

United States
Environmental Protection
Agency

Office Of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

EPA-452/D-00-005 ✓
September 2000

Air



Economic Impact Analysis for the Proposed Municipal Solid Waste Landfills



U.S. Environmental Protection Agency
Region 5, Library (PL-12J)
77 West Jackson Boulevard, 12th Floor
Chicago, IL 60604-3590

This report has been reviewed by the Emission Standards Division of the Office of Air Quality Planning and Standards of the United States Environmental Protection Agency and approved for publication. Mention of trade names or commercial products is not intended to constitute endorsement or recommendation for use. Copies of this report are available through the Library Services (MD-35), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, or from the National Technical Information Services 5285 Port Royal Road, Springfield, VA 22161.

U.S. Environmental Protection Agency
Region 5, Library (PL-12J)
77 West Jackson Boulevard, 12th Floor
Chicago, IL 60604-3590

Doc # 47522531

Abbreviations and Acronyms Used in This Report

CAA	Clean Air Act
CBI	Confidential Business Information
CEM	continuous emissions monitoring
CFR	Code of Federal Regulations
CMS	continuous monitoring system
EIA	Economic Impact Analysis
EPA	Environmental Protection Agency
EG	emission guidelines
FR	Federal Register
HAPs	hazardous air pollutants
ICR	Information Collection Request
kg/year	kilograms per year
MACT	maximum achievable control technology
mg/dscm	milligrams per dry standard cubic meter
Mg/year	megagrams per year
MSW	municipal solid waste
NAICS	North American Industrial Classification System
NESHAP	national emission standards for hazardous air pollutants
ng/dscm	nanograms per dry standard cubic meter
NMOC	nonmethane organic compounds
NSPS	new source performance standards
OAQPS	Office of Air Quality Planning and Standards
OMB	Office of Management and Budget
PMACT	presumptive maximum achievable control technology
ppmv	parts per million by volume
Pub. L.	Public Law
RCRA	Resource Conservation and Recovery Act
RFA	Regulatory Flexibility Act
SBREFA	Small Business Regulatory Enforcement Fairness Act
SIC	Standard Industrial Classification
SSM	startup, shutdown, and malfunction
TTN	Technology Transfer Network
UMRA	Unfunded Mandates Reform Act
U.S.C.	United States Code
VOC	volatile organic compounds

ECONOMIC IMPACT ANALYSIS: MUNICIPAL SOLID WASTE LANDFILLS

1. INTRODUCTION

This report presents the economic impacts associated with the proposed national emission standards for hazardous air pollutants (NESHAP) for municipal solid waste (MSW) landfills. These standards are scheduled to be proposed in the summer of 2000. These proposed standards are applicable to all major and some area sources. Hazardous air pollutants (HAP) emitted by MSW landfills include but are not limited to vinyl chloride, ethyl benzene, toluene, and benzene. Exposure to these and other HAP can cause adverse health effects including cancer. Possible noncancer health effects include respiratory and skin irritation; severe allergic reaction; effects upon the eyes; various systemic effects including effects upon the liver, kidney, lung, cardiovascular system, and blood; neurotoxic effects; and, in extreme cases, death. This proposed NESHAP contains the same requirements as the emission guidelines and new source performance standards (EG/NSPS), 40 CFR part 60, subparts Cc and WWW. In addition to the requirements of the EG/NSPS, this NESHAP adds startup, shutdown, and malfunction requirements, operating condition violations for out-of-bounds monitoring parameters, and it changes the reporting frequency for one type of report.

These proposed standards fulfill the requirements of section 112(d) of the Clean Air Act (CAA), which requires the Administrator to regulate emissions of HAP listed in section 112(b) and in the Urban Air Toxics Strategy required to be developed under section 112(k) of the CAA.

1.1 Regulated Industries and Entities

Entities potentially regulated by this action are MSW landfills located at major and area sources. Regulated industries and entities include the following North American Industrial Classification System (NAICS) and Standard Industrial Classification System (SIC) codes:

Category	NAICS Code	SIC Code	Examples of potentially regulated entities
Industry: Air and water resource and solid waste management	924110	9511	Solid waste landfills
Industry: Refuse systems - solid waste landfills	562212	4953	Solid waste landfills

State, local, and Tribal government agencies	562212 924110	4953	Solid waste landfills; Air and water resource and solid waste management
---	------------------	------	---

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in this table could also be affected. More detail about the regulated industries affected by this proposed rule are in Chapter 2 of this report, which contains the profile of affected entities.

1.2 Background Information

These proposed standards enhance 40 CFR part 60, subparts Cc and WWW and continue to ensure the reduction of HAP emissions from MSW landfills. These proposed standards have the same applicability as the emission guidelines and new source performance standards (EG/NSPS) and require that the provisions of the EG/NSPS are met. The enhancements are the provisions for a startup, shutdown, and malfunction (SSM) plan and the associated records and reports, and operating condition violations for out-of-range monitoring parameters. Finally, one type of annual report required by the EG/NSPS is required semiannually by these proposed standards.

Section 112 of the CAA is the statutory authority for these proposed standards. Under section 112(d), we are required to regulate major sources of 188 HAPs listed in section 112(b) of the CAA. On July 16, 1992, we published a list of industrial source categories, which included MSW landfills, that emit one or more of these HAPs. We must promulgate standards for the control of HAP emissions from both new and existing major source MSW landfills. For "major" source MSW landfills (those that emit 10 tons/year or more of a listed pollutant or 25 tons/year or more of a combination of pollutants), the CAA requires us to develop standards that require the application of stringent air pollution controls, known as MACT. In addition, section 112(d) allows the regulation of landfills emitting HAP at area source levels, that is, less than 10 tons per year of any single HAP and less than 25 tons per year of any combination of HAP.

Under section 112(c), we are required to list area sources that represent a threat of adverse effects to human health and the environment. Furthermore, the standards developed for area sources can be less stringent than MACT. Section 112(k) of the CAA requires EPA to list sufficient area source categories for future regulatory development to ensure that 90 percent of the emissions from area sources located in urban areas are subject to standards pursuant to section 112(d). Under section 112(k), EPA must develop a strategy to address public health risks posed by air toxics from area sources in urban

areas. Section 112(k)(3)(B) of the CAA requires EPA to identify not less than 30 HAP that are estimated to pose the greatest threat to public health in the largest number of urban areas as the result of emissions from area sources. In addition, section 112(k) mandates that the Strategy achieve a 75 percent reduction in cancer incidence attributable to HAP emitted by stationary sources. MSW landfills were first listed as one of these area source categories on September 14, 1998 (63 FR 49240).

During the PMACT phase of this rulemaking, we held two stakeholder meetings, one with industry representatives on July 23, 1998 and one with representatives of State and local regulatory agencies and regional EPA offices on July 30, 1998. We also gathered readily available data on the physical, operational, and emissions characteristics of landfills and visited 20 landfills in seven States to further characterize the source and the control technologies in use. From the data we gathered, we developed a database for MSW landfills. We identified the MACT floor level of control. Following that determination, we estimated HAP emissions from landfills using information in the database. Finally, we determined MACT for major and area source MSW landfills.

1.3 Summary of the Proposed Standards

Overall, this proposed NESHAP is equivalent to the EG/NSPS for MSW landfills. This proposed NESHAP contains the same requirements as the EG/NSPS, plus SSM requirements and violations for out-of-range monitoring parameters. Also, these proposed standards require semiannual compliance reporting while the EG/NSPS requires annual reporting.

If a landfill is subject to the collection and control requirements of the EG/NSPS (40 CFR part 60, subparts Cc and WWW), then the landfill would be subject to these proposed standards. The collection and control requirements of the EG/NSPS apply to owners or operators of landfills that emit equal to or greater than 50 Mg/yr NMOC and have a design capacity equal to or greater than 2.5 million Mg and 2.5 million m³ (under a specific State or Tribal plan, the EG applicability criteria may vary from these values). We estimate that all major sources of HAP are or will be subject to the EG/NSPS, therefore these proposed standards would apply to all major sources. Several area sources are also subject to the EG/NSPS and, therefore, subject to these standards.

These proposed standards contain the same applicability requirements as the EG/NSPS collection and control requirements. Therefore, if your landfill must meet the collection and control requirements of the EG through a State plan, Tribal plan, or the Federal plan, or must meet the collection and control requirements of the NSPS, then your landfill would be required to meet the requirements of these proposed standards.

These proposed standards also have the same collection and control requirements

as the EG/NSPS. Under the EG/NSPS, landfills greater than 2.5 million Mg and 2.5 million m³ that emit equal to or greater than 50 Mg/yr NMOC must install collection and control systems to control landfill gas. Requirements for the EG/NSPS are located at 40 CFR part 60, subparts Cc and WWW.

These proposed standards would also require the collection and control of landfill gas, which is the same pollutant regulated by the EG/NSPS. By volume, landfill gas is approximately 50 percent methane, 50 percent carbon dioxide, and less than 1 percent of many different "nonmethane" organic compounds, or NMOC. Nonmethane organic compounds include VOC, HAP, and odorous compounds. Therefore, by collecting and controlling landfill gas, HAP are also collected and controlled. To reduce the burden and complexity of measuring and monitoring the various HAP, NMOC is specified as a surrogate in these proposed standards for determining the applicability of collection and control of HAP emissions. Also, landfill owners and operators are already required to estimate NMOC under the EG/NSPS. It is not necessary to increase the burden by requiring specific HAP measurements.

For more information on the standards being proposed on landfills, please refer to the preamble or the docket.

1.4 Rationale for the Proposed NESHAP

EPA was not able to locate any information identifying any landfill gas emissions control technologies that are more effective in reducing HAP emissions than the controls required under the EG/NSPS for MSW landfills. Therefore, the next step was to determine if the EG/NSPS level of control could be selected as the MACT floor level of control for existing major sources. The MACT floor level of control for existing major sources must be based on the maximum achievable control technology used by at least 12 percent of existing major sources. To ascertain this, we had to determine which landfills are major sources and whether at least 12 percent of the major sources are subject to the gas collection and control requirements of the EG/NSPS.

From the data we collected, sufficient information was available, or could be developed, to estimate emissions and to determine the major and area source status for 9,593 landfills. A comprehensive discussion of the database acquisition, development of the database, and data analysis for this rulemaking can be found in the memo "Database Development," December 13, 1999, found at Docket No. A-98-28 (ERG, 1999).

We determined the major or area source status for each landfill in the database based on its maximum uncontrolled emissions of HAP in landfill gas emissions. We identified facilities as major sources of HAP if the emission rate of a single HAP exceeded 10 tons per year, or if the total HAP emission rate exceeded 25 tons per year. This process produced an estimate that 1,140 out of 9,593 landfills are, or will be, major sources of HAP emissions. (Note that because emissions from active landfills increase

over time as more waste is placed in the landfills, some landfills that are not major sources now will become major sources in the future.) The remaining 8,453 landfills are estimated to be area sources.

Similar to the determination of major sources, we used maximum NMOC emissions estimates and landfill capacities to determine if landfills are subject to the EG/NSPS. To be subject to the collection and control requirements of the EG/NSPS, a facility must have a design capacity greater than 2.5 million Mg and 2.5 million m³ and emit equal to or greater than 50 Mg of NMOC per year. Out of the 9,593 landfills in the data set, we identified 1,312 facilities that are subject to the EG/NSPS. Because the previously identified 1,140 major sources are a subset of the 1,312 facilities subject to the EG/NSPS, it is clear that 100 percent of the major sources are subject to the EG/NSPS. Therefore, the EG/NSPS is the MACT floor for existing sources. Because no better controls are available, we concluded that the EG/NSPS is also the MACT floor for new sources.

Limited data are available to characterize the potential HAP emissions from landfill wastewater. However, the available data indicate that volatile HAP concentrations in landfill wastewater are low. We developed HAP emission estimates using several worst case assumptions, such as assuming that all HAP from landfill wastewater would volatilize and be released to the atmosphere, and using median reported HAP concentrations and maximum estimates of all wastewater produced at landfills. Even with these unrealistic assumptions, we estimate that total nation-wide emission from wastewater operations at all of the landfills in the United States are no more than 57 tons per year of HAP. We expect that this estimate is high for the reasons stated. When considering that there are more than 10,000 landfills in the United States, the amount of HAP released from any one landfill's wastewater operations would be very small. We estimate that emissions from landfill wastewater represent approximately 0.4 percent of the combined landfill gas-wastewater emissions.

Metal HAP, including mercury, may be emitted from landfills and would not be controlled by the EG/NSPS control technologies. No capture devices or control for metals have been demonstrated for landfill gas or landfill gas combustion technologies. Therefore, the MACT floor for metal HAP is no control.

In attempting to examine options beyond the floor, the EPA found there were no options more stringent than the MACT floor for landfill gas control. The EG/NSPS requirements for landfill gas collection and emissions reduction are the best control for landfill gas. The gas collection system required by the EG/NSPS is designed to capture as much landfill gas as possible and requires several parameters to be monitored to ensure this, including pressure, nitrogen or oxygen concentration, temperature, and surface methane concentration. There are no data indicating that collection systems are in use that are more effective than those required by the EG/NSPS.

Similarly, there are no known technologies that can regularly achieve reduction efficiencies greater than those specified in the EG/NSPS. The EG/NSPS regulations require 98 percent reduction efficiency for NMOC or a maximum outlet concentration of 20 ppmv if an enclosed combustion device is used. These reduction efficiencies can be regularly achieved by several types of control technologies with proper operation.

Because there are no collection and control technologies more stringent than the EG/NSPS, MACT for both existing and new sources is the same as the MACT floor, that is the EG/NSPS. We have been unable to identify a MACT floor for landfill wastewater because we have not found information on the prevalence of any practices that may reduce air emissions from wastewater collection and treatment. Therefore, we were unable to consider other options and we propose that MACT does not include any control requirements or emission limits for these operations. As previously stated, emissions from landfill wastewater are expected to be minimal, approximately 0.41 percent of all landfill emissions.

The EG/NSPS does not control emissions of HAP metals and no capture devices or other controls for metals have been demonstrated for landfill gas or for landfill gas combustion technologies. For this reason, the MACT floor and the MACT for control of HAP metals at new and existing major source landfills is no control and no other options were considered.

While mercury emissions are not affected by the proposed standards, it is well known that municipal solid waste landfills receive refuse that contains mercury in organic and inorganic forms. Common wastes that contain mercury that are routinely disposed of in landfills include thermometers, batteries, light switches, thermostats, and fluorescent lights. Mercury has been identified as one of the many HAP present in landfill gas. Furthermore, mercury has been identified in emissions from the working face of landfills, that is, it is emitted from waste being deposited at the surface of the landfill prior to burial. Mercury emissions have also been measured in trucks transporting waste to landfills and in waste transfer containers, such as dumpsters and curbside waste carts. Thus, it is clear that mercury is emitted from MSW prior to the waste entering landfills.

Unfortunately, insufficient data are available to us to adequately characterize the concentrations of mercury in landfill gas, as well as emissions of mercury in fugitive landfill gas and in residuals from landfill gas combustion devices. Although we have concluded that the MACT floor for mercury control is no control, we are interested in characterizing mercury in landfill gas because of its bioaccumulative capacity and known health affects. We specifically request comment or data on mercury concentrations in landfill gas and mercury emissions from fugitive landfill gas and from landfill gas control devices.

The proposed MACT standards for MSW landfills would incorporate the level of emissions reduction required by the EG/NSPS. This standard would only impose a

requirement to prepare an SSM plan, the recordkeeping and reporting requirements for SSM events, and semiannual reports instead of annual reports.

As with major source landfills, all area source landfills that are large enough to trigger the applicability of the EG/NSPS will already be required to implement the EG/NSPS. Because we have selected MACT for these area sources, there are no impacts from this proposed standard. Area source landfills that are too small to trigger the EG/NSPS applicability are not subject to control under this proposed standard and, therefore, will not incur impacts.

Many existing area source MSW landfills are closed (82 percent were closed as of January 1999). Landfill emissions are at their highest level within the year right after closure and then begin to decrease steadily. Thus, landfills are a unique emission source, because they are self-regulating. It makes little sense to require expensive controls for small, closed area source landfills, when their emissions are low and will decrease over time. Clearly, as emissions decrease, there would be a dramatic decrease in the average cost effectiveness per Mg of NMOC reduction achieved through control of small, closed area source landfills.

1.5 Costs of the Proposed Standards

The costs of the proposed standards are \$2.2 million (1998\$). These costs reflect only monitoring, recordkeeping, and reporting requirements, since the proposed standards require no control. These costs are roughly \$1,700 (1998\$) per affected landfill.

1.6 Small Entity Impacts

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedures Act or any other statute unless the agency certified that the rule will not have a significant impact or a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impact of today's rule on small entities are defined as: (1) a small business that is primarily engaged in the collection and disposal of refuse in a landfill operation as defined by SIC codes 4953 and 5911 with annual receipts less than 6 million dollars; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000, and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's proposed NESHAP for MSW landfills on small entities, we certify that this action will not have a significant economic

impact on a substantial number of small entities. We have determined that small entities will experience little new impact since this rule will rely on the requirements specified in 40 CFR part 60, subparts Cc and WWW. Additional requirements for this NESHAP are limited to a slight increase in the reporting frequency of some reports and the development of a startup, shutdown, malfunction (SSM) plan. For more information on the economic impacts of the proposed standards, refer to Chapter 3 of this report.

Although this proposed NESHAP for MSW landfills will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities. To that end we have evaluated the operational practices, collection systems and control systems required by 40 CFR part 60 subparts Cc and WWW for co-control environmental benefits. Since the requirements in 40 CFR part 60 subparts Cc and WWW adequately address the emissions of hazardous air pollutants while controlling landfill gas, we are using these same requirements with only a slight increase in reporting activity/frequency for this rulemaking. In addition to the reduction effort, we have performed a number of outreach activities to interact with small entities during this rulemaking effort. We have held formal stakeholder meetings. In addition, we have presented rule related information at national conferences sponsored by the trade organizations for these entities. Finally, we requested the establishment of an electronic link between the International City/County Management Association website and our rule development website. Through the efforts discussed above, small entities have been engaged in this rulemaking effort. We continue to be interested in the potential impacts of the proposed rule on small entities and welcome comments or issues related to such impacts.

1.7 Unfunded Mandates

Title II of the 1995 Unfunded Mandates Reform Act (UMRA), Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures by State, local, and tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any 1 year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least-costly, most cost-effective, or least-burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least-costly, most cost-effective, or least-burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect

small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

The EPA has determined that this proposed NESHAP does not contain a Federal mandate that may result in expenditures of \$100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any 1 year. Thus, today's proposed rule is not subject to the requirements of section 202 and 205 of the UMRA.

2. PROFILE OF AFFECTED ENTITIES

The demand for municipal solid waste (MSW) landfills flows from the demand for services that collect and dispose of the large volume and variety of wastes Americans produce. This chapter briefly looks into the market structure for these services: what sectors generate MSW (and thereby "demand" disposal services), and what sectors of society collect, transport, and dispose MSW (and thereby "supply" disposal services).

2.1 Generators

MSW generators demand-in the economic sense of the word-services that collect and dispose of MSW. These generators provide most of the demand for MSW landfill services. There are four broad categories of MSW generators:

- Residential or Household: Waste from single- and multiple-family homes.
- Commercial: Waste from retail stores, shopping centers, office buildings, restaurants, hotels, and other commercial establishments.
- Industrial: Waste such as corrugated boxes and other packaging, cafeteria waste, and paper towels from factories or other industrial buildings. Industrial MSW does not include waste from industrial processes, whether hazardous or nonhazardous.
- Other: Waste from public works such as street sweepings and tree and brush trimmings, and institutional waste from schools and colleges, hospitals, prisons, and similar public or quasi-public buildings. Infectious and hazardous waste from these generators are managed separately from MSW.

Households are the primary direct source of MSW, followed by the commercial sector. The commercial, industrial, and other sectors each directly generate smaller portions of MSW than households. The industrial sector manages most of its own solid residuals, whether MSW or industrial process wastes, by recycling, reuse, or self disposal. For this reason industry directly contributes only a small share of the MSW flow, although some industrial process wastes do end up as MSW.

Various underlying factors influence the trends in the quantity of MSW generated over time. These factors include changes in population, individual purchasing power and disposal patterns, trends in product packaging, and technological changes that affect disposal habits and the nature of materials disposed.

2.2 Collection and Disposal

Governments -local, state, and federal-continue to play a large role in regulating and operating MSW management systems. Governmental influence, however, is limited. Material, engineering, geographic, cost, and other technical and economic conditions spell out some of the limits.

In addition, all MSW management systems ultimately involve private decision makers. Households and private firms generate most MSW, collect and transport MSW, build and operate MSW disposal systems, provide financing, and provide markets for recycled material. In some settings these private activities compete with public operations; in others, they provide factors of production and demand for outputs from public operations. Whatever the case, these technical and market relationships are important factors in conditioning the influence of local governments on MSW management generally.

2.2.1. Collection

Local governments, especially in more urbanized areas, often take the lead in organizing MSW management and, in many cases, providing collection and disposal services. This is particularly true in the Eastern United States (Chartwell, 1998). A wide variety of reasons explain this involvement: concern for the public health threat of uncollected or improperly disposed MSW, natural economies of scale in organizing and performing MSW collection and disposal, and a concern for the negative externalities-litter, noise, smells, traffic-sometimes associated with private collection and disposal. These negative externalities are not necessarily unhealthy, but they are detractors from public welfare.

How extensive is the local government role? Four market structures for MSW collection predominate:

- Public monopoly-public agency collects all MSW.

- Private monopoly-private firm(s) collect(s) all MSW in a specific area under a franchise agreement and is (are) reimbursed by the local government.
- Competitive-public agency and private firm(s) both collect MSW.
- Self-service - generators haul their MSW to disposal sites.

Most residential refuse is collected under the first three market structures; about 50 percent is collected under the first. A large fraction of private service is provided by contractors selected by local governments. In such cases, the government plays a role in selecting the private collection firm, specifying the terms and conditions of collection, and paying the private collector for the service.

2.2.2. *Disposal*

Many factors justify the interest of government institutions, and local communities in particular, in playing a large role in leading MSW management. These factors include: MSW may pose a threat to the public health, improperly disposed waste may result in adverse environmental impacts, and problems such as noise, traffic, and odor may result from the disposal of MSW.

Over 64 percent of municipal landfills nationwide are publicly owned. The most common owners of landfill facilities are county and city governments, who together own nearly 60 percent of all landfills. Other local governments, such as towns and villages, own 25 percent of landfills. The federal government owns 3 percent of existing landfills, which are mainly facilities on military bases and installations. State governments own less than one percent of landfills. The greatest proportion of public ownership is generally found in the Northeast, while the greatest proportion of private ownership is generally found in the West. Around 36 percent of landfills are owned by private entities, a percentage that has grown over the last 10 years.

Economies of scale exist in landfilling MSW, making the unit costs of operating small landfills relatively high compared to larger landfills. Consequently, it is usually not profitable for private waste disposal firms to operate small landfills. The imposition of additional environmental regulations, such as the Resource Conservation and Recovery Act (RCRA) provisions applied to landfills as codified in 40 CFR, part 258, subpart A, also contribute to small landfills having higher unit costs and thus more difficulty in operating compared to larger landfills. Data provided by Chartwell, Inc. indicate that 5,247 facilities closed as of April 15, 1994. Most of these landfills were small landfills that likely could not meet the requirements of these RCRA provisions by this date (actually, April 9, 1994) and continue operating. Thus, it made economic sense to close rather than to make the improvements required under the RCRA provisions.

It should be noted that while the number of public sector-owned facilities is 64 percent, the volume of waste actually handled by the public sector is about 42 percent. This illustrates that the average size of privately owned facilities is larger than publicly owned facilities, and indicates that private firms may do a better job of managing and developing larger and newer landfills. As of 1998, the largest landfill owner was Waste Management, which handles 15 percent of all intake volume for landfills nationwide. The next two firms in terms of intake volume are USA Waste Service and Browning-Ferris Industries, with 8 and 7 percent of all intake volume nationally (Chartwell, 1998). The top 11 firms by intake volume handle 42 percent of volume nationally, indicating that the landfills private sector is not concentrated among a few firms.

2.3 Revenue Generation

The costs of developing and operating MSW landfills are ultimately covered by tipping fees, general tax revenues, or a combination of the two. Tipping fees ultimately reflect many aspects of MSW disposal. Population and economic growth, recycling rates, operating and transportation costs, land values, and legislation all contribute to how much waste disposal facilities charge for the privilege of waste disposal (Chartwell, 1998). As of 1998, the nationwide average tipping fee for MSW landfills was \$31.59/ton waste volume (Chartwell, 1998). This rate is more than that for materials recovery stations, but less than that charged by incinerators, mixed waste sites, and transfer stations. Approximately 30 percent of landfills receive all their revenues from tipping fees, and approximately 35 percent of landfills receive all their revenues from taxes. The remaining 35 percent of landfills cover the costs of waste disposal through a combination of tipping fees and taxes. The use of taxes as a revenue sources rather than tipping fees has implications on waste disposal services. First, when disposal costs are included in taxes, most people are not aware of the actual costs involved. Without an effective mechanism for transmitting cost information, waste generators have no incentive to reduce their generation rates. Second, tax-supported facilities are typically underfunded relative to actual disposal costs, resulting in poorer operation than fully funded landfills supported by tipping fees (U.S. EPA, OSWER, 1989).

Factors that influence the choice of revenue sources include landfill size and ownership. Landfills receiving small quantities of waste are likely to rely heavily on taxes for their revenue while larger landfills rely on both taxes and tipping fees. Not surprisingly, private owners of landfills rely heavily on tipping fees relative to other landfill owners. It remains unclear whether private landfills rely on tipping fees because they are larger, or larger landfills rely heavily on tipping fees because they are private.

A distinction must be drawn between tipping fees and the actual costs of landfilling. Communities often set tipping fees to cover current operating costs without regard to amortization of capital expenditures (capital equipment, land, closure, and long-term care costs). Similarly, the cost of disposal for the 35 percent of landfills supplementing tipping fee revenues with taxes is usually much higher than the fee

charged. In addition to tax subsidies, tipping fees do not cover the actual costs to society of disposal because landfill costs usually do not include three important social costs (U.S. EPA, OAQPS, 1991):

- 1) Depletion costs of existing landfills (i.e., discounted present value of the difference in landfill costs today and the future costs of a replacement landfill),
- 2) Opportunity costs of land used in landfills, and
- 3) Environmental costs (risk of environmental damage from landfills).

3. ECONOMIC IMPACTS

3.1 General Impacts

The proposed MACT standards for MSW landfills would only impose a requirement to prepare an SSM plan, the recordkeeping and reporting requirements for SSM events, and semi-annual reports instead of annual reports. Similar to major source landfills, all area source landfills that are large enough to trigger the applicability of the MACT will already be required to implement the EG/NSPS. Therefore, this standard will impose minimal additional impacts or cost. Area source landfills that are too small to trigger the EG/NSPS applicability are not subject to the proposed standard and, therefore, will not incur impacts. The following section will explore further the possible impacts to major source landfills across the country.

3.2 Landfill Impacts

Landfills account for almost half of the facilities in the whole of the MSW disposal industry. As stated before, the estimated annual costs to landfills of the proposed standards are \$2.2 million (1998\$). This estimated costs per affected landfill is about \$1,700 (1998\$). Again, these costs reflect only the monitoring, recordkeeping, and reporting requirements, since the proposed standards require no additional add-on controls. Therefore, no capital cost are incurred with this regulation.

Landfill revenue and operating cost data is limited. A major component of the landfill's revenue is its tipping fee. These tipping fees are usually defined as the landfill's gate fees. As mentioned in Chapter 2, the national average tipping fee for landfills in 1998 was \$31.59 per ton intake volume. It is assumed that the cost of the regulation will be passed on to the users of landfills as reflected in a higher tipping fees, and this should lead to minimal increases in tipping fees as a result of the proposed regulation.

Landfills are publicly as well as privately owned. Many publicly owned landfills are privately managed. Given the minimal compliance costs associated with this

proposal, the regulation is not expected to change the current nationwide structure of landfill ownership or management.

Based on the relatively small compliance cost per landfill, the impact of this regulation is expected to be insignificant. There will not be a significant impact on a substantial number of small entities associated with this proposed regulation.

REFERENCES

1. Eastern Research Group. "Database Development." Prepared for the U.S. Environmental Protection Agency, Emission Standards Division. December 13, 1999.
2. Chartwell Information Publishers, Inc. Chartwell's Directory and Atlas of Solid Waste Disposal Facilities, 1997-98. 1998.
3. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Office of Solid Waste. The Solid Waste Dilemma: An Agenda for Action, February 1989. In three parts:

 Final Report of the Municipal Solid Waste Task Force, EPA/530-SW-89-019.
 Background Document, EPA/530-SW-88-054a.
 Appendices A-B-C, EPA/530-SW-88-054b.
4. U.S. Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning and Standards. *Regulatory Impact Analysis of Air Pollutant Emission Standards and Guidelines for Municipal Solid Waste Landfills.* March 1991.

TECHNICAL REPORT DATA*(Please read Instructions on reverse before completing)*

1 REPORT NO EPA-452/D-00-005	2	3. RECIPIENT'S ACCESSION NO
4. TITLE AND SUBTITLE Economic Impact Analysis for the Proposed Municipal Solid Waste Landfills		5 REPORT DATE September 2000
		6. PERFORMING ORGANIZATION CODE
7 AUTHOR(S) Larry Sorrels and Lillian Bradley		8 PERFORMING ORGANIZATION REPORT NO
9 PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Research Triangle Park, NC 27711		10 PROGRAM ELEMENT NO
		11 CONTRACT/GRANT NO. None
12 SPONSORING AGENCY NAME AND ADDRESS Director Office of Air Quality Planning and Standards Office of Air and Radiation U.S. Environmental Protection Agency Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Proposed regulation
		14. SPONSORING AGENCY CODE EPA/200/04
15 SUPPLEMENTARY NOTES		
16 ABSTRACT <p>Pursuant to Section 112 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) is developing a National Emissions Standard for Hazardous Air Pollutants (NESHAP) to control emissions released from the landfills. This report presents the economic impacts associated with the proposed national emission standards for hazardous air pollutants (NESHAP) for municipal solid waste (MSW) landfills. These standards are scheduled to be proposed in the summer of 2000. These proposed standards are applicable to all major and some area sources. Hazardous air pollutants (HAP) emitted by MSW landfills include but are not limited to vinyl chloride, ethyl benzene, toluene, and benzene. Exposure to these and other HAP can cause adverse health effects including cancer. Possible noncancer health effects include respiratory and skin irritation; severe allergic reaction; effects upon the eyes; various systemic effects including effects upon the liver, kidney, lung, cardiovascular system, and blood; neurotoxic effects; and, in extreme cases, death. This proposed NESHAP contains the same requirements as the emission guidelines and new source performance standards (EG/NSPS), 40 CFR part 60, subparts Cc and WWW. In addition to the requirements of the EG/NSPS, this NESHAP adds startup, shutdown, and malfunction requirements, operating condition violations for out-of-bounds monitoring parameters, and it changes the reporting frequency for one type of report.</p> <p>These proposed standards fulfill the requirements of section 112(d) of the Clean Air Act (CAA), which requires the Administrator to regulate emissions of HAP listed in section 112(b) and in the Urban Air Toxics Strategy required to be developed under section 112(k) of the CAA.</p>		
17 KEY WORDS AND DOCUMENT ANALYSIS		
a DESCRIPTORS	b IDENTIFIERS/OPEN ENDED TERMS	c COSATI Field/Group
	air pollution control, environmental regulation, economic impact analysis, landfills	

18 DISTRIBUTION STATEMENT Release Unlimited	19 SECURITY CLASS (<i>Report</i>) Unclassified	21 NO OF PAGES 11
	20 SECURITY CLASS (<i>Page</i>) Unclassified	22 PRICE