facilities, secure financing, and stabilize rates, because of the guaranteed waste flow to the County's WTE facility. In NJDEPE's opinion, because municipalities control market conditions, rates fluctuate less than they would in the free market.

Municipal Solid Waste Management

Solid Waste Disposal Facilities

Of the 834,000 tons of solid waste generated by Union County, UCUA's waste disposal system disposes of approximately 452,000 tons (54%).[19] This system includes the following facilities:

WASTE MANAGED IN 1992 (IN TONS)

Total Waste Generated:	834,000
Amount Recycled:	382,000
IN-STATE	
Amount Combusted:	407,000
Amount Landfilled:	45,000
OUT-OF-STATE	
Amount Landfilled (ash):	116,000

- **A WTE facility** provides capacity to burn 1,440 tons per day (tpd) of municipal solid waste. Besides MSW from Union County, the facility also accepts 400 tpd (or 150,000 tons per year (tpy)) of MSW from nearby Bergen County. The WTE facility currently disposes of 90 percent of the County's non-recycled solid waste or 407,000 tpy. UCUA has a 20-year contract with a private vendor to operate the facility.

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[18] NJDEPE will grant a franchise to a public entity only if the franchise is consistent with the county solid waste management plan, the geographic and economic needs of the management facility, and the public interest. N.J. Stat. Ann. § 48:13A-5. This franchise excludes recyclable materials.

[19] Prior to start-up of the WTE facility in February 1994, UCUA directed nearly all of the County's non-recycled solid waste (approximately 437,000 tons) to two transfer stations for shipment to out-of-State landfills. A County landfill disposed of only 15,000 tons of MSW annually. To be consistent with the discussion of UCUA's current waste disposal system, EPA used the 1992 waste generation rates and approximated how the waste would be managed under the current system with the WTE facility in operation.

- **A small municipal landfill** accepts all non-processible waste from the entire County (approximately 45,000 tpy).

- **A Pennsylvania landfill** accepts all the ash from the WTE facility under a long-term contract with UCUA (approximately 116,000 tpy).

UCUA MANAGEMENT FACILITIES

PUBLICLY-OWNED

- 1 Waste-to-energy facility;
- 1 Small municipal landfill;
- 3 Composting facilities; and
- 1 Transfer station/materials recovery facility.

PRIVATELY-OWNED

- 2 Transfer station/materials recovery facilities;
- 6 Class A recycling facilities (Class A facilities accept glass, paper, plastic, cardboard, etc.); and
- 4 Class B recycling facilities (Class B facilities accept components of construction and demolition debris -- brick, concrete, asphalt, wood, rock, tree stumps -- and tires).

These facilities supply Union County with the capacity to manage all of its wastes for the next 20 years. Nevertheless, the State requires the County to identify in-state disposal sites for ash because the out-of-state disposal contract with the Pennsylvania landfill is inconsistent with the State's self-sufficiency goal.[20]

Recycling Programs

Flow controls do not have a direct impact on recycling in New Jersey, because the State exempts source separated recyclable materials from flow controls. Even without flow control over recyclable materials, Union County has increased its recycling rate annually. In 1992, Union County recycled 46 percent of its waste (382,000 tons). UCUA likely will achieve New Jersey's goals of 50 percent municipal solid waste recycling by 1995.[21]

UCUA provides curbside recycling, operates drop-off centers, collects household hazardous waste, manages composting facilities, and encourages commercial recycling. UCUA also contracts with private management companies for materials recovery and processing services. Individual municipalities within the County may participate in UCUA's curbside collection program, contract with private recyclers, or conduct their own municipal recycling collection programs. UCUA also

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[20] Currently, no in-state disposal capacity is available for the County's ash, and the County does not expect to be able to develop an ash monofill within Union County.

[21] N.J. Stat. Ann. § 13:1E-99.13(b). The State also established source reduction goals that limit per capita waste generation to 1990 levels and limit aggregate waste generation in the State by 1998. See New Jersey Department of Environmental Protection and Energy, Solid Waste Management State Plan Update: 1993-2002, January 1993, Ex. Sum. p. 14.

provides education and public information programs to residents and businesses on source reduction and recycling (for a discussion on funding recycling programs, see sections on Recycling Fees and State Grants and Taxes, below).

The County requires all generators to separate the following recyclable materials prior to collection:

- Newspapers;
- Glass containers;
- Aluminum cans;
- Vehicular and consumer batteries;
- Plastic containers (HDPE and PET);
- Corrugated cardboard;
- Mixed paper;
- Ferrous cans;
- White goods;
- Used motor oil;
- Roofing materials; and
- Yard trimmings.

In order to track recycling progress, the County requires governmental, commercial, institutional, and industrial facilities to document recycling activities and report information quarterly to UCUA. The County also requires information from the private materials recovery and recycling facilities. The County combines this information with data from its composting activities to calculate an annual recycling rate. The County submits an annual recycling report to the State for certification. Through its various recycling programs, UCUA recycled 46 percent of its solid waste in 1992 and is well on its way to achieving the State's 50 percent goal.

Funding Solid Waste Management

UCUA funds its integrated waste management program through a combination of mechanisms that include: tipping fees at disposal facilities, recycling fees charged to individual households, State grants, and special State taxes.

Tipping Fees

UCUA issued close to $280 million in long-term revenue bonds to finance its waste disposal system including building the WTE facility, contracting for out-of-State landfill capacity (for ash

management), and establishing recycling and household hazardous waste programs. Revenue generated by the WTE facility backs the bonds. Revenue sources include both tipping fees and the sale of electricity.[22] Tipping fees currently are $71.50 per ton of MSW disposed at the WTE facility and $78.79 per ton for bulky/residual waste.[23] The WTE tipping fee covers the debt service on the revenue bonds, operating costs at the WTE facility, and any administrative costs associated with the WTE facility. In addition, the tipping fee also partially subsidizes household hazardous waste collection and recycling education programs.

By guaranteeing a steady supply of waste, flow controls ensure that the WTE facility can generate sufficient revenues to pay debt service and other fixed costs. In addition, flow controls reduce investor risk and thus reduce the cost of financing the facility.

Recycling Fees

Each municipality charges a recycling fee of $23.45 per household per year to fund collection and processing of recyclable materials and composting of yard trimmings and vegetative wastes. This fee also covers most public education and administrative costs of the recycling programs.

State Grants and Taxes

New Jersey's "Recycling Program Planning and Recycling Education Grants" assist UCUA in funding recycling programs.[24] In addition, a State recycling tax provides funds for low interest loans, research and market studies, recycling program planning, administrative costs, and public

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[22] Due to the recent start-up of the WTE facility, no actual revenue numbers from the sale of electricity were available.

[23] Prior to the start-up of the WTE facility, tipping fees at transfer stations were $102 per ton. That tipping fee covered the costs of processing, shipping, and disposal of waste at out-of-state landfills.

[24] The New Jersey Statewide Mandatory Source Separation and Recycling Act of 1987 (N.J. Stat. Ann. §§ 13:1E-99.11 et seq.) levies a tax of $1.50 per ton of solid waste accepted for disposal at a landfill or accepted for transfer to an out-of-state facility for disposal. These tax revenues, in addition to a one-time $8 million appropriation from the general fund for recycling start-up activities, help fund recycling activities.

information and education programs. The State also provides some funds for implementing county solid waste management plans and subsidizing the rates for WTE facilities.[25]

SUMMARY OF KEY FINDINGS

- All counties in the State of New Jersey use flow controls.
- Flow controls promote recycling indirectly as they generate revenues that partially subsidize recycling education programs. Flow controls, however, do not directly promote recycling, because source separated recyclable materials are excluded from all New Jersey flow control ordinances.
- Union County recycles approximately 46 percent of its waste stream (1992).
- New Jersey authorizes flow controls as a means to develop disposal self-sufficiency and achieve State capacity goals. Union County developed solid waste management capacity to dispose of all of its wastes for the next 20 years, except for WTE ash. Flow controls provide a guaranteed revenue source that allowed UCUA to obtain financing for new facilities.

SPOKANE COUNTY, WASHINGTON

Overview of State Structure

The State of Washington authorizes each county to control solid waste or to designate disposal sites for all solid waste generated in a county's unincorporated areas. Spokane County (the "County") uses flow controls to provide a County-wide solution for solid waste disposal and to finance its waste management programs and facilities. The Washington Solid Waste Management Act authorizes flow controls for all MSW except commercial recyclables. Spokane County does not use the full authority granted by the State. Instead, Spokane County's flow control ordinance excludes all source separated

[25] Revenues from the Solid Waste Services Tax and the Resource Recovery Investment Tax provide these funds, which are available to all counties based on the amount of waste generated and disposed at in-state landfills. N.J. Stat. Ann. § 13:1E. Union County uses the Solid Waste Services Tax to fund household hazardous waste programs and other solid waste facility development projects. Union County uses the Resource Recovery Investment Tax to subsidize the tipping fee at the WTE facility and to subsidize other WTE related projects.

recyclables, whether they are generated in the commercial or residential sectors.[26]

OVERVIEW OF SPOKANE COUNTY

Spokane County is located on the eastern border of Washington State and has an approximate population of 385,000. The major urban area is Spokane City, which is located in the center of the County.

In Washington, each county, in cooperation with the cities within its borders, must prepare a comprehensive solid waste management plan and develop a solid waste management system to meet the plan's objectives.[27] To execute its plan, Spokane County established the Spokane Regional Solid Waste Disposal System to manage solid waste and to develop waste reduction and recycling programs. Municipalities within Spokane County may join the solid waste management system or develop their own systems.

Planning and Flow Control

In 1985, Spokane County established a flow control ordinance,[28] amended in 1988, specifically designating the City of Spokane's Regional Solid Waste Disposal System (System)[29] as the exclusive management agency for all solid waste collected in the unincorporated areas of the County. In addition, individual cities located within the borders of the County may participate in the System by signing the Regional Cities Inter-local Cooperation Agreement. This Agreement requires a participating city to deliver its waste to the System for a period of 25 years. All 11 cities (including the City of Spokane) within the County and Fairchild Air Force Base have signed inter-local agreements and currently use the System.

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26 "Recyclable materials may include, but shall not be limited to, bottles, aluminum cans, newspapers, cardboard, paper materials, or other specific commercially marketable items, where and only where such materials have been specially sorted prior to collection, apart from the common municipal solid waste stream for commercial manufacture or recycling." (Ordinance No. C31014).

27 RCW 70.95.080.

28 Ordinance 85-0395, authorized by RCW 36.58.040.

29 The System is comparable to Union County's Utility Authority.

Implementing the Plan

Spokane County established its flow control ordinance to guarantee the delivery of wastes necessary to pay for debt service and other fixed costs of the Regional Solid Waste Disposal System and to provide for long-term capacity to ensure self-sufficiency. The ordinance states that "it is unlawful for any collecting agency or other person to deliver or deposit any solid waste generated and collected within the unincorporated areas of the County outside the borders of Spokane County or within the County except at a disposal site consistent with the comprehensive plan and approved as a disposal site by the board of County commissioners." By controlling where waste generated within the County must be managed, the ordinance guarantees waste and revenue streams to the System.

SOLID WASTE MANAGEMENT PLAN COMPONENTS

- Inventory of all existing facilities;
- Estimate of facility needs for the next 20 years;
- Program for development of solid waste handling facilities;
- Program for surveillance and control;
- Inventory of solid waste collection needs;
- Review of potential areas that meet disposal facility siting criteria;
- Comprehensive waste reduction and recycling program; and
- Assessment of the plan's impact on the costs of solid waste collection.

The Solid Waste Disposal System consists primarily of a $110 million WTE facility and two transfer stations that cost $5.5 million and $4.5 million each. Spokane financed these facilities with revenue bonds and $60 million in State grants.

Spokane County pays the facility operator, Wheelabrator Spokane Inc., a fixed fee if 220,000 tons or less of waste are delivered to the WTE facility annually. For any amount of waste exceeding 220,000 tons, Spokane County pays Wheelabrator on a per ton basis. Spokane County is not obligated to deliver any specified minimum amount of waste per year to the WTE facility.

Municipal Solid Waste Management

Solid Waste Disposal Facilities

Of the 521,900 tons of waste generated by Spokane County in 1993, approximately 317,200 tons (61 percent) were managed in the County's waste disposal System, which includes the following facilities:

- **A WTE facility** with an operational capacity of 800 tpd (the facility can be expanded to accommodate 1200 tpd) combusts County MSW. A private contractor maintains and operates the facility. In 1993, the WTE facility burned approximately 294,700 tons of waste. The County delivers ash residue by rail to an ash monofill, 210 miles away, in Klickitat County, Washington.[30]

WASTE MANAGED IN 1993 (IN TONS)	
Total Waste Generated:	521,900
Amount Recycled:	204,700
IN-STATE	
Amount Combusted:	294,700
Amount Landfilled:	22,500

- **A landfill** (actually a landfill cell) receives non-processible wastes (i.e., wastes that cannot be recycled or combusted). In 1993, the landfill managed 22,500 tons of waste, consisting mostly of construction and demolition wastes such as concrete and sheetrock.

Recycling Programs

No direct impact on recycling occurs from the County's flow control ordinance, because the ordinance, does not cover source separated recyclables. However, as a condition of a grant agreement that provided funds for planning and implementing the County's WTE program, the Washington State Department of Ecology required the County to develop a comprehensive recycling plan.[31]

SPOKANE REGIONAL SOLID WASTE DISPOSAL SYSTEM FACILITIES

PUBLICLY-OWNED

- 1 Landfill;
- 2 Transfer centers (centers include recycling and household hazardous waste collection);
- 1 Yard trimmings compost facility; and,
- 1 Waste-to-energy facility.

PRIVATELY-OWNED

- 12 Full-service private recyclers (newspaper, cardboard, glass, and aluminum cans);
- Approximately 20 specialized private recycling centers that accept only one or two types of materials; and
- Over 100 drop-off facilities.

The County is moving steadily toward the State's 1995 goal of 50 percent recycling. Spokane County recycled 32 percent (167,959 tons) of its waste in 1992 and 39 percent (204,700 tons) in 1993. The County's recycling rate has increased steadily since 1985.

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[30] This is the only element of the Spokane County Solid Waste Management System that is located outside Spokane County.

[31] The State already required Spokane County to include waste reduction and recycling elements in its solid waste management plan. The new directive, however, required that Spokane County develop a separate comprehensive recycling plan, which Spokane submitted to the Department of Ecology in March of 1989.

About 35 private companies in Spokane County collect and process recyclable materials from both the residential and commercial sectors. Recycling services include buy-back centers, drop-off facilities, and pick-up services. Private recyclers accept various materials, such as paper, plastics, glass, metals, tins, used oil, and batteries.

Public sector recycling programs include the System's voluntary curbside recycling program, which serves approximately 90,000 households, a recently constructed yard trimmings composting facility, and two household hazardous waste collection centers located at the transfer stations. In 1994, the County expects to receive approximately 30,000 tons of yard trimmings for composting.

Spokane County also actively promotes waste reduction programs. Education and technical assistance aid residents and commercial businesses in identifying ways to reduce waste. Other waste reduction and recycling activities include a waste exchange, in-house source reduction programs, waste audits, and a recycling hotline.

The recycling and source reduction programs largely are funded by tipping fees at the transfer stations and the WTE facility. A smaller percentage of the costs is funded by other sources of revenue, such as State grants (see section on Funding Solid Waste Management below).

Funding Solid Waste Management

In order to establish a comprehensive system of solid waste management, the County incurred capital costs of close to $124 million to pay for construction of the WTE facility, construction of the two transfer stations, electric utility interconnection (i.e., connection of the WTE facility with a local power company's electrical transmission lines), landfill expansion, administrative expenses, contingency planning, and closure/post-closure expenses at existing landfills (approximately $8 million is needed for the initial costs of cleaning up contaminated landfill sites). The capital costs were financed by $64 million in revenue bonds and $60 million in State grants.

Spokane County funds the System's operating expenses through tipping fees, State grants, interest income, revenue from a rate stabilization fund, and revenues from the sale of recyclables and

electricity. The County anticipates that 1994 operating expenses will total approximately $34 million. County revenues for 1994 are estimated at $28,311,000.[32]

Tipping Fees

Spokane County currently charges $85 per ton in tipping fees for residential waste received at the two transfer stations and the WTE facility (the fee was increased from $75 per ton on March 1, 1994).[33] Spokane County charges a slightly higher fee of $90 per ton for commercial waste delivered to the WTE facility and the transfer stations. Total revenue from tipping fees in 1994 is expected to be $22,959,000. The tipping fees fund approximately 81 percent of the County's solid waste management program.

State Grants and Interest Income

The County expects to receive a total of $653,000 in State grants and interest income in 1994. Activities eligible for funding through State grants include recycling, composting, educational activities, and household hazardous waste collection. State grants, however, cover only a small percentage (approximately 2 percent) of the Spokane County waste management program's total operating expenses.

Other Sources of Funds

Three additional sources of funds include sale of recyclables, electricity receipts, and a rate stabilization fund. In 1994, Spokane County expects to receive $4,657,000 in electricity revenues and $42,000 from the sale of recyclable materials. The County also established a rate stabilization fund

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[32] The difference between operating revenues and expenses (i.e., the shortfall of $5,248,000) will be covered through (1) an increase in tipping fees (from $75/ton to $85/ton) that will increase revenues by $2,573,000, and (2) a transfer of $2,675,000 from a rate stabilization fund. The rate stabilization fund is a special fund established by Spokane County to stabilize rates during the early years of the WTE facility's operation. Money for the Fund has been collected since March 1988 from tipping fees at landfills. The County transfers the proceeds to a revenue fund and uses them to pay a portion of the solid waste management system's operating expenses. The transfers generally stabilize tipping fees at all facilities.

[33] Haulers deliver waste directly to either the WTE facility or the transfer stations. The County sends non-processible waste to the landfill. No tipping fees are charged at the composting facility.

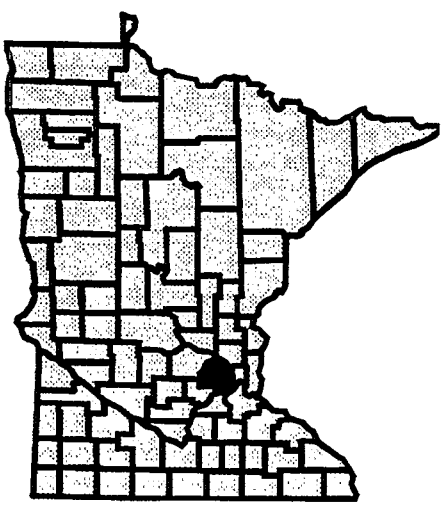
with money raised from the sale of revenue bonds for waste management facilities; money from this fund provides additional support for the System.

SUMMARY OF KEY FINDINGS

- Spokane County (all cities and unincorporated areas) uses flow control.
- In Spokane County, flow controls do not have a direct role in increasing recycling rates, because Spokane's flow control ordinance does not include source separated recyclable materials. Flow controls do, however, promote recycling indirectly as they generate funds through tipping fees, which partially subsidize recycling, composting, household hazardous waste collection, and recycling education.
- The County currently is recycling approximately 39 percent of its waste stream.
- The County manages all of its waste, including ash, in-state.

HENNEPIN COUNTY, MINNESOTA

Overview of State Structure



The Minnesota Waste Management Act requires all counties to develop solid waste management plans either individually or in groups of counties. To aid in implementation of the plans, the Act authorizes each county to use waste designation, or flow controls, but only after the county performs a rigorous analysis and shows that other, less restrictive methods of handling waste cannot be employed.[34] Basically, the State established flow controls as a means of last resort. In addition, flow controls in Minnesota do not apply to recyclable materials.[35]

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[34] Minn. Stat. §§ 115A.80 to 115A.893.

[35] Recyclable materials are defined as "materials that are separated from mixed municipal solid waste for the purpose of recycling, including paper, glass, metals, automobile oil, and batteries. Refuse derived fuel or other material that is destroyed by incineration is not a recyclable material." (Minn. Stat. § 115A.03)

Planning and Flow Control

As a result of a United States Court of Appeals' decision in *Waste Systems Corp. v. County of Martin*,[36] Hennepin County (the "County") became concerned that its flow control ordinance also might be ruled unconstitutional. In the *County of Martin* case, the court held that Martin and Faribault Counties' municipal ordinances, which directed that all MSW be managed at a public composting facility, discriminated against interstate commerce. The court ruled that the ordinance's primary interest was to ensure the financial viability of a publicly-owned waste management facility and was not a sufficiently compelling State interest to justify interference with interstate commerce.

Due to the Court's ruling, Hennepin County decided to avoid the potential for litigation over its own flow control ordinance and arranged other means of funding its solid waste management system. The following discussion, however, primarily describes how Hennepin County funded waste management when it still used flow controls.

OVERVIEW OF HENNEPIN COUNTY

Hennepin County is a heavily populated urban/suburban county in Minnesota with a population of approximately 1.1 million. The County contains a total of 47 cities, including Minneapolis and its suburbs.

Hennepin County implemented waste designation to reduce landfill usage in accordance with State goals, to ensure that non-recyclable materials were handled in the most environmentally sound manner possible, and to ensure disposal capacity. Hennepin County's flow control ordinance designated two privately-owned WTE facilities, one privately-owned transfer station, and two publicly-owned transfer stations to handle County waste.[37] In addition, the flow control ordinance did not direct waste to one privately-owned WTE facility that mostly processed commercial waste.[38]

Implementing the Plan

Counties choosing to use flow controls must submit a plan to either the Minnesota Office of Waste Management or the Metropolitan Council for approval. The plan must show that alternatives to

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[36] 784 F. Supp. 641 (D. Minn. 1992), *aff'd* 985 F. 2d 1381 (8th Cir. 1993).

[37] Hennepin County owns one transfer station and the City of Minneapolis owns the other publicly-owned transfer station.

[38] This facility managed some County waste.

flow controls do not exist and that flow controls will not negatively affect recycling and source reduction. If the plan is approved, the county must hold a public hearing on flow controls and for 90 days must attempt to negotiate contracts with licensed waste haulers that operate in the proposed flow control area. After the 90-day negotiation period, the county may develop a flow control ordinance. In Minnesota, flow controls have been used to direct waste only to WTE and composting facilities.[39]

Municipal Solid Waste Management

Solid Waste Disposal Facilities

Of the 1,393,900 tons of waste generated in Hennepin County in 1993, approximately 598,600 tons were managed in Hennepin County's waste disposal system, which includes facilities located outside the County:

WASTE MANAGED IN 1993 (IN TONS)	
Total Waste Generated:	1,393,900
Amount Recycled:	676,300
IN-STATE	
Amount Combusted:	580,700
Amount Landfilled:	17,900
OUT-OF-STATE	
Amount Landfilled:	119,000

- **3 privately-owned and operated WTE facilities** receive processible wastes. Only one facility, the Hennepin Energy Resource Company (HERC), is located in Hennepin County. HERC is a 1000 ton per day (tpd) mass burn facility. The other facilities consist of a 1500 tpd refuse derived fuel (RDF) facility and a modular facility (the flow control ordinance did not direct waste to the modular facility); both of these facilities are located outside the County. Collectively, these WTE plants combust about 50 percent of Hennepin County's waste (580,700 tons).
- **3 transfer stations** receive waste for transport to the WTE facilities.
- **3 out-of-state ash monofills** accept the ash generated by the WTE facilities.

[39] Although it is possible to direct waste to landfills, the Minnesota Waste Management Act discourages landfilling and mandates that waste currently being managed in a composting or WTE facility cannot be directed to a landfill through flow controls.

Recycling Programs

Flow controls in Hennepin County did not directly affect recycling because: (1) source separated recyclable materials could not be directed to designated facilities[40]; and, (2) Minnesota law prohibits WTE facilities from burning recyclable materials unless "no other person [is] willing to accept the recyclable materials."[41] Flow controls indirectly supported recycling because Hennepin County used a portion of the tipping fee, which was set artificially high, to fund its curbside recycling and household hazardous waste programs.[42]

FACILITIES USED BY HENNEPIN COUNTY

PUBLICLY-OWNED

- 2 Transfer stations (1 is owned by Hennepin County and 1 is owned by the City of Minneapolis); and
- 2 Citizen waste drop-off centers.

PRIVATELY-OWNED

- 1 Transfer station;
- 3 Out-of-state ash monofills;
- 14 Recycling centers;
- 22 Recycling stations;
- 5 Materials recovery facilities; and
- 3 Waste-to-energy facilities.

Hennepin County has surpassed the State's 40 percent recycling goal. The County recycled approximately 46 percent of its waste in 1991, 48 percent in 1992, and 48.5 percent (676,364 tons) in 1993. Part of this high recycling rate stems from the County's curbside recycling program that serves more than 1,000,000 people. In addition, all cities in the County provide curbside recycling programs for their residents. As part of its recycling program, the County relies on 14 recycling centers, 22 recycling stations, and 5 privately-owned and operated materials recovery facilities.[43]

In addition, Hennepin County operates an independent program to collect household hazardous waste. The County received a grant from the State Solid Waste Processing Facilities Capital Assistance Grant Program to build a household hazardous waste facility. The County also promotes

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[40] Minn. Stat. § 115A.83.

[41] Minn. Stat. § 115A.95.

[42] With the U.S. Court of Appeals' judgment and the County's decision to stop using flow controls, new mechanisms were needed to fund the programs. Hennepin County made up for lost revenues by imposing a waste management fee on residents and businesses.

[43] Minnesota defines recycling centers as facilities that are open at least 12 hours per week, 12 months per year, and accept at least four types of materials. The State defines recycling stations as drop-off facilities that do not meet the requirements of recycling centers. Minnesota also defines materials recovery facilities as facilities that prepare at least three different material types for market by baling, shredding, etc.

source reduction by providing educational materials on the identification, reduction, and proper management of household hazardous waste.

Funding Solid Waste Management

A. Funding System With Flow Controls

Tipping Fees. When Hennepin County used flow controls, it set tipping fees, pursuant to service agreements with private vendors. These tipping fees funded its integrated solid waste management program. Fees collected at the facilities repaid the $111 million in revenue bonds issued for the HERC WTE facility and the $12.6 million issued for a transfer station.[44] The fees also funded other operating costs. For example, the County established a $95.00 per ton tipping fee for waste delivered to the HERC facility. That fee included approximately $12.00 for reduction, composting, and recycling; $56.00 for combustion; $15.00 for transfer stations; $7.00 for administration; and $5.00 for household hazardous waste management.

B. Funding System Without Flow Controls

After the court ruled that the Martin and Faribault Counties' flow controls were unconstitutional, Hennepin County changed its strategy for funding solid waste management, fearing that its own flow controls would be contested.

Tipping Fees. In order to compete with facilities not part of the County system, Hennepin County lowered its tipping fees to $60 per ton. Nevertheless, Hennepin County now loses almost 17 percent (325 tpd) of its waste to out-of-state facilities.

Waste Management Fees. In order to continue paying for existing waste programs using a $60 tipping fee, the County added a 9 percent waste management fee (similar to a sales tax) to residential waste collection accounts and a 14 percent waste management fee to commercial

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[44] While the HERC facility is privately-owned and operated, the County, under its service agreement with the owner, is responsible for paying the debt service.

accounts.[45] Waste haulers collect the waste management fee as part of their regular waste collection bills and are responsible for remitting the revenues to the County.

Curbside recycling in Hennepin County is handled separately by each city. The County currently subsidizes curbside recycling by allotting cities $1.75 per month for each household where recyclable materials are collected. On average, cities receive 80 percent of the funding to operate curbside recycling programs. Residents pay the remaining 20 percent through property taxes or added charges on utility bills.

In 1994, Hennepin County anticipates that total waste management expenses will reach approximately $59 million. The HERC WTE facility will require the largest share of annual expenses, costing almost 53% of the total waste management budget.

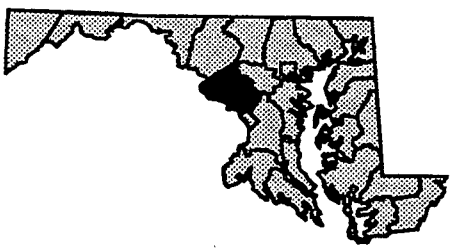
SUMMARY OF KEY FINDINGS

- Prior to the U.S. Court of Appeals decision in *Waste Systems Corp. v. County of Martin*, Hennepin County used flow control guarantees to raise revenue for its solid waste management program. Because the court overturned a similar flow control ordinance, Hennepin County decided to discontinue the use of its own flow control ordinance. Now, the County uses tipping fees and waste management fees (taxes) to fund its integrated waste management programs.
- Flow controls promoted recycling indirectly as tipping fees helped fund curbside recycling, household hazardous waste collection, and composting programs. Because State law excludes source separated recyclable materials from flow controls, flow controls did not directly affect recycling.
- Without flow controls, the County currently is recycling and composting approximately 48.5 percent of its MSW waste stream.
- Hennepin County developed new capacity (a waste-to-energy facility and MRFs). The County used flow controls to help fund its waste management programs and facilities. However, after the court ruling in the *County of Martin* case, Hennepin County switched its method of funding from flow controlled tipping fees to a combination of waste management fees and lower market-based tipping fees.

[45] Recently, waste haulers and the owners of a Minnesota landfill and an Iowa landfill filed a lawsuit challenging the legality of imposing these waste management fees. (*Oehrleins v. Hennepin County* (D. Minn., filed January 1994)). The haulers and landfill owners also challenged the constitutionality of the flow control ordinance because, although it is not being used, the ordinance has never been rescinded officially.

MONTGOMERY COUNTY, MARYLAND

Overview of State Structure



The State of Maryland does not specifically authorize the use of flow controls for waste management purposes. However, because it is a home rule State, Maryland municipalities can independently determine whether they want to use flow controls.[46]

Planning

Due to opposition to flow controls and uncertainty concerning their legality as waste management tools, Montgomery County (the "County") chose not to use flow controls. Instead, it developed other means (e.g., service charges, tipping fees) of funding its facilities and achieving its solid waste management goals.

In order to fund its integrated waste management program, Montgomery County established a Collection and Disposal District (the District"). The District includes all single family residences in the unincorporated areas of the County and in municipalities that decide to participate. Currently, only two very small municipalities (actually, special taxing districts) participate. Waste generators in the District pay for all waste collection and disposal services through service charges added to annual tax bills (see section on Funding Solid Waste Management).

OVERVIEW OF MONTGOMERY COUNTY

Montgomery County is located north and west of Washington, D.C. and has a population of approximately 760,000.

The County contracts with private haulers for collection of residential wastes within the District. Generators in the District may contract independently with private collection and disposal services if they choose; however, these generators still will be charged for the County's waste disposal services. Private haulers collect all residential

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46 Generally, under home rule authority, municipalities may exercise power over local issues to the extent not prohibited or regulated by the State. For example, Prince George's County, Maryland established flow controls over its solid waste.

waste generated outside the Collection and Disposal District and all commercial waste both inside and outside of the District. Private haulers enter into contracts with the waste generators and may deliver waste to the County facilities but are not obligated to do so.

Under Maryland State law, each county must provide for the management of solid waste generated within its borders. Counties must prepare solid waste management plans to cover at least a ten year period.[47] They must review their solid waste management plans every two years and submit revised plans to the Maryland Department of the Environment. The Montgomery County Comprehensive Solid Waste Management Plan states that the management and disposal methods selected will follow the State solid waste management hierarchy: source reduction and recycling followed by combustion, and, finally, landfilling.

To implement its plan, Montgomery County developed a solid waste strategy that involves construction of a new landfill, expansion of recycling facilities, closure of the Oaks Landfill, and construction of the Montgomery County Resource Recovery Project (the Project). The Project will consist of: (1) a WTE facility with a maximum capacity of 1800 tons per day (tpd) and an annual effective operating capacity of 558,450 tons per year (tpy); (2) improvements to an existing transfer station owned by Montgomery County; and, (3) a solid waste transportation system. The Project is currently under construction and is expected to be operational in 1996.[48]

The WTE facility is the major component of the solid waste management system upgrade. Once constructed, the WTE facility will generate 643 kilowatt hours of electricity per ton of waste processed. All non-recyclable processible waste generated in Montgomery County will be combusted at the WTE facility. The facility will replace the Oaks Landfill as the County's primary disposal facility. Any remaining non-processible waste will be disposed at a new landfill to be constructed as part of the plan.

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47 Annotated Code of Maryland §9-503.

48 The Project will be owned and financed by the Northeast Maryland Waste Disposal Authority, which was established in 1980 to assist political subdivisions in the State. The estimated construction cost of the Project is approximately $278,000,000, which the Authority plans to finance from revenue bonds issued in 1993. Montgomery County will pay the Authority for solid waste management services pursuant to a Waste Disposal Agreement between Montgomery County and the Authority.

Municipal Solid Waste Management

Solid Waste Disposal Facilities

WASTE MANAGED IN 1993 (IN TONS)	
Total Waste Generated:	800,000
Amount Recycled:	182,000
IN-STATE	
Amount Landfilled:	428,000
OUT-OF-STATE	
Amount Landfilled:	190,000

In 1993, Montgomery County estimated that approximately 428,000 tons of waste would be disposed at the Oaks Landfill, while 190,000 tons of waste would be disposed at out-of-state disposal facilities. The following disposal facilities are located in Montgomery County:

- **The Oaks Landfill** provides Montgomery County with 13.6 million cubic yards of total disposal capacity. The Oaks Landfill has been the County's primary disposal facility since 1982. The County plans to continue using it until the WTE facility and a new landfill are constructed in 1996. At that time, the Oaks Landfill will close.

- **A transfer station**, designed to receive up to 2,000 tpd of solid waste, handles all of Montgomery County's waste before it is distributed to other facilities.

Recycling Programs

Montgomery County currently recycles approximately 23 percent of its waste (182,000 tons) and has achieved Maryland's goal of 20 percent recycling by 1994. By the year 2000, the County hopes to achieve a 50 percent recycling rate.

The County's materials recovery facility (MRF) functions as a processing facility for mixed recyclable materials and as a transfer station for newspapers and yard trimmings. The MRF processes glass bottles, aluminum and steel cans, certain plastic bottles, old newspaper, leaves, grass clippings, and wood brush. The MRF may process up to 200 tpd of mixed recyclable materials. Although the MRF is publicly owned, it is privately operated. The County receives 75 percent of the revenues from selling materials recovered at the MRF, and the operator receives 25 percent as an incentive to increase marketing efforts and sell more recycled materials.

Montgomery County currently mandates recycling in both the residential and commercial sectors. Single and multi-family houses are required to recycle the following materials:

- Newspaper;
- Yard trimmings;
- Aluminum and steel cans;
- Glass; and
- Some plastic bottles.

Commercial recycling regulations require businesses to recycle the following materials:

- Corrugated cardboard containers;
- Office paper;
- Newspaper;
- Aluminum and bi-metal cans;
- Glass containers;
- Plastic containers; and
- Yard trimmings.

MONTGOMERY COUNTY SOLID WASTE MANAGEMENT FACILITIES

PUBLICLY-OWNED

- 1 Landfill;
- 1 Transfer station;
- 1 Resource recovery facility (under construction);
- 1 Materials recovery facility; and
- 1 Yard trimmings composting site.

The County and all municipalities operate curbside recycling programs that collect newspaper and commingled recyclable materials from single family residences. The programs also provide for the collection of yard trimmings from single family homes in response to the County's April 4, 1994, yard trimmings ban. The County's composting facility manages the leaves and grass clippings collected by the County's recycling program. Approximately 24,000 tons of yard trimmings were collected in 1992.

In an effort to reduce waste generation, Montgomery County established a goal to achieve a zero percent increase over 1992 per capita generation rates. The County plans to promote waste reduction through education and support of national and State reforms, such as recycled content procurement and packaging initiatives. The County is establishing a unit-based pricing mechanism on

yard trimmings to assist in its waste reduction goals and eventually may expand this effort to cover all solid waste.[49]

Financing Solid Waste Management

Montgomery County funds its integrated waste management program through a combination of the following mechanisms: service charges; tipping fees; fees from County institutions (e.g., government office buildings, the fire department); revenues from the sale of recyclables, methane, and compost; and, investment earnings.

Service Charges

Montgomery County imposes a service charge on residents in the Collection and Disposal District that covers collection costs, recycling, and disposal. In 1993, the average annual charge per household was $205.03. The County also charges residents who use the County's recycling facilities but live outside the Collection and Disposal District; these charges, however, cover only recycling services (i.e., the charges do not cover MSW collection and disposal costs, because residents who live outside the District enter into contracts with private haulers for waste collection).

Tipping Fees

The County charges a $53 per ton tipping fee at the transfer station to private haulers and municipalities that use County management facilities.[50] Haulers delivering residential waste from households located in the District are not charged tipping fees.

Fees for County Institutions

The County pays fees for services rendered to certain County institutions (such as government office buildings and the fire department) utilizing County solid waste management facilities.

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[49] Starting in 1995, the County will establish a per-bag fee on yard trimmings that will be implemented through a tag program. This unit-based pricing mechanism is expected to provide an economic incentive for home composting and will reduce the volume of yard trimmings to be managed.

[50] All solid waste is delivered directly to the transfer station and distributed to other facilities from there.

Revenues from the Sale of Recyclable Materials, Yard Trimmings Compost, and Methane Gas

The County collects revenues from the sale of recyclable materials and yard trimmings compost. The County also sells methane gas generated at the Gude landfill, which closed in 1982.

Investment Earnings

Montgomery County collects interest income on money generated from the sale of revenue bonds for the WTE facility and landfill. Interest is earned until the money is spent for the construction of the WTE facility or landfill.

Systems Benefit Charge

The County originally planned to implement a "systems benefit charge" (i.e., a tax) on all generators (residents and businesses) of waste in Montgomery County regardless of whether or not their waste was disposed in the County system. Montgomery County voters, however, blocked the legislation with a referendum. If the voters eventually approve the benefit charge, it will supersede the existing funding system.

SUMMARY OF KEY FINDINGS

- Montgomery County manages its solid waste program without flow controls.
- Montgomery County taxes residents within the Collection and Disposal District for solid waste management regardless of whether or not they use County facilities.
- Without flow controls, the County exceeds State recycling goals and currently recycles approximately 23 percent of its waste.
- Montgomery County plans to build a resource recovery facility and a new landfill to meet future capacity needs.

Exhibit II-2

SUMMARY OF CASE STUDIES

Case Study Location	Flow Controls	County Recycling Rate	State Recycling Goal	Achieving In-State Capacity Goals
Union County, New Jersey	yes*	46% (1992)	50% of MSW and 60% of total waste stream by 1995	New Jersey facilities handle all of Union County's waste with the exception of combustion ash, which is disposed in a Pennsylvania landfill.
Spokane County, Washington	yes*	39% (1993)	50% by 1995	All of Spokane County's waste, with the exception of combustion ash, is handled by facilities located within Spokane County. Spokane County delivers its ash to a monofill in Klickitat County, Washington.
Hennepin County, Minnesota	no longer uses flow controls	49% (1993)	40% by 1996	Approximately 17% (325 tpd) of Hennepin County's waste is disposed in out-of-state facilities.
Montgomery County, Maryland	no	23% (1993)	20% by 1994	Montgomery County disposes approximately 24% of its MSW in out-of-county or out-of-state facilities.

* Flow control statute excludes source separated recyclable materials.

APPENDIX III-A

Technical Analysis: Waste Stream Estimate

A.1 USING *BIOCYCLE* DATA TO ESTIMATE THE SIZE OF WASTE STREAM RECEIVED AT MSW FACILITIES

In order to prepare this Report, EPA needed to determine the best estimate of the amount of waste received at MSW management facilities, including the amount of non-MSW that may compete for MSW management capacity. For the following reasons, EPA concluded that the *BioCycle* estimate of 292 million tons for 1992 appeared to be the most appropriate estimate for the size of the waste stream for this market analysis of flow controls:

- **Measures non-MSW affecting MSW management capacity.** States reporting to *BioCycle* often measure the total amount of waste received at MSW management facilities, including such non-MSW waste types as C&D, sewage sludge, and industrial non-hazardous waste. This approach quantifies additional wastes that are relevant to the issue of adequate future capacity since it measures waste received at MSW facilities. However, *BioCycle* does not provide a complete measure of all non-MSW wastes received at MSW facilities, since States may or may not provide this data.

- **Measures additional waste disposal capacity needed for residuals.** Counting both materials processed at recycling and combustion facilities as well as the residues of these processes managed at landfills allows for a more accurate assessment of waste management capacity; data on recycling and combustion facility capacity and throughput are often reported on a "tons received" basis, and landfill disposal capacity is needed to manage residuals from these facilities. However, States do not consistently report this data to *BioCycle*.

A.2 RECONCILING EPA AND *BIOCYCLE* ESTIMATES

To confirm that *BioCycle* includes non-MSW amounts in State estimates for the amount of waste landfilled, EPA reviewed State reports on waste generation and management. Exhibits III-A.1 and III-A.2 show the results of this review. Exhibit III-A.1 compares *BioCycle* landfill estimates with available State data on waste received at MSW landfills (MSWLFs), excluding waste received at C&D and other non-MSW landfills dedicated to the disposal of these non-MSW types. Column A shows the amount of 1992 waste each State reported to *BioCycle*. Column B

shows the percent of waste landfilled as reported by each State. Column C is the result of Column A multiplied by Column B. Column D shows the amount of waste disposed in MSWLFs according to State reports. Column E is the difference between the *BioCycle* landfill estimate (Column C) and the State data for MSWLFs (Column D). Although Column E indicates some discrepancies between the *BioCycle* estimate and the reported amount of waste received by MSWLFs, the largest differences are for two States (Indiana and New York) that are major waste importers/exporters, and the net difference for the 12 States listed in the exhibit (420,050 tons) is relatively small. For example:

- In 1992, **Arkansas** reported MSW generation to *BioCycle* of 2,154,000 tons (Column A). A review of data provided by Arkansas on the amount of waste received at MSWLFs in 1992 showed a total of 2,153,532, almost exactly the same amount reported as generation.[1] This example shows that Arkansas is reporting the amount of waste received at MSWLFs and not the amount of MSW generated.

- The State of **Indiana** reported 8.4 million tons of MSW generation to *BioCycle* in 1992. Again, this number closely matches the amount of waste disposed in MSWLFs in that year, as provided in a State report.[2] However, the amount of waste received at Indiana MSWLFs includes 1.8 million tons of waste imports. Moreover, an Indiana report indicates that the waste disposed in MSWLFs includes some non-MSW, such as C&D waste and industrial process waste, although the report also indicates that a substantial amount of non-MSW is managed by non-MSW facilities, such as dedicated C&D landfills. In this example, the *BioCycle* estimate is a reasonable approximation of waste received at MSWLFs, with non-MSW that is shipped to dedicated non-MSW facilities excluded.

EPA received six other State reports that are not current and/or do not clarify whether the data they present are for all landfills or just for MSWLFs. Nonetheless, Exhibit III-A.2 compares *BioCycle* reported landfill estimates for these 6 States with other relevant information provided in State reports. This exhibit illustrates the data anomalies and uncertainties inherent in available State landfill disposal data. For example, one **Texas** report appears to indicate that total waste received at "MSWLFs" is 16 million tons greater than the amount reported to *BioCycle*, but another State report seems to suggest that these additional tons are non-MSW that may be

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[1] As reported in a printout of waste amounts received at Arkansas sanitary landfills as submitted by the State.

[2] "Summary of Solid Waste Facility Data for Indiana: 1992 Annual Report," Department of Environmental Management, 1992.

managed at dedicated non-MSW facilities. The *BioCycle* estimates appear to include C&D wastes in **Maine** and exclude C&D wastes in **Massachusetts** -- State reports confirm that C&D wastes generally are sent to MSWLFs in Maine and to dedicated commercial C&D facilities in Massachusetts.

EXHIBIT III-A.1

BioCycle Reported Municipal Solid Waste Landfill Disposal Versus State Reported Data

State	BioCycle Reported Waste (1992)	% Land-filled	*BioCycle* Landfill Estimate	State Data for MSWLFs	Difference	Comments from State Reports Reviewed by EPA
	(A)	(B)	(C)=(A)*(B)	(D)	(D)-(C)	
Arkansas	2,154,000	85	1,839,900	2,153,532	322,632	• Amount reported to BioCycle is the amount of waste disposed in MSWLFs in 1992.
Florida	19,400,000	49	9,506,000	9,687,836	181,836	• Amount reported to BioCycle includes 3.3 million tons of C&D waste and 0.7 million tons of extra metals. • Amount of waste landfilled includes waste disposed in active MSWLFs in 1992. • Active Class III landfills (C&D, tires, other inert waste) received about 5 million tons in 1992.
Illinois	14,140,000	87	12,301,800	12,313,649	11,849	• Difference is statistical error (actual amount of waste disposed is 87.1 percent). • State uses average per capita MSW generation rate of 6.2 lbs/day to estimate 14.2 million tons and subtracts 100,000 tons for "net exports" and notes, "In 1992, 14.1 million tons of *non-hazardous solid waste were handled*." • Landscape wastes banned from landfills since July 1990.
Indiana	8,400,000	75	6,300,000	8,418,485	2,118,485	• Amount reported to BioCycle is the amount of waste received at MSWLFs in 1992. Approximately 1.8 million tons is out-of-State waste. • Waste received at MSWLFs includes "C&D waste, industrial process waste, sludge, ash, asbestos, and contaminated soils."
Minnesota	4,270,000	27	1,274,400	1,350,535	76,135	• Approximately 110,000 tons of industrial non-hazardous waste was co-disposed in MSWLFs in 1992.
Nevada	2,300,000	90	2,070,000	2,245,011	175,011	• Amount of waste reported to BioCycle is the amount of waste disposed in 1990. State uses an average generation rate of 10.12 lbs/person/day. • Amount of waste disposed in MSWLFs includes disposal figures from Class I MSWLFs receiving greater than 10,000 tpy.
New Jersey	7,513,000	45	3,380,850	2,895,947	-484,903	• Amount disposed in MSWLFs is from 12 of 37 MSWLFs.

EXHIBIT III-A.1 (continued)

BioCycle Reported Municipal Solid Waste Landfill Disposal Versus State Reported Data

State	BioCycle Reported Waste (1992) (A)	% Land-filled (B)	*BioCycle* Landfill Estimate (C)=(A)*(B)	State Data for MSWLFs (D)	Difference (D)-(C)	Comments from State Reports Reviewed by EPA
New York	22,800,000	62	14,136,000	11,900,000	-2,236,000	• State reported exporting 3 million tons out-of-State in 1990. • State estimate (1990) for MSW disposal is 18,306,072 and recycling is 4,054,905. • State estimate (1990) for C&D generation is 3 million and industrial non-hazardous waste is 3.6 million. Report indicates that most industrial waste never leaves the point of generation and the management of C&D waste is difficult to track, although State has 77 known C&D landfills, with about 25 having MSWLF-type permits.
North Carolina	7,788,000	95	7,398,600	6,681,578	-717,022	• Difficult to determine how State arrived at estimate reported to BioCycle. • State reports (FY 1991-92) 6,681,578 tons disposed in MSWLFs, 19,859 tons in tire monofills, 121,944 in incinerators, 267,428 tons yard trimmings collection/compost, and 432,430 tons recycling. (total is 7,523,239).
Ohio	16,400,000	75	12,300,000	12,466,719	166,719	• BioCycle estimate is the amount of waste delivered to landfills and incinerators in 1991. In 1992, these facilities received 17.5 million tons of waste from the following sources: industrial waste (6.1 million tons); "exempt waste," e.g., ash, C&D (0.8 million tons); "general solid waste," defined to include MSW as well as contaminated soils, MSW treatment sludge, MSW incinerator ash. • Captive industrial landfills received 3.8 million tons and incinerators received 1.5 million tons, leaving approximately 12.2 million tons disposed in MSWLFs. This total includes 1.8 million tons of out-of-State waste. • The amount of waste disposed in MSWLFs is taken from a detailed listing of MSWLF facilities for 1992.
Utah	1,500,00	80	1,200,000	1,835,416	635,416	• Difficult to determine how State arrived at estimate reported to BioCycle. State report notes 1.9 million tons of residential and commercial waste generated in 1992. • State report indicates 1.8 million tons disposed in MSWLFs and 0.5 million tons of C&D waste disposed in dedicated C&D landfills.

EXHIBIT III-A.1 (continued)

BioCycle Reported Municipal Solid Waste Landfill Disposal Versus State Reported Data

State	BioCycle Reported Waste (1992) (A)	% Land-filled (B)	*BioCycle* Landfill Estimate (C)=(A)*(B)	State Data for MSWLFs (D)	Difference (D)-(C)	Comments from State Reports Reviewed by EPA
Washington	5,708,000	65	3,710,200	3,889,092	178,892	• Amount of waste landfilled (1991 figure) includes demolition waste, industrial waste, sludge, and other waste (tires, petroleum contaminated soils, compost materials, ash, etc.)
		NET	**75,417,750**	**75,837,800**	**420,050**	

EXHIBIT III-A.2

BioCycle Reported Municipal Solid Waste Landfill Disposal Compared to Information Obtained from State Reports

State	BioCycle Reported Waste (1992) (A)	% Land-filled (B)	*BioCycle* Landfill Estimate (C)=(A)*(B)	Comments from State Reports Reviewed by EPA Note: Landfill data for these State reports are not current (they are 1989 or 1990 data) and/or do not clarify whether data are for all landfills or just for MSWLFs.
Iowa	2,088,000	75	1,566,000	• Landfills reported receiving 2.2 million tons of solid waste in 1989.
Maine	1,246,000	33	411,180	• BioCycle estimate includes 0.4 million tons of C&D waste. "Very few licensed facilities exist for the management of these wastes."
Massachusetts	6,600,000	23	1,518,000	• In 1990, Massachusetts generated 6.65 million tons of MSW plus an additional 3.35 million tons of other waste (C&D, municipal and industrial sludge, and contaminated soils). • State reported landfilling 3.1 million tons of MSW in 1990. • It appears that very little other waste (C&D) is disposed in MSWLFs, e.g., "60-80 percent of C&D waste is managed by in-State facilities. The majority of waste is disposed at seven large commercial landfills. Most MSWLFs greatly limit C&D wastes, even from residents."
South Dakota	800,000	90	720,000	• In 1991, State reported generating 842,000 tons of solid waste: 416,000 tons of residential/commercial waste, 123,000 tons of yard trimmings, and 303,000 tons of industrial waste. • An inventory of existing solid waste disposal facilities reported receiving 1.94 million tons of solid waste. Approximately 1.5 million tons were received at one facility. Discounting this facility leaves 0.45 million tons disposed (the approximate amount of MSW generated).
Texas	14,469,000	88	12,732,720	• Texas landfills reported receiving a total of 21.7 million tons in 1992. Of this amount, about 14.5 million is household/commercial waste (the amount reported to BioCycle). The remaining was is non-MSW, including 3.6 million of C&D waste. • In a separate report, Texas reported that 29.8 million tons of waste are disposed in MSW facilities: 13.1 million tons of MSW, 0.2 million tons of municipal sludge, 13.3 million tons of industrial waste, and 3.2 million tons of C&D waste. This report also showed MSW generation of 14.5 million tons.

EXHIBIT III-A.2 (continued)

BioCycle Reported Municipal Solid Waste Landfill Disposal Compared to Information Obtained from State Reports

State	BioCycle Reported Waste (1992) (A)	% Land-filled (B)	*BioCycle* Landfill Estimate (C) = (A)*(B)	Comments from State Reports Reviewed by EPA Note: Landfill data for these State reports are not current (they are 1989 or 1990 data) and/or do not clarify whether data are for all landfills or just for MSWLFs.
Wisconsin	3,352,000	72	2,413,440	• Amount of waste reported to BioCycle is based on a 1990 characterization study by Franklin Associates and includes only EPA-defined MSW. • State reports generation of an additional 6.3 million tons of non-MSW. • Of MSW generated, State reported that in 1990 2.6 million tons were landfilled. • There is no indication that non-MSW is managed in MSW facilities.

APPENDIX III-B

Technical Analysis: Compost Segment

This appendix details the basis for estimating the amount of MSW managed by the composting market segment in 1992 (9 million tons) as well as the amount of waste composted in individual States. This appendix corresponds to Section B in Chapter III.

B.1 ESTIMATE OF MIXED-WASTE COMPOSTING

Exhibit III-B.1 lists the 21 mixed-waste composting facilities in operation in 1992. Most of these facilities report mixed MSW as their only feedstock. However, five facilities process a mixture of MSW and sludge, one of these receives industrial waste (i.e., brewery waste), and another receives agricultural waste (i.e., manure). Also, the Fillmore and Swift County facilities in Minnesota are actually source-separated organics composting facilities; these facilities receive a feedstock of food and other compostables separated by households and commercial waste generators (e.g., food and paper waste from grocery stores).

The combined design capacity of the 21 facilities listed in Exhibit III-B.1 is 4,472.6 tons per day, or approximately 1.2 million tons per year based on 260 days of operation. However, the exhibit also shows that the 1992 throughput for these facilities is substantially lower than their design capacity -- 1,876 tons per day, or approximately 0.5 million tons per year based on 260 days of operation. The estimate of 0.5 million tons should be revised downward, however, for two reasons: (1) one large facility in Florida, accounting for almost 30 percent of the total ton per day throughput of all mixed-waste facilities, suspended operations in late 1992; and (2) the annual throughput at several other facilities includes some amount of sewage sludge, which should be excluded from the estimate of MSW composting and included in the estimate of non-MSW composting to avoid double counting. For these reasons, EPA believes that 0.4 million tons is a better approximation of the amount of MSW managed in mixed-waste composting facilities in 1992.

EXHIBIT III-B.1[3]

Mixed Waste Composting Facilities Operating in 1992

Facility	Feedstock	Design Capacity (tpd)	Percent Composted	Current Throughput (tpd)
Pinetop-Lakeside, AZ	MSW/sludge	15	75	15
New Castle, DE	MSW/sludge	1350	20	225[1]
Escambia, FL	MSW	400	95	200[2]
Pembroke Pines, FL	MSW	660	75	550[3]
Sumter County, FL	MSW	200	55	50
Buena Vista, IA	MSW	70	52	16[4]
Montgomery County, KS	MSW	300	65	50
Mackinac Island, MI	MSW/manure	1.6	45	N/A
Fillmore County, MN	source separated organics	11	43	11
Lake of the Woods, MN	MSW	10	60	5
Mora, MN	MSW	500	72	170
Pennington County, MN	MSW	80	30	8
Prairieland, MN	MSW	100	63	85
St. Cloud, MN	MSW	75	70	50
Swift County, MN	source separated organics	40	45	6
Wright County, MN	MSW	165	62	110
Sevier County, TN	MSW/sludge	225	75	150
Big Sandy, TX	MSW/brewery waste/sludge	25	85	Unavailable
Whatcom County, WA	MSW	125	60	100[5]
Columbia County, WI	MSW	80	33	55
Portage, WI	MSW/sludge	40	N/A	20
TOTAL		4,472.6		1,876

[1] Composting has stopped at the Delaware Reclamation Plant pending the result of an appeal by the facility operator. It had been composting 200-225 tons/day (tpd) of MSW with biosolids.

[2] No MSW composting in Escambia County since February 1993. County plans to restart (at 200 tpd) by first quarter 1994.

[3] Pembroke Pines stopped composting in November, 1992. Facility repairs are nearing completion. A phased in start-up is expected to begin in early 1994. The facility had been composting 550 tpd.

[4] Reported annual throughput (4,200 tons) divided by 260 days.

[5] At one point, Recomp of Washington was composting 100 tpd of MSW. That portion of the facility is essentially shut down pending the issuance of composting regulations by the Washington Department of Ecology.

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[3] Throughput data from "Solid Waste Composting Update," *BioCycle*, November 1993; all other data from *U.S. Solid Waste Composting Facility Profiles*, Volume II, The United States Conference of Mayors, March 1993.

B.2 ESTIMATE OF YARD TRIMMINGS COMPOSTING

The estimate of the amount of yard trimmings composted in 1992 is based on the convergence of two different estimates.

National Yard Trimmings Composting Estimate Based on EPA and *BioCycle* Data

BioCycle reported that the number of yard trimmings facilities grew from 1,407 in 1990 to 2,981 in 1992. In other words, the number of operating yard trimmings facilities in 1992 was 212 percent of the number of facilities in 1990 (2,981/1,407 = 2.12). Applying this percentage change to EPA's estimate of the total amount of yard trimmings composted in 1990 (4.2 million tons) suggests that a reasonable estimate of the amount of yard trimmings composted in 1992 is approximately 8.9 million tons (2.12 multiplied by 4.2 = 8.9).

Estimating the growth in yard trimmings composting based on the growth in the number of facilities implicitly assumes that the average amount of yard trimmings composted per facility did not change substantially between 1990 and 1992. (Note: use of the average does not mean that all facilities are assumed to be of equal size in terms of quantity of yard trimmings composted.) However, *BioCycle* also reports that among those yard trimmings facilities specifying incoming feedstocks in 1990, 64 percent reported that they accepted only leaves, and 36 percent accepted all yard trimmings; in 1992, 94 percent of the facilities specifying feedstock reported that they accepted all yard trimmings.[4] Thus, this data suggests that yard trimmings composting is growing not only in terms of the number of facilities but also in the average amount of yard trimmings that facilities process. If the average quantity of yard trimmings composted per facility increased between 1990 and 1992, then the estimate of 8.9 million tons of yard trimmings composted in 1992 may understate the actual amount of yard trimmings managed by this market subsegment.

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[4] The number of facilities specifying feedstock was 811 in 1990, or 58 percent of all 1,407 yard trimmings facilities in 1990. The number of facilities specifying feedstock in 1992 was 1,944, or 65 percent of all 2,981 yard trimmings facilities in 1992.

National Yard Trimmings Composting Estimate Based on *BioCycle* and State Data

In order to estimate the average amount of yard trimmings received at yard trimmings composting facilities and to develop a second estimate of the total amount of yard trimmings composted in 1992, EPA requested available data on composting from all 50 States. A total of eight States provided data on the amount of yard trimmings composted in 1992. Because of the rapid growth in yard trimmings composting, the data reported by the eight State sample may somewhat understate the amount of yard trimmings composted by these States during calendar year 1992, because some of these State reports are for fiscal years ending prior to the end of the 1992 calendar year (e.g., Illinois data is for the year ending April 1, 1992). If composting activity continued to grow throughout the remainder of the year, then the fiscal year data would understate the amount of yard trimmings composting during the 1992 calendar year.

Exhibit III.B-2 presents the yard trimmings composting tonnage reported by the eight-State sample, the number of yard trimmings composting facilities reported by *BioCycle* for each of these States, and the average quantity of yard trimmings composted per facility for each State (i.e., yard trimmings tonnage divided by number of facilities). These eight States provide a reasonably good sample because they are regionally diverse, and they account for 38 percent of all the yard trimmings facilities reported by *BioCycle*. On average, the yard trimmings facilities in these States receive 2,950 tons of yard trimmings per year. The average or mean throughput is statistically the best point estimate to use in extrapolating to the larger population of all composting facilities active in 1992; use of the mean does not imply that EPA assumes all composting facilities are equal in amount of yard trimmings accepted. Extrapolating the average throughput of the eight State sample to all of the 1992 facilities reported by *BioCycle* suggests that the amount of yard trimmings composted in 1992 was approximately 8.8 million tons (2,950 tons per facility times 2,981 facilities = 8.8 million tons).

Using the average throughput per facility from the eight State sample to estimate the total national tonnage of yard trimmings composted in 1992 results in an estimate that is very close to the estimate developed above using a different methodology. The convergence of these estimates enhances confidence in the estimate of 8.8 million tons of yard trimmings composted nationwide in 1992. However, statistical issues of selection and measurement bias, as well as natural variation, imply that large confidence limits (e.g., error bands) may be in fact appropriate for this estimate. For example:

EXHIBIT III-B.2

Eight State Sample

State	State Estimates of Tons of Yard Trimmings Composted in 1992 (A)	*BioCycle* Estimate of Number of Yard Trimmings Composting Facilities in 1992 (B)	Yard Trimmings Composted Per Facility (C)=(A)/(B)
California	575,491	26	22,134
Florida	847,900	20	42,395
Illinois	418,331	96	4,358
Minnesota	328,470	397	827
North Carolina	267,428	75	3,566
New York	467,858	200	2,339
Pennsylvania	267,104	300	890
Washington	157,673	15	10,512
SAMPLE TOTAL	**3,330,255**	**1,129**	**2,950 (Average)**

- The eight States in Exhibit III-B.2 present a very wide range of average annual throughputs -- from 827 tons per facility in Minnesota to 42,395 tons per facility in Florida. Part of this variation in average throughput may be due to climatic variations among the sample States, because the highest average throughputs are reported by Florida and California where yard trimmings facilities can receive yard trimmings all year,[5] and the lowest average throughput is reported by Minnesota which has a very short yard trimmings generation season. However, because these States were not selected randomly, an element of selection bias may also justify large confidence limits around the observed mean.

- Variation in the calculated average throughputs for different States may also reflect the rapid changes in this market subsegment which can result from impositions of landfill bans on yard trimmings as well as from market forces. For example, Illinois reported that its amount of yard trimmings composted almost doubled from 221,515 tons in 1991 to 418,331 tons in 1992, while the number of Illinois facilities reported in *BioCycle* declined from 106 in 1991 to 96 in 1992, due to facility consolidations. By contrast, Pennsylvania reported the largest year-to-year increase in total facilities

[5] Florida's reported generation of yard trimmings per capita (0.234 tons per year) is 66 percent greater than the EPA's estimate for national per capita yard trimmings generation (.141 tons per year).

reported by *BioCycle*, rising from 169 facilities in 1991 to 300 facilities in 1992; Pennsylvania's low average throughput compared to Illinois may reflect a large number of new facilities that were not in operation for the entire 1992 calendar year, which would reflect an element of measurement bias.

Such natural variation and potential sources of bias mean that the error bands (confidence limits) surrounding the national composting estimate may be larger than suggested by the convergence of the results of the two different estimating methodologies.

B.3 STATE-SPECIFIC COMPOSTING ESTIMATES

In the context of the market analysis of flow controls, State-specific estimates of the amount of yard trimmings composted are useful in identifying important State or regional variations in MSW management markets. Exhibit III-B.3 provides preliminary estimates of total 1992 MSW composting (mixed-waste and yard trimmings) in the 50 States and the District of Columbia. EPA undertook the following steps to develop this exhibit:

- State estimates of yard trimmings composting were used for the eight States reporting this information (Exhibit III-B.2);
- For the remaining 42 States and the District of Columbia, EPA multiplied the number of yard trimmings composting facilities reported to *BioCycle* by the average throughput calculated in Exhibit III-B.2 (2,950 tons); and
- The amount of mixed-waste composting reported in Exhibit III-B.1 was listed for those States with such facilities.[6]

As the exhibit indicates, the total amount of MSW composted nationwide was 9,181,415 tons in 1992.

Exhibit III-B.4 provides a "reality check" on State-specific composting estimates developed in Exhibit III-B.3, by comparing the preliminary State estimates with *BioCycle*'s reported estimates for State recycling and composting. Columns A and B, respectively, list each State's 1992 waste

[6] The aggregated tons per year of mixed-waste composting in Florida was reduced by 0.1 million to account for the November shutdown of the 550 ton per day facility in Florida, and to avoid double counting yard trimmings received at mixed waste composting facilities that might have been included in the yard trimmings composting data reported by Florida.

EXHIBIT III-B.3

Preliminary Estimate of Municipal Solid Waste Composting in Each State

State	*BioCycle* Yard Trimmings Facilities (A)	Estimated Yard Trimmings Composted (tons per year) (B)	Other MSW Composted (tons per year) (C)	Total MSW Composted (tons per year) (D)=(B)+(C)
Alabama	12	35,400	--	35,400
Alaska	0	0	--	0
Arizona	2	5,900	3,900	9,800
Arkansas	17	50,150	--	50,150
California	26	575,491	--	575,491
Colorado	5	14,750	--	14,750
Connecticut	84	247,800	--	247,800
Delaware	2	5,900	58,500	64,400
District of Columbia	1	2,950	--	2,950
Florida	20	847,900	108,000	955,900
Georgia	88	259,600	--	259,600
Hawaii	5	14,750	--	14,750
Idaho	6	17,700	--	17,700
Illinois	96	418,331	--	418,331
Indiana	128	377,600	--	377,600
Iowa	30	88,500	4,160	92,660
Kansas	30	88,500	13,000	101,500
Kentucky	26	76,700	--	76,700
Louisiana	13	38,350	--	38,350
Maine	22	64,900	--	64,900
Maryland	8	23,600	--	23,600
Massachusetts	265	781,750	--	781,750
Michigan	200	590,000	--	590,000
Minnesota	397	328,470	115,700	444,170
Mississippi	8	23,600	--	23,600
Missouri	50	147,500	--	147,500
Montana	9	26,550	--	26,550

EXHIBIT III-B.3 (continued)

Preliminary Estimate of Municipal Solid Waste Composting in Each State

State	*BioCycle* Yard Trimmings Facilities (A)	Estimated Yard Trimmings Composted (tons per year) (B)	Other MSW Composted (tons per year) (C)	Total MSW Composted (tons per year) (D)=(B)+(C)
Nebraska	15	44,250	--	44,250
Nevada	1	2,950	--	2,950
New Hampshire	78	230,100	--	230,100
New Jersey	270	796,500	--	796,500
New Mexico	1	2,950	--	2,950
New York	200	467,858	--	467,858
North Carolina	75	267,428	--	267,428
North Dakota	5	14,750	--	14,750
Ohio	78	230,100	--	230,100
Oklahoma	2	5,900	--	5,900
Oregon	20	59,000	--	59,000
Pennsylvania	300	267,104	--	267,104
Rhode Island	16	47,200	--	47,200
South Carolina	25	73,750	--	73,750
South Dakota	3	8,850	--	8,850
Tennessee	4	11,800	39,000	50,800
Texas	75	221,250	--	221,250
Utah	1	2,950	--	2,950
Vermont	12	35,400	--	35,400
Virginia	19	56,050	--	56,050
Washington	15	157,673	26,000	183,673
West Virginia	N/A	0	--	0
Wisconsin	213	628,350	19,500	647,850
Wyoming	3	8,850	--	8,850
TOTAL	2,981	8,793,655	387,760	9,181,415

EXHIBIT III-B.4

Revised State-Specific Composting Estimates

State	*BioCycle* 1992 Waste Generation (million tons) (A)	Reported % Composted/ Recycled (B)	Amount Composted/ Recycled (million tons) (C)=(A)*(B)	Preliminary Compost Estimate (million tons) (D)	Compost Estimate as a % of Amount Composted/ Recycled (E)=(D)/(C)	Revised Compost Estimates (F)
Alabama	5.20	12	0.62	0.04	6	0.04
Alaska	0.50	6	0.03	0.00	0	0.00
Arizona	4.15	7	0.29	0.01	3	0.01
Arkansas	2.15	10	0.22	0.05	23	0.05
California	44.54	11	4.90	0.58	12	0.58
Colorado	3.50	26	0.91	0.01	2	0.01
Connecticut	2.90	19	0.55	0.25	45	0.25
Delaware	0.79	16	0.13	0.06	51	0.06
District of Columbia	0.92	30	0.28	0.00	1	0.00
Florida	19.40	27	5.24	0.96	18	0.96
Georgia	6.00	12	0.72	0.26	36	0.26
Hawaii	1.30	4	0.05	0.01	28	0.01
Idaho	0.85	10	0.09	0.02	21	0.02
Illinois	14.14	11	1.56	0.42	27	0.42
Indiana	8.40	8	0.67	0.38	56	0.38
Iowa	2.09	23	0.48	0.09	19	0.09
Kansas	2.40	5	0.12	0.10	85	0.10
Kentucky	4.65	15	0.70	0.08	11	0.08
Louisiana	3.48	10	0.35	0.04	11	0.04
Maine	1.25	30	0.37	0.06	17	0.21
Maryland	5.00	15	0.75	0.02	3	0.02
Massachusetts	6.60	30	1.98	0.78	39	0.78
Michigan	13.00	26	3.38	0.59	17	0.59
Minnesota	4.27	38	1.62	0.44	27	0.44
Mississippi	1.40	8	0.11	0.02	21	0.02
Missouri	7.50	13	0.98	0.15	15	0.15

EXHIBIT III-B.4 (continued)
Revised State-Specific Composting Estimates

State	*BioCycle* 1992 Waste Generation (million tons) (A)	Reported % Composted/ Recycled (B)	Amount Composted/ Recycled (million tons) (C)=(A)*(B)	Preliminary Compost Estimate (million tons) (D)	Compost Estimate as a % of Amount Composted/ Recycled (E)=(D)/(C)	Revised Compost Estimates (F)
Montana	0.74	5	0.04	0.03	71	0.03
Nebraska	1.40	10	0.14	0.04	32	0.04
Nevada	2.30	10	0.23	0.00	1	0.00
New Hampshire	1.14	10	0.11	0.23	202	0.08
New Jersey	7.51	34	2.55	0.80	31	0.80
New Mexico	1.49	6	0.09	0.00	3	0.00
New York	22.80	21	4.79	0.47	10	0.47
North Carolina	7.79	4	0.31	0.27	87	0.27
North Dakota	0.47	17	0.08	0.01	19	0.01
Ohio	16.40	19	3.12	0.23	7	0.23
Oklahoma	3.00	10	0.30	0.01	2	0.01
Oregon	3.35	23	0.77	0.06	8	0.06
Pennsylvania	8.98	11	0.99	0.27	27	0.27
Rhode Island	1.20	15	0.18	0.05	26	0.05
South Carolina	5.00	10	0.50	0.07	15	0.07
South Dakota	0.80	10	0.08	0.01	11	0.01
Tennessee	5.80	10	0.58	0.05	9	0.05
Texas	14.47	11	1.59	0.22	14	0.22
Utah	1.50	13	0.20	0.00	2	0.00
Vermont	0.55	25	0.14	0.04	26	0.04
Virginia	7.60	24	1.82	0.06	3	0.06
Washington	5.71	33	1.88	0.18	10	0.18
West Virginia	1.70	10	0.17	0.00	0	0.00
Wisconsin	3.35	24	0.80	0.65	81	0.65
Wyoming	0.32	4	0.01	0.01	69	0.01
TOTAL	291.74	17	49	9.18	19	9.18

generation amount and percent of waste composted/recycled as reported to *BioCycle*. Column C multiplies the values in the first two columns to calculate the total amount of waste composted/recycled in each State. Column D shows the preliminary estimate as determined in Exhibit III-B.3. Column E divides the preliminary estimate (Column D) by the *BioCycle* estimate (Column C) to determine the percentage of the composting/recycling tonnage attributable to composting in each State.

This analysis indicates that the percentage of composting/recycling that is attributable to composting varies substantially from State to State. A large part of this variation may be due to the data limitations reflected in composting estimates for individual States. However, one of the States where composting accounts for a very high percentage of composting/recycling (i.e., more than 90 percent) is Pennsylvania, and the composting estimate for this State is based on reported State data.

The percent of composting/recycling tonnage attributable to composting is greater than 100 for just one State, New Hampshire. This indicates that the preliminary estimate of composting in New Hampshire (Exhibit III-B.3) accounts for more than 100 percent (in fact, more than 200 percent) of *BioCycle*'s estimate of recycling and composting combined. To correct this anomaly, and retain the national estimate of waste composting, the revised estimate for New Hampshire reduces the preliminary estimate by 0.15 million tons, and increases the preliminary estimate for the neighboring State of Maine by an equal amount. This adjustment also retains the regional estimate for composting in New England. The revised composting estimates for Maine and New Hampshire are shown in Column F. EPA chose 0.15 million tons because it was the smallest adjustment needed to bring New Hampshire within the range of observed values of Column E; EPA could have made a larger adjustment. EPA chose to assign this 0.15 million tons to Maine because, compared to the other States bordering New Hampshire, Maine had the lowest value in Column E; the adjustment could have been added, instead, to Massachusetts and/or Vermont. These revised estimates preserve the integrity of available reported data on regional composting markets, and minimize adjustments to individual State data, while reconciling an obvious inconsistency in State data estimates (i.e., composting exceeding the sum of composting and recycling in New Hampshire). These adjustments have no significant effect on the findings presented in this Report.

APPENDIX III-C

Technical Analysis: Recycling Segment

This appendix details the basis for estimating (1) the amount of waste managed by the recycling market segment in 1992 (40 million tons), (2) the amount of waste recycled in each State, and (3) the amount of waste recycled by each recycling market subsegment. This appendix corresponds to Section C of Chapter III.

C.1 STATE RECYCLING ESTIMATES BASED ON *BIOCYCLE*, GAA, AND STATE DATA

Exhibit III-C.1 presents a preliminary estimate of recycling in each state as well as the national total. This estimate relies primarily upon estimates calculated for the composting market segment in Appendix III-B. For example, Column A and Column B respectively list the amount of 1992 waste generated and the percentage of waste recycled/composted as reported by each state to *BioCycle*. Column C multiplies the first two columns to calculate the total amount of waste recycled/composted in each State. Column D lists the amount of waste composted as estimated in Appendix III-B, while Column E is the result of Column C minus Column D, or the State-specific recycling estimate. The sum of State-specific estimates for recycling (Column E) is approximately 40 million tons.

Exhibit III-C.2 provides a "reality check" on the preliminary recycling estimate by comparing the estimated amount of waste recycled to the amount of waste managed at in-State MRFs. Column A lists the amount of waste recycled/composted as reported by *BioCycle* and Column B lists the preliminary State-specific estimate as determined by Exhibit III-C.1. Column C lists the amount of recyclables processed at MRFs as found in the Government Advisory Associate's (GAA) *1992-93 Materials Recovery and Recycling Yearbook: Directory and Guide*. Column D shows the percentage of each State's preliminary estimate of recyclables that are processed at MRFs (i.e., Column C divided by Column B). For the nineteen States that do not have in-State MRFs, Column D reads "--." Exhibit III-C.2 lists States by U.S. Census Regions. The portion of recyclables processed at MRFs ranges from 7 percent in the Mid-West to 31 percent in the Northeast.

EXHIBIT III-C.1

Preliminary Estimate of Recycling for Each State

State	*BioCycle* 1992 Waste Generation (million tons) (A)	*BioCycle* % Recycled/ Composted (B)	Amount Recycled/ Composted (million tons) (C)=(A)*(B)	Compost Estimate (million tons) (D)	Recycling Estimate (million tons) (E)=(C)-(D)
Alabama	5.20	12%	0.62	0.04	0.59
Alaska	0.50	6%	0.03	0.00	0.03
Arizona	4.15	7%	0.29	0.01	0.28
Arkansas	2.15	10%	0.22	0.05	0.17
California	44.54	11%	4.90	0.58	4.32
Colorado	3.50	26%	0.91	0.01	0.90
Connecticut	2.90	19%	0.55	0.25	0.30
Delaware	0.79	16%	0.13	0.06	0.06
District of Columbia	0.92	30%	0.28	0.00	0.27
Florida	19.40	27%	5.24	0.96	4.28
Georgia	6.00	12%	0.72	0.26	0.46
Hawaii	1.30	4%	0.05	0.01	0.04
Idaho	0.85	10%	0.09	0.02	0.07
Illinois	14.14	11%	1.56	0.42	1.14
Indiana	8.40	8%	0.67	0.38	0.29
Iowa	2.09	23%	0.48	0.09	0.39
Kansas	2.40	5%	0.12	0.10	0.02
Kentucky	4.65	15%	0.70	0.08	0.62
Louisiana	3.48	10%	0.35	0.04	0.31
Maine	1.25	30%	0.37	0.21	0.16
Maryland	5.00	15%	0.75	0.02	0.73
Massachusetts	6.60	30%	1.98	0.78	1.20
Michigan	13.00	26%	3.38	0.59	2.79
Minnesota	4.27	38%	1.62	0.44	1.18
Mississippi	1.40	8%	0.11	0.02	0.09
Missouri	7.50	13%	0.98	0.15	0.83
Montana	0.74	5%	0.04	0.03	0.01
Nebraska	1.40	10%	0.14	0.04	0.10
Nevada	2.30	10%	0.23	0.00	0.23
New Hampshire	1.14	10%	0.11	0.08	0.03
New Jersey	7.51	34%	2.55	0.80	1.76
New Mexico	1.49	6%	0.09	0.00	0.09
New York	22.80	21%	4.79	0.47	4.32

EXHIBIT III-C.1 (continued)
Preliminary Estimate of Recycling for Each State

State	*BioCycle* 1992 Waste Generation (million tons) (A)	*BioCycle* % Recycled/ Composted (B)	Amount Recycled/ Composted (million tons) (C)=(A)*(B)	Compost Estimate (million tons) (D)	Recycling Estimate (million tons) (E)=(C)-(D)
North Carolina	7.79	4%	0.31	0.27	0.04
North Dakota	0.47	17%	0.08	0.01	0.06
Ohio	16.40	19%	3.12	0.23	2.89
Oklahoma	3.00	10%	0.30	0.01	0.29
Oregon	3.35	23%	0.77	0.06	0.71
Pennsylvania	8.98	11%	0.99	0.27	0.72
Rhode Island	1.20	15%	0.18	0.05	0.13
South Carolina	5.00	10%	0.50	0.07	0.43
South Dakota	0.80	10%	0.08	0.01	0.07
Tennessee	5.80	10%	0.58	0.05	0.53
Texas	14.47	11%	1.59	0.22	1.37
Utah	1.50	13%	0.20	0.00	0.19
Vermont	0.55	25%	0.14	0.04	0.10
Virginia	7.60	24%	1.82	0.06	1.77
Washington	5.71	33%	1.88	0.18	1.70
West Virginia	1.70	10%	0.17	0.00	0.17
Wisconsin	3.35	24%	0.80	0.65	0.16
Wyoming	0.32	4%	0.01	0.01	0.00
TOTAL[7]	**292.0**	**17%**	**49**	**9**	**40**

As Exhibit III-C.2 indicates, the percentage of recycled tonnage managed in MRFs is greater than 100 for three States: Connecticut (111 percent), Nevada (111 percent), and North Carolina (214 percent). These discrepancies most likely are explained by MRFs receiving recyclables from out of State. To correct this anomaly, and retain the preliminary national estimate of recycling, EPA "reallocated" to neighboring States some of the waste managed in MRFs in these three States. This reallocation, shown in Exhibit III-C.3, retains the regional estimates for recycling. In reallocating recycled tonnage, EPA selected the smallest amounts needed to bring the three States down to a range no greater than 90-99 percent for Column D. Tonnage was assigned to the bordering State with the lowest value for Column D (e.g.,

[7] Numbers may not add due to rounding errors.

EXHIBIT III-C.2

Regional- and State-Specific Recycling Estimates

State	*BioCycle* Amount Recycled/Composted (million tons) (A)	Preliminary Recycling Estimate (million tons) (B)	Recyclables Processed at MRFs (million tons) (C)	Percent of Tons Recycled at MRFs (D)=(C)/(B)
Northeast				
Connecticut	0.55	0.30	0.34	111.24%
Maine	0.37	0.16	0.00	0.08%
Massachusetts	1.98	1.20	0.17	14.25%
New Hampshire	0.11	0.03	0.02	59.29%
New Jersey	2.55	1.76	0.66	37.29%
New York	4.79	4.32	0.945	21.90%
Pennsylvania	0.99	0.72	0.49	67.52%
Rhode Island	0.18	0.13	0.08	62.17%
Vermont	0.14	0.10	0.02	15.77%
Region Total	11.67	8.73	2.715	31.1%
South				
Alabama	0.62	0.59	0.02	2.61%
Arkansas	0.22	0.17	--	--
Delaware	0.13	0.06	0.01	16.31%
District of Columbia	0.28	0.27	0.09	33.41%
Florida	5.24	4.28	0.43	10.16%
Georgia	0.72	0.46	0.11	24.96%
Kentucky	0.70	0.62	--	--
Louisiana	0.35	0.31	0.02	5.74%
Maryland	0.75	0.73	0.29	40.23%
Mississippi	0.11	0.09	--	--
North Carolina	0.31	0.04	0.09	214.20%
Oklahoma	0.30	0.29	--	--
South Carolina	0.50	0.43	0.02	4.69%
Tennessee	0.58	0.53	0.06	10.76%
Texas	1.59	1.37	0.04	3.04%
Virginia	1.82	1.77	0.06	3.55%
West Virginia	0.17	0.17	--	--
Region Total	14.38	12.18	1.25	10.22%

EXHIBIT III-C.2 (continued)
Regional- and State-Specific Recycling Estimates

State	*BioCycle* Amount Recycled/Composted (million tons) (A)	Preliminary Recycling Estimate (million tons) (B)	Recyclables Processed at MRFs (million tons) (C)	Percent of Tons Recycled at MRFs (D)=(C)/(B)
MidWest				
Illinois	1.56	1.14	0.28	24.24%
Indiana	0.67	0.29	--	--
Iowa	0.48	0.39	0.01	3.26%
Kansas	0.12	0.02	--	--
Michigan	3.38	2.79	0.14	5.05%
Minnesota	1.62	1.18	0.11	9.25%
Missouri	0.98	0.83	0.01	1.80%
Nebraska	0.14	0.10	--	--
North Dakota	0.08	0.06	--	--
Ohio	3.12	2.89	0.09	3.03%
South Dakota	0.08	0.07	--	--
Wisconsin	0.80	0.16	0.07	44.08%
Region Total	13.02	9.91	0.71	7.16%
West				
Alaska	0.03	0.03	--	--
Arizona	0.29	0.28	0.13	45.10%
California	4.90	4.32	0.49	11.3%
Colorado	0.91	0.90	--	--
Hawaii	0.05	0.04	--	--
Idaho	0.09	0.07	--	--
Montana	0.04	0.01	--	--
Nevada	0.23	0.23	0.25	**111.33%**
New Mexico	0.09	0.09	--	--
Oregon	0.77	0.71	--	--
Utah	0.20	0.19	--	--
Washington	1.88	1.70	0.14	8.04%
Wyoming	0.01	0.00	--	--
Region Total	9.48	8.57	1.0	11.7%
All States Total[8]	**49**	**40**	**5.7**	**14.3%**

[8] Numbers may not add due to rounding errors.

EXHIBIT III-C.3

Revised Regional- and State-Specific Recycling Estimates

State	*BioCycle* Amount Recycled/Composted (million tons) (A)	Preliminary Recycling Estimate (million tons) (B)	Recyclables Processed at MRFs (million tons) (C)	Percent of Tons Recycled at MRFs (million tons) (D)=(C)/(B)
Northeast				
Connecticut	0.55	0.30	0.30	98.94%
Maine	0.37	0.16	0.00	0.08%
Massachusetts	1.98	1.20	0.21	17.36%
New Hampshire	0.11	0.03	0.02	59.29%
New Jersey	2.55	1.76	0.66	37.29%
New York	4.79	4.32	0.945	21.9%
Pennsylvania	0.99	0.72	0.49	67.52%
Rhode Island	0.18	0.13	0.08	62.17%
Vermont	0.14	0.10	0.02	15.77%
Region Total	11.67	8.73	2.715	31.1%
South				
Alabama	0.62	0.59	0.02	2.61%
Arkansas	0.22	0.17	--	--
Delaware	0.13	0.06	0.01	16.31%
District of Columbia	0.28	0.27	0.09	33.41%
Florida	5.24	4.28	0.43	10.16%
Georgia	0.72	0.46	0.11	24.96%
Kentucky	0.70	0.62	--	--
Louisiana	0.35	0.31	0.02	5.74%
Maryland	0.75	0.73	0.29	40.23%
Mississippi	0.11	0.09	--	--
North Carolina	0.31	0.04	0.04	90.72%
Oklahoma	0.30	0.29	--	--
South Carolina	0.50	0.43	0.04	9.38%
Tennessee	0.58	0.53	0.06	10.76%
Texas	1.59	1.37	0.04	3.04%
Virginia	1.82	1.77	0.09	4.93%
West Virginia	0.17	0.17	--	--
Region Total	14.38	12.18	1.24	10.20%

EXHIBIT III-C.3 (continued)
Revised Regional- and State-Specific Recycling Estimates

State	*BioCycle* Amount Recycled/Composted (million tons) (A)	Preliminary Recycling Estimate (million tons) (B)	Recyclables Processed at MRFs (million tons) (C)	Percent of Tons Recycled at MRFs (million tons) (D)=(C)/(B)
MidWest				
Illinois	1.56	1.14	0.28	24.24%
Indiana	0.67	0.29	--	--
Iowa	0.48	0.39	0.01	3.26%
Kansas	0.12	0.02	--	--
Michigan	3.38	2.79	0.14	5.05%
Minnesota	1.62	1.18	0.11	9.25%
Missouri	0.98	0.83	0.01	1.80%
Nebraska	0.14	0.10	--	--
North Dakota	0.08	0.06	--	--
Ohio	3.12	2.89	0.09	3.03%
South Dakota	0.08	0.07	--	--
Wisconsin	0.80	0.16	0.07	44.08%
Region Total	13.02	9.91	0.71	7.16%
West				
Alaska	0.03	0.03	--	--
Arizona	0.29	0.28	0.16	**55.79%**
California	4.90	4.32	0.49	11.3%
Colorado	0.91	0.90	--	--
Hawaii	0.05	0.04	--	--
Idaho	0.09	0.07	--	--
Montana	0.04	0.01	--	--
Nevada	0.23	0.23	0.22	**98.12%**
New Mexico	0.09	0.09	--	--
Oregon	0.77	0.71	--	--
Utah	0.20	0.19	--	--
Washington	1.88	1.70	0.14	8.04%
Wyoming	0.01	0.00	--	--
Region Total	9.48	8.57	1.0	11.7%
All States Total[9]	**49**	**40**	**5.7**	**14.3%**

[9] Numbers may not add due to rounding errors.

Connecticut's tonnage was assigned to Massachusetts rather than Rhode Island or New York). These revised estimates preserve the integrity of available reported data on regional recycling markets, and minimize adjustments to individual State data, while reconciling inconsistencies in State data estimates (i.e, MRF recycling alone in a State exceeding total recycling in that State). These adjustments have no significant effect on the findings presented in this Report.

C.2 NATIONAL RECYCLING ESTIMATE BASED ON EPA AND INDUSTRY DATA

The previous section relied on *BioCycle*, GAA, and State data to develop preliminary national estimates of the amount of waste managed by the recycling market segment. This section reconciles those preliminary estimates with other national estimates of materials recovery. Exhibit III-C.4 lists estimates of 1992 materials recycled provided by various trade associations and EPA population-adjusted estimates from the *Characterization of Municipal Solid Waste in the United States: 1992 Update.* These trade association and EPA data also total 40 million tons of recycling.

EXHIBIT III-C.4
National Estimates of Material Recovery

MSW Material	Estimated MSW Recycled in 1992 million tons	Source of Estimate
Paper	29.1	American Forest and Paper Association (1993)
Glass	4.1	Glass Packaging Institute (1993)
Other Plastic/Glass	0.7	American Plastics Council (1993)
Aluminum Cans	1.1	Can Manufacturer Institute (1993)
Steel or Bi-Metal Cans	1.1	Steel Can Institute (1993)
Other Metal	1.6	EPA (1992)[10]
Other Material (Wood Pallets, Tires, Textiles, Batteries)	2.3	EPA (1992)[10]
All Materials	**40.00**	

[10] 1990 numbers reported in *1992 Characterization of Municipal Solid Waste* were adjusted to reflect population growth and increased recycling. In particular, recycling of certain materials (i.e., batteries, tires) has increased at a faster pace than other materials due to landfill bans and other disposal trends.

C.3 ALLOCATION OF RECYCLING ESTIMATE BY MARKET SUBSEGMENT

As discussed in Section C, the MSW recycling market consists of four subsegments:

- Independent paper recyclers, dealers, brokers, and processors;
- Various industry buy-back, drop-off, and local recycling centers;
- MRFs; and
- Mixed-waste processing facilities (MWPFs).

Estimates of Material Recovered by Independent Paper Recyclers, Dealers, and Brokers

The American Forest and Paper Association (AFPA) estimated that 33.6 million tons of paper and paperboard were recovered in 1992.[11] From this amount, EPA subtracted recovery estimates of pulp substitutes,[12] because these materials would not be counted in MSW, estimates of composted paper, and estimates of paper and paperboard processed at MRFs. The result, 25 million tons, is estimated to have been processed by independent paper recyclers, dealers, and brokers (so-called "paper packers"). In order to simplify the presentation of the recycling market and to avoid double counting recycled materials, EPA assumes that paper packing facilities process all paper not recovered at MRFs (or MWPFs). In reality, however, some amount of recycled paper and paperboard may be recovered by other recycling facilities.

Estimates of Material Recovered from Other Recycling Centers

EPA assumed that materials not managed at MRFs, MWPFs, or paper packing facilities were managed at drop-off, buy- back, or recycling centers. In general, these facilities receive source-separated recyclables from consumers. Again, to simplify the presentation of the recycling market, EPA assumed that all remaining materials (except paper) were processed at such facilities. Thus, EPA allocated 9 million tons of waste to these centers. This allocation methodology indicates the following:

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[11] *Recovered Paper Statistical Highlights 1992*, AFPA (April, 1993).

[12] *Recovered Paper Statistical Highlights 1992*, AFPA (April, 1993).

- Approximately one half of all mixed containers are managed at other recycling centers (including recovery in bottle bill States).
- The majority of used aluminum beverage cans appear to be recovered at the more than 10,000 industry buy-back centers throughout the nation. It is reasonable to assume that consumers are more likely to return this high-value recyclable, especially given the number of can drives to raise funds for community and other organizations.
- Other recycling centers receive all other materials not commonly received at MRFs - other plastics, metals, textiles, tires, batteries, and wood pallets.

Overall, EPA's estimate of this market subsegment is consistent with other available data sources. For example, *BioCycle* reports that States estimated 1,015 facilities processing recyclables in 1992 - including MRFs, mixed waste processing facilities, and other recycling centers.[13] Removing EPA's estimate of MRFs and MWPFs (see below) from this figure leaves 794 other facilities processing recyclables. These other facilities are likely to be small, local processing facilities with much lower throughput than high-tech MRFs.

Estimates of Material Recovered at MRFs

GAA's *1992-93 Materials Recovery and Recycling Yearbook: Directory and Guide* provides data (e.g., throughput, costs, capacities) on MRFs located nationwide. MRFs expected to be in operation in 1992 managed approximately 5.7 million tons of material annually. This amount does not include compostable waste or C&D waste, both of which are rarely processed at MRFs included in GAA's *Yearbook*. Specific material tonnages are as follows:

- Paper accounted for 3.4 million tons, or 60 percent of all materials;
- Mixed containers (and any separate glass and plastic container estimates) accounted for a little more than 1.7 million tons, or approximately 30 percent of the total;
- Steel/bi-metal cans accounted for approximately 225,000 tons, or about 4 percent of the total; and
- Aluminum cans represented about 56,000 tons, less than one percent of the total.

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[13] Robert Steuteville and Nora Goldstein, "The State of Garbage - 1993 Nationwide Survey," *BioCycle*, May 1993, page 49.

In addition, other materials (e.g., oil, other commercial) represented less than 4 percent of the total.

Estimates of Material Recovered by MWPFs

EPA relied upon data reported for MWPFs in existence in 1992 or planning to begin operations in 1992, as reported in the GAA *Yearbook*. The GAA *Yearbook* provided capacity and estimated material throughput for 21 such facilities. In sum, these facilities processed approximately 0.3 million tons of waste, excluding residuals. Because most facilities did not report the distribution of material types, EPA allocated the materials in the same percentages as reported by other recycling facilities.

C.4 RECYCLING NON-MSW

As discussed in Appendix III-A, some States include non-MSW (e.g., C&D waste) amounts in their estimates of MSW generation to *BioCycle*. However, comparing the latest EPA combined estimate of recycling and composting (33 million tons in 1990) to *BioCycle*'s combined estimate (35 million tons in 1990) suggests that non-MSW composting and recycling at MSW facilities is negligible. (The difference could be rounding errors or minor differences in estimation methodologies, for example.) EPA assumed this was the case in 1992.

C.5 MRFs AND FLOW CONTROL

Using data from the GAA *Yearbook*, Exhibit III-C.5 presents the total number of MRF facilities expected to be operating in 1992 and their respective throughput supported by flow controls, by contractual arrangements, by neither, or for which data were unavailable. The exhibit shows that 13 percent of total MRFs in 1992, with 19 percent of the total throughput, were supported by flow controls.

EXHIBIT III-C.5

Use of Flow Controls by Materials Recovery Facilities (MRFs) in 1992

	#	%	Throughput	%
Flow Control	26	13%	1,081,587	19%
Contract	82	41%	2,491,170	44%
Neither	79	40%	2,034,156	36%
N/A	11	6%	97,068	2%
Total	198		5,703,981	

Exhibit III-C.6 shows the respective use of flow controls by high-technology and low-technology MRFs. As shown, a much higher percentage (i.e., 32 percent) of the throughput of high-technology MRFs is supported by flow controls than is the case for low-technology MRFs (i.e., 7 percent of throughput). In fact, the majority of low-technology MRFs for which data are available use neither flow controls nor contractual guarantees.

EXHIBIT III-C.6

Use of Flow Controls by High-Technology and Low-Technology Materials Recovery Facilities (MRFs) in 1992

	High-Technology MRFs			Low-Technology MRFs		
	#	Throughput	%	#	Throughput	%
Flow Control	17	890,426	32%	9	191,161	7%
Contract	29	1,414,590	50%	53	1,076,580	37%
Neither	14	492,868	18%	65	1,540,288	53%
N/A	1	20,222	1%	10	76,864	3%
Total	61	2,819,106		137	2,884,893	

The difference in use of flow controls by high-technology and low-technology MRFs reflects the greater capital costs of the former ($4.8 million on average) compared to the latter

($1.9 million on average). Exhibit III-C.7 shows available capital cost data for both high-technology and low-technology MRFs, distinguished by use of flow controls, contracts, neither, or for which such data was not reported. As shown, those facilities making use of flow controls have higher capital costs on average than facilities not supported by flow controls; this is true for both high- and low-technology MRFs.

EXHIBIT III-C.7

Capital Costs and Use of Flow Controls by Materials Recovery Facilities (MRFs) in 1992

	High-Technology MRFs		Low-Technology MRFs	
	#	Average Capital Costs	#	Average Capital Cost
Flow Control	13	$6,788,462	8	$3,256,250
Contract	26	4,605,769	46	1,255,602
Neither	9	2,474,444	36	2,035,889
N/A	0	0	4	2,022,500
Total	48	4,797,292	86	1,920,810

Note: Only 134 of the 198 MRFs reported capital costs; of these 134, all but 4 provided data on use of waste guarantees (e.g., flow controls). Only 21 of the 26 MRFs supported by flow controls reported capital cost information.

Exhibit III-C.8 presents data on the ownership of the 198 MRFs and their use of waste guarantees. The percentage use of flow controls by privately owned and operated MRFs is much less -- in terms of facilities (8.8 percent) and throughput (14.6 percent) -- than for MRFs that are publicly owned (25 percent and 42.5 percent, respectively). Use of flow controls among the publicly-owned/privately-operated category, which has the highest ratio of high-technology to low-technology MRFs, falls in between the privately and publicly owned categories of MRFs.

Exhibit III-C.9 focuses on the Northeast region where 86 of the 198 MRFs (i.e., 43 percent) are located, having a total throughput of 2,739,154 tons (48 percent of national MRF throughput). As shown, 20 MRFs in the Northeast are supported by flow controls, which constitute 77 percent of the 26 MRFs nationwide that are reported using flow controls. The

EXHIBIT III-C.8

Materials Recovery Facilities Ownership and Use of Flow Control

	Privately Owned and Operated		Publicly Owned/Privately Operated		Publicly Owned and Operated	
	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)
Facility Type						
High-Tech	38	1,664,617	17	986,011	6	168,478
Low-Tech	98	2,286,338	17	400,649	22	197,888
Total	136	3,950,955	34	1,386,660	28	366,366
Flow Control	12	575,353	7	350,616	7	155,618
	(8.8%)	(14.6%)	(20.6%)	(25.3%)	(25%)	(42.5%)
Contract	53	1,531,210	20	881,802	9	78,158
Neither	61	1,747,323	6	154,242	12	132,591
N/A	10	97,068	1	0	0	0
Total	136	3,950,955	34	1,386,660	28	366,366

EXHIBIT III-C.9

Use of Flow Controls by Materials Recovery Facilities in the Northeast (n = 86 of 198)

	High-Technology		Low-Technology		Total	
	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)
Flow Control	13	764,680	7	163,661	20	928,341
Contract	19	795,716	17	334,991	36	1,130,707
Neither	8	321,451	21	338,433	29	659,884
N/A	1	20,222	0	0	1	20,222
Total	41	1,902,069	45	837,085	86	2,739,154

throughput of 928,341 tons under flow control in the Northeast equals 86 percent of the total MRF throughput nationwide that is supported by flow controls (i.e., 928,341 is 86 percent of 1,081,587).

Exhibit III-C.10 shows comparable data for the 24 MRFs planned to be operational after 1992. The bulk of the additional capacity is expected to come from high-technology MRFs, with significant support from flow controls. One quarter of the facilities did not report throughput data.

EXHIBIT III-C.10

Use of Flow Controls by 24 Materials Recovery Facilities Planned to be Operational After 1992[1]

	High-Technology		Low-Technology		Total	
	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)	# Facilities	Throughput (tons)
Flow Control	6	255,000	1	38,500	7	293,500
Contract	4	462,000	2	50,000[2]	6	512,000[3]
Neither	1	180,000	1	50,000	2	230,000
N/A	6	521,050[4]	3	0	9	521,050[5]
Total	17	1,418,050[6]	7	138,500[7]	24	1,556,550[8]

1 Planned start-up dates: 1993 (18 facilities), 1994 (5 facilities), and 1995 (1 facility).

2 Only one facility reporting throughput.

3 Only 5 facilities reporting throughput.

4 Only 4 facilities reporting throughput.

5 Only 4 facilities reporting throughput.

6 Fifteen (15) facilities reporting throughput.

7 Only 3 facilities reporting throughput.

8 Eighteen (18) facilities reporting throughput.

APPENDIX III-D

Technical Analysis: WTE Segment

This appendix summarizes data used in the analysis of the waste-to-energy market segment, Section D of Chapter III. The primary sources of information were the surveys of WTE facilities prepared by Government Advisory Associates, Inc., entitled *Resource Recovery Yearbook: Directory & Guide*. The latest edition (1993-94) includes detailed data on all WTE facilities in the United States, whether they are operating, planned, or shutdown either temporarily or permanently for 1992. The type of data collected for each facility includes: technical specifications, fuel/energy recovery, recycling and materials recovery, institutional arrangements, operating history, capital costs, operation and maintenance costs (O&M), and tipping fees. The GAA *Yearbook* also includes narrative providing summary information on the WTE facilities. Although some of this narrative was useful in preparing the WTE analysis, it did not always reflect all of the detailed data required for this analysis. For example, the GAA *Yearbook* divides WTE facilities into regions and market subsegments based on number of facilities and not by throughput. Moreover, it is not clear whether the GAA *Yearbook* uses weighted averages to determine average facility capital and O&M costs and tipping fees. To overcome these limitations, EPA used the detailed data on each facility (presented as appendices to GAA surveys) to sort facilities based on several parameters and to develop weighted averages for costs and tipping fees. The following exhibits present the results of this data analysis.

Exhibit III-D.1 lists the number of WTE facilities by State and notes whether they are existing, advanced planned/under construction, or conceptually planned. In sum, 145 facilities were in existence in 1992 (including 10 that were not operating or were temporarily shut down), 26 were advanced planned (including five that were under construction), and 27 were conceptually planned.

Exhibit III-D.2 lists, for each State, the amount of 1992 throughput attributed to each of the three market subsegments, mass burn, modular, and RDF, comprising the 135 operating WTE facilities in 1992. The States are organized into four regions for comparison with the other market segments. Exhibit III-D.3 lists for the 135 operating WTE facilities, for each State, the amount of 1992 throughput that is guaranteed by flow control, contractual arrangements, or not guaranteed at all. Exhibit III-D.4 presents data on use of flow control, contracts, or neither by WTE ownership for the 135 operating WTE facilities. Finally, Exhibit III-D.5 presents summary

EXHIBIT III-D.1

Location of Existing Facilities by State in 1992

State	E[1]	AP/UC[2]	CP[3]	Total	State	E[1]	AP/UC[2]	CP[3]	Total
AL	2			2	MT	1			1
AK	3			3	NE				--
AZ				--	NV		1		1
AR	2			2	NH	3			3
CA	5		1	6	NJ	5	3		8
CO				--	NM				--
CT	7	1		8	NY	16	3	4	23
DE	2		1	3	NC	2	1	2	5
FL	14	1		15	ND				--
GA	1		2	3	OH	3	1	1	5
HI	1			1	OK	2			2
ID				--	OR	1			1
IL	1	3	1	5	PA	6	4		10
IN	1	1	1	3	RI		2	1	3
IA	2			2	SC	2		1	3
KS				--	SD				--
KY			1	1	TN	4			4
LA				--	TX	5			5
ME	4			4	UT	1			1
MD	3	1	1	5	VT	1			1
MA	8	2		10	VA	8	1	3	12
MI	3		4	7	WA	5	1		6
MN	14		1	15	WV				--
MS	1			1	WI	6			6
MO			1	1	WY				--

[1] Existing facilities (i.e., in operation, start-up, and temporarily shutdown). (N=145)
[2] Advanced planned/under construction. (N=26)
[3] Conceptually planned. Puerto Rico has one facility in this stage that is not listed here. (N=27)

EXHIBIT III-D.2

1992 Throughput of 135 Operating Facilities by Market Subsegment, State, and Region

Region	State	Mass Burn	Modular	RDF	Total
Northeast	Connecticut	1,229,501	165,092	613,508	2,008,101
	Delaware			230,000	230,000
	Maine	229,220		445,000	674,220
	Maryland	717,773	120,269		838,042
	Massachusetts	1,870,260	190,239	872,338	2,932,837
	New Hampshire	251,850	39,420		291,270
	New Jersey	1,536,534	14,200		1,550,734
	New York	2,710,583	195,980	911,000	3,817,563
	Pennsylvania	2,157,798	12,000		2,169,798
	Region Total	**10,703,519**	**737,200**	**3,071,846**	**14,512,565**
	Region Percent of National Total	**52.7%**	**48.4%**	**35.1%**	**46.7%**
South	Alabama	193,925	89,422		283,347
	Arkansas		37,520		37,520
	Florida	3,603,713	51,254	1,795,000	5,449,967
	Georgia	175,200			175,200
	Mississippi		35,910		35,910
	North Carolina	71,193	102,546		173,739
	South Carolina	224,012	71,971		295,983
	Tennessee	374,221	15,752	3,900	393,873
	Texas		42,152		42,152
	Virginia	1,519,306	46,395	476,705	2,051,506
	Region Total	**6,161,570**	**492,922**	**2,275,605**	**8,930,097**
	Region Percent of National Total	**30.0%**	**32.4%**	**25.3%**	**28.7%**

EXHIBIT III-D.2 (continued)

1992 Throughput of 135 Operating Facilities by Market Subsegment, State, and Region

Region	State	Mass Burn	Modular	RDF	Total
Midwest	Illinois	355,000			355,000
	Indiana	675,048			675,048
	Iowa			63,300	63,300
	Michigan	257,325		750,000	1,007,325
	Minnesota	423,619	159,936	1,050,500	1,634,055
	Ohio	93,074		853,649	946,723
	Wisconsin		61,905	124,500	186,405
	Region Total	**1,804,066**	**221,841**	**2,841,949**	**4,867,856**
	Region Percent of National Total	**8.8%**	**14.6%**	**31.6%**	**15.7%**
West	Alaska	7,174	168	9,000	16,342
	California	898,514			898,514
	Hawaii			600,000	600,000
	Montana		19,500		19,500
	Oklahoma	349,442	15,865		365,307
	Oregon	189,107			189,107
	Utah	115,048			115,048
	Washington	340,567	35,000	205,000	580,567
	Region Total	**1,399,852**	**70,533**	**814,000**	**2,784,385**
	Region Percent of National Total	**9.2%**	**4.6%**	**9.0%**	**9.0%**
GRAND TOTAL*		**20,569,004**	**1,522,497**	**9,003,400**	**31,094,901**

* Column totals may not add up exactly due to rounding errors.

EXHIBIT III-D.3

1992 Throughput of 135 Operating Facilities by Type of Waste Guarantee

Region	State	Total Throughput	Guaranteed by Flow Control	Percent of Total	Guaranteed by Contract	Percent of Total	No Guarantee	Percent of Total
Northeast	Connecticut	2,008,101	1,187,400	59.1	820,700	40.9	0	0.0
	Delaware	230,000	230,000	100.0	0	0.0	0	0.0
	Maine	674,220	64,240	9.5	609,980	90.5	0	0.0
	Maryland	838,042	0	0.0	717,773	85.6	120,269	14.4
	Massachusetts	2,932,837	0	0.0	2,932,837	100.0	0	0.0
	New Hampshire	291,270	39,420	13.5	251,850	86.5	0	0.0
	New Jersey	1,550,734	1,359,610	87.7	176,925	11.4	14,200	0.9
	New York	3,817,563	1,871,083	49.0	1,658,280	43.4	288,200	7.5
	Pennsylvania	2,169,798	2,157,798	99.4	12,000	0.6	0	0.0
	Region Total	**14,512,565**	**6,909,551**	**47.6**	**7,180,345**	**49.5**	**422,669**	**3.4**
South	Alabama	283,347	193,925	68.4	0	0.0	89,422	31.6
	Arkansas	37,520	0	0.0	0	0.0	37,520	100.0
	Florida	5,449,967	4,121,073	75.6	166,022	3.0	1,162,872	21.3
	Georgia	175,200	175,200	100.0	0	0.0	0	0.0
	Mississippi	35,910	0	0.0	35,910	100.0	0	0.0
	North Carolina	173,739	173,739	100.0	0	0.0	0	0.0
	South Carolina	295,983	0	0.0	295,983	100.0	0	0.0
	Tennessee	393,873	378,121	96.0	0	0.0	15,752	4.0
	Texas	42,152	0	0.0	0	0.0	42,152	100.0
	Virginia	2,042,406	1,899,439	93.0	0	0.0	142,968	7.0
	Region Total	**8,930,097**	**6,941,497**	**77.7**	**497,915**	**5.6**	**1,490,686**	**16.7**

EXHIBIT III-D.3 (continued)

1992 Throughput of 135 Operating Facilities by Type of Waste Guarantee

Region	State	Total Throughput	Guaranteed by Flow Control	Percent of Total	Guaranteed by Contract	Percent of Total	No Guarantee	Percent of Total
Midwest	Illinois	355,000	0	0.0	0	0.0	355,000	100.0
	Indiana	675,048	675,048	100.0	0	0.0	0	0.0
	Iowa	63,300	0	0.0	20,800	32.9	42,500	67.1
	Michigan	1,007,325	257,325	25.5	750,000	74.5	0	0.0
	Minnesota	1,634,055	883,619	54.1	668,625	40.9	81,812	5.0
	Ohio	946,723	308,074	32.5	0	0.0	638,649	67.5
	Wisconsin	186,405	154,897	83.3	0	0.0	31,508	16.7
	Region Total	**4,867,856**	**2,278,963**	**46.8**	**1,439,425**	**29.6**	**1,149,469**	**23.6**
West	Alaska	16,342	168	1.0	0	0.0	16,174	99.0
	California	898,514	406,097	45.2	492,417	54.8	0	0.0
	Hawaii	600,000	600,000	100.0	0	0.0	0	0.0
	Montana	19,500	0	0.0	0	0.0	19,500	100.0
	Oklahoma	365,307	349,442	95.7	0	0.0	15,865	4.3
	Oregon	189,107	189,107	100.0	0	0.0	0	0.0
	Utah	115,048	115,048	100.0	0	0.0	0	0.0
	Washington	580,567	340,567	58.7	35,000	6.0	205,000	35.3
	Region Total	**2,784,385**	**2,000,429**	**71.8**	**527,417**	**18.9**	**256,539**	**9.2**
GRAND TOTAL*		**31,094,901**	**18,129,988**	**58.3**	**9,645,551**	**31.0**	**3,319,362**	**10.7**

* Column totals may not add up exactly due to rounding errors.

EXHIBIT III-D.4

Waste-to-Energy Ownership and Use of Flow Controls

	Flow Control		Contract		Neither		Total	
	#	Total Throughput (average)	#	Total Throughput (average)	#	Total Throughput (average)	#	Total Throughput (average)
Privately Owned and Operated	23	8,843,776 (384,512)	27	7,083,744 (262,361)	8	430,364 (53,796)	58	16,357,884 (282,032)
Privately Operated/ Publicly Owned	23	6,929,624 (301,288)	6	2,122,423 (353,737)	5	1,000,114 (200,023)	34	10,052,161 (295,652)
Publicly Owned and Operated	15	2,356,588 (157,106)	7	439,385 (62,769)	21	1,888,884 (89,947)	43	4,684,857 (108,950)
Total	61	18,129,988 (297,213)	40	9,645,551 (241,139)	34	3,319,362 (97,628)	135	31,094,901 (230,333)

EXHIBIT III-D.5
Throughput Projections for 1995 and 2000

Status	1995	2000
Throughput of Existing, Operational Facilities in 1992 (n=135)	31,094,901	31,094,901
Throughput of Existing Facilities Temporarily Shutdown in 1992 (n=10)[14]	627,542	627,542
Throughput of Facilities Currently Under Construction (n=5)	1,308,310 (n=4)	1,603,310 (n=5)
Throughput of Facilities Currently Advanced Planned (n=21)	618,466 (n=3)	6,526,441 (n=21)
PROJECTED THROUGHPUT	33,649,219	39,852,194

[14] Six facilities were expected to start up by 1995, while the start up dates for the other four were listed as "unknown." This exhibit assumes that all ten facilities will start up by 1995.

data used to develop projections of WTE throughput for the years 1995 and 2000. For these exhibits, row and column totals may not always add up precisely, due to rounding.

Exhibit III-D.6 presents data on capital costs of WTEs operational in 1992. Mass burn and RDF facilities entail very high capital costs, $87 million and $80.9 million on average, respectively; median capital costs are somewhat lower, particularly for RDFs, which include smaller facilities that only produce RDF as well as larger facilities that both produce and combust RDF. Modular facilities entail capital costs an order of magnitude smaller, on average.

EXHIBIT III-D.6

Capital Costs of Waste-to-Energy Facilities Operational in 1992

Facility Type	# Facilities	Total Throughput (tons)	Capital Cost/Facility	
			Average (millions)	Median (millions)
Mass Burn	65	20,569,004	$87.0	$70.0
RDF	32	9,003,400	$80.9	$51.5
Modular	38	1,522,497	$8.3	$5.7
	135	31,094,901		

Exhibit III-D.7 and III-D.8 present comparable data for two subsets of WTEs: (1) those supported by flow controls and (2) those supported by neither flow controls nor contracts, respectively. The 61 WTEs supported by flow controls have higher mean and median capital costs, regardless of facility type. The 34 WTEs supported by neither flow controls nor contracts have lower mean and median capital costs, with the exception of RDF mean capital costs. As noted above, there are two very different configurations of RDF facilities that can skew the statistics, given the small number of RDFs involved (i.e., 8). These exhibits confirm an association between magnitude of WTE capital costs and use of flow controls.

EXHIBIT III-D.7

Capital Costs of Waste-to-Energy Facilities Operational in 1992 and Supported by Flow Controls

Facility Type	# Facilities	% Facilities with Flow Controls	Total Throughput (tons)	% Throughput of Facility Type	Capital Cost/Facility	
					Average (millions)	Median (millions)
Mass Burn	44	67.7	14,365,752	69.9	$90.6	$78.0
RDF	11	34.4	3,426,933	38.1	$81.9	$54.5
Modular	6	15.8	337,623	22.2	$12.6	$7.8
			18,129,988			

EXHIBIT III-D.8

Capital Costs of Waste-to-Energy Facilities Operational in 1992 and Supported Neither by Flow Controls Nor Contracts

Facility Type	# Facilities	% Facilities with Flow Controls	Total Throughput (tons)	% Throughput of Facility Type	Capital Cost/Facility	
					Average (millions)	Median (millions)
Mass Burn	6	9.2	826,886	4.0	$13.8	$7.7
RDF	8	25.0	1,901,149	21.1	$92.7	$44.0
Modular	20	52.6	591,327	38.8	$5.3	$3.0

Exhibit III-D.9 shows that the types of waste guarantees, if any, associated with WTEs differ across the three different types of WTE facilities. Most mass burn facilities are supported by flow controls; most RDF facilities rely on either flow controls or contracts; most modular facilities are not supported by flow controls, instead they operate either with contracts or no form of waste guarantee.

EXHIBIT III-D.9

Use of Waste Guarantees by Type of Waste-to-Energy Facility Operational in 1992

Facility Type	Waste Guarantees								
	Flow Controls			Contracts			Neither		
	# Facilities	Through-put	% Total	# Facilities	Through-put	% Total	# Facilities	Through-put	% Total
Mass Burn	44	14,365,752	69.9	15	5,376,367	26.1	6	826,886	4.0
RDF	11	3,426,933	38.1	13	3,645,638	40.8	8	1,901,199	21.1
Modular	6	337,623	22.2	12	593,547	39.0	20	591,327	38.8
Total	61	18,129,988	58.0	40	9,645,551	31.0	34	3,319,362	11.0

APPENDIX III-E

Technical Analysis: Landfill Segment

This appendix summarizes data used in preparing Section E of Chapter III. The estimated amount of waste landfilled in 1992, 211 million tons, is derived by subtracting the amount of waste managed in the other market segments from *BioCycle's* estimate of 292 million tons. For example, the composting market segment managed 9 million tons, the recycling segment 40 million tons, and the WTE segment 32 million tons.[15] Subtracting 81 million tons from 292 million leaves approximately 211 million tons as managed in landfills.

Exhibit III-E.1 presents remaining landfill capacity in years for 21 States reporting this information to *BioCycle* for 1990 and 1992. The average estimated remaining capacities (9.5 in 1990 and 15.9 in 1993) is the mean of the 21 State sample. For States that reported a range estimate, EPA used the mid-point of that range. Exhibit III-E.1 includes a third column noting the percentage change in recycling/composting rates over this same time period; States with major increases in recycling/composting (e.g., Alabama, New Mexico, Oklahoma, Pennsylvania, South Carolina, and South Dakota) generally showed marked increases in remaining landfill capacity, while States with less remaining landfill capacity during this period (e.g., Delaware, Indiana, Ohio) tended to have lower rates of increase in recycling/composting.

Exhibit III-E.2 compares the capacity of large landfills in 14 States with the amount of waste disposed in these States annually. Fourteen (14) States provided information on the total tonnage disposed annually in landfills. We derived in-state large landfill (i.e., greater than 500 tons per day) capacity estimates from ranges of capacity reported in the *Solid Waste Price Index* (November, 1992). For the purposes of this analysis, we used average values of the ranges. We used 750 tons per day as an average value for the range of 500 to 1000 tons per day, and used 1250 tons per day as an average value for landfills with 1000 tons per day or greater capacity. This exhibit illustrates that large private landfills provide enough capacity to meet between 23 and 62 percent of the 14 State sample's annual disposal needs. The total annual capacity for large landfills (i.e., greater than 500 tons per day) in this 14 State sample is equal to 41 percent of the total amount disposed.

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[15] The WTE segment includes one million tons managed by incinerators without energy recovery.

EXHIBIT III-E.1

Remaining State Landfill Capacity

State	Years of Remaining Capacity (1990)	Years of Remaining Capacity (1993)	Percentage Change in Recycling/ Composting Rate
Alabama	4	9	200
Delaware	20+	20	45
Georgia	3-4	9	20
Hawaii	5	10	175
Indiana	7	5	60
Iowa	10	10	60
Kentucky	3	14	50
Maryland	7	10	130
Minnesota	5-10	9	86
Missouri	9	8	80
New Mexico	2-5	50	700
New York	9	9	53
Ohio	8-10	8	122
Oklahoma	12-15	30	400
Oregon	20+	23	8
Pennsylvania	5+	15	260
Rhode Island	4	15	11
South Carolina	10	10	275
South Dakota	10-15	25	900
Texas	15	20	50
Utah	20	25	30
Average Estimated Remaining Capacity	**9.5**	**15.9**	

Source: Jim Glenn and David Riggle, "The State of Garbage," Biocycle, April 1991; Robert Steuteville, "The State of Garbage," Biocycle, April 1994.

EXHIBIT III-E.2

Large Facility Capacity Compared to Total Waste Disposed in 1992 (million tons)

State	Tons Disposed in Landfill Annually	Annual Ton Capacity of Large Landfills
Arkansas	2.2	.8
Florida	9.7	5.9
Illinois	12.3	5.8
Indiana	8.3	3.4
Minnesota	1.3	.8
New Jersey	2.9	1.8
New York	11.9	3.0
Nebraska	1.3	.5
Nevada	2.2	.5
North Carolina	6.7	2.0
Ohio	12.5	4.7
Texas	21.7	9.2
Utah	1.8	.5
Washington	3.9	1.3
Total	98.7	40.2

Sources: State reports, and Solid Waste Price Index, November 1992.

Extrapolating this sample to the nation suggests that large landfills, both public and private, account for 41 percent of all landfill capacity.

Correspondingly, Exhibit III-E.3 provides an overview of the largest private companies in the landfill segment, including the number of landfills they own and operate, the median ton per day capacity of these landfills, and total annual tons per year capacity of the firms. The total annual capacity of these firms is equal to 64.7 million tons. This capacity represents approximately 31 percent of our prior estimate of 211 million tons for the entire landfill market segment. By subtracting the 31 percent from the 41 percent of the total landfill market segment that large landfills represent (obtained in Exhibit III-E.2), we can estimate that the remaining 10 percent of the large landfill segment is comprised of large government landfills. (Note that 58 percent of the **total** landfill segment must be attributed to small landfills.)

EXHIBIT III-E.3

Overview of Largest Companies in Landfill Market

Firm	Number of Landfills in 1992	Median TPD Capacity	Total TPY Capacity (millions)[16]
Waste Management	133[1]	750	25.9
Browning-Ferris	99	750	19.3
Laidlaw	26	750	5.1
Mid-American[a]	21[2]	750	4.1
Chambers[a]	15[3]	750	2.9
Western[a]	4	750	0.8
Attwoods	1	750	0.2
Sanifill[a]	14	375	1.4
Republic	8	750	1.6
Eastern	2	750	0.4
USA Waste	6	750	1.2
American	3	375	0.3
Norcal[a]	16	350	1.5
Total	348	NA	64.70

Notes:
1. Thirteen sites opened or acquired in 1992.
2. Two MSW landfill projects under development.
3. One landfill under construction.
4. A fifth landfill for non-hazardous industrial wastes exists.

a. Company also operates other non-MSW landfills (e.g., C&D, industrial, dry waste, and special waste landfills.)

[16] Total TPY capacity equals the number of landfills multiplied by median capacity times 260 operating days per year.