U.S. ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD-FRL–5523–1]

RIN 2060–AC62

Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Medical Waste Incinerators

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability of supplemental information and reopening of public comment period.

SUMMARY: On February 27, 1995, EPA proposed new source performance standards (NSPS or standards) and emission guidelines (EG or guidelines) for new and existing medical waste incinerator(s) (MWI) that will reduce air pollution from MWI. Once implemented, these standards and guidelines will protect public health by reducing exposure to air pollution. In the proposal preamble, EPA made a commitment to reconsider the proposed NSPS and EG based on new information submitted. Today's action presents an assessment of the supplemental information submitted following the proposal and solicits public comment on this assessment. Today's action also serves to address comments received on the proposal and reopens the comment period for development of the MWI standards and guidelines.

DATES: *Public Meeting.* A public meeting will be held on July 10, 1996 beginning at 9:00 a.m. At the public meeting, EPA will review the contents of this notice and answer questions so that commenters can better prepare their written comments. See **ADDRESSES** below for the location of the meeting.

Comments. Comments are requested on all information associated with the development of MWI standards and guidelines. Written comments must be received on or before August 8, 1996. See **ADDRESSES** below.

ADDRESSES: *Public Meeting.* The public meeting will take place at the Holiday Inn, Hotel and Suites, 625 First Street, Alexandria, Virginia, 22314, (703) 548–6300. Persons interested in attending the meeting should notify Ms. Donna Collins, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone (919) 541–5578.

Comments. Comments should be submitted (in duplicate, if possible) to the following: The Air and Radiation Docket and Information Center, ATTN: Docket No. A–91–61, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460.

Submissions containing proprietary information (Confidential Business Information) should be sent directly to the following address, not to the public docket, to ensure that proprietary information is not inadvertently placed in the docket: Attention: Mr. Rick Copland, c/o Ms. Melva Toomer, U.S. Environmental Protection Agency Confidential Business Manager, 411 W. Chapel Hill Street, Room 944, Durham, North Carolina 27701. See **SUPPLEMENTARY INFORMATION** for further discussion of confidential business information.

Docket. Docket No. A–91–61, containing supporting information used in developing the standards and guidelines, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m. , Monday through Friday, at the Air and Radiation Docket and Information Center, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, telephone (202) 260–7548, fax (202) 260–4000. A reasonable fee may be charged for copying. See **SUPPLEMENTARY INFORMATION** for a list of documents most directly related to today's notice.

FOR FURTHER INFORMATION CONTACT: Mr. Rick Copland at (919) 541–5265 or Mr. Fred Porter at (919) 541–5251, Emission Standards Division (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

SUPPLEMENTARY INFORMATION: *Regulated Entities.* Entities potentially regulated by the standards and guidelines are those which operate medical waste incinerators. Regulated categories and entities include those listed in Table 1.

TABLE 1.—REGULATED ENTITIES [a]

Category	Examples of regulated entities
Industry	Hospitals, nursing homes, research laboratories, other healthcare facilities, commercial waste disposal companies.
Federal Government	Armed services, public health service, Federal hospitals, other Federal healthcare facilities.
State/local/Tribal Government	State/county/city hospitals and other healthcare facilities.

[a] This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by the standards or guidelines for MWI. This table lists the types of entities that EPA is now aware could potentially be regulated. Other types of entities not listed in the table could also be regulated. To determine whether your facility is regulated by the standards or guidelines for medical waste incinerators, you should carefully examine the applicability criteria in sections 60.50(c) and 60.51(c) of the February 1995 proposal and sections II(B), II(H), and II(I) of today's notice. If you have questions regarding the applicability of the MWI standards and guidelines to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Confidential Business Information. Commenters wishing to submit proprietary information for consideration should clearly distinguish such information from other comments and clearly label it ''Confidential Business Information.'' Information covered by such a claim of confidentiality will be disclosed by the EPA only to the extent allowed and by the procedures set forth in 40 CFR part 2. If no claim of confidentiality accompanies a submission when it is received, the submission may be made available to the public without further notice to the commenter.

Documents Available Electronically. An electronic version of this action as well as the February 1995 Federal Register proposal notice are available for download from EPA's Technology Transfer Network (TTN), which is a network of electronic bulletin boards developed and operated by EPA's Office of Air Quality Planning and Standards. The TTN provides information and technology exchange in various areas of air pollution control. The service is free, except for the cost of a telephone call. Dial (919) 541–5742 for data transfer of up to 14,400 bits per second. The TTN is also available on the Internet (access: TELNET ttnbbs.rtpnc.epa.gov). For more information on the TTN, contact the systems operator at (919) 541–5384.

Documents in the Docket. The documents listed below are not available through the TTN, but are available through Air Docket No. A–91–61 located at the Air and Radiation Docket and Information Center (see the **ADDRESSES** section earlier in this notice). These documents provide the analyses that are summarized in this notice.

Item No.	Title
IV–A–7	National Dioxin Emission Estimates from Medical Waste Incinerators.
IV–A–8	Revised Economic Impacts: Existing Medical Waste Incinerators.
IV–A–9	Revised Economic Impacts: New Medical Waste Incinerators.
IV–B–23	PM MACT Floor Emission Levels for Potential Subcategories of the MWI Source Category.
IV–B–24	Determination of the Maximum Achievable Control Technology (MACT) Floor for Existing Medical Waste Incinerators that Incinerate General Medical Waste.
IV–B–25	Definition of Medical Waste.
IV–B–26	Operator Training and Qualification and Incinerator Inspection Requirements.
IV–B–30	Approach Used to Estimate the Capital and Annual Costs for MWI Wet Scrubbers.
IV–B–32	Revised Costs for Dry Injection/Fabric Filter Controls for MWI.
IV–B–33	Revised Costs for Secondary Chamber Retrofits for MWI.
IV–B–37	Projections for New MWI Population.
IV–B–38	Determination of the Maximum Achievable Control Technology (MACT) Floor for New Medical Waste Incinerators.
IV–B–39	Annual Costs for the Operator Training and Qualification Requirements for MWI Operators.
IV–B–43	Alternative Methods of Medical Waste Treatment: Availability, Efficacy, Cost, State Acceptance, Owner Satisfaction, Operator Safety, and Environmental Impacts.
IV–B–44	Determination of Medical Waste Incinerator (MWI) Size.
IV–B–45	Updated Medical Waste Incinerator Data Base.
IV–B–46	PM, CO, and CDD/CDF Average Emission Rates and Achievable Emission Levels for MWI with Combustion Controls.
IV–B–47	Acid Gases and Metals Typical Performance and Achievable Emission Levels for Medical Waste Incinerators with Good Combustion Control.
IV–B–48	Wet Scrubber Performance Memorandum.
IV–B–49	Dry Scrubber Performance Memorandum.
IV–B–50	Cost Impacts of the Regulatory Options for New and Existing Medical Waste Incinerator (MWI).
IV–B–51	Air Emission Impacts of the Regulatory Options for New and Existing Medical Waste Incinerators (MWI).
IV–B–52	Potential Solid Waste, Wastewater, and Energy Impacts of the New Source Performance Standards and Emission Guidelines for New and Existing Medical Waste Incinerators.
IV–B–54	Testing and Monitoring Options and Costs for MWI—Methodology and Assumptions.
IV–B–56	Standards of Performance for Medical Waste Pyrolysis Units.

Acronyms, Abbreviations, and Measurement Units. The following list of acronyms, abbreviations, and measurement units is provided to aid the reader.

AHA	American Hospital Association
Btu	British thermal unit
Cd	cadmium
CEMS	continuous emission monitoring system(s)
CFR	Code of Federal Regulations
CO	carbon monoxide
dioxin	dioxins and dibenzofurans
DI/FF	dry injection/fabric filter
dscf	dry standard cubic foot
dscm	dry standard cubic meter
EG	emission guidelines
EPA	Environmental Protection Agency
ft^3	cubic feet
FTE	full time equivalent
g	grams
gr	grains
HCl	hydrogen chloride
Hg	mercury
hr	hour
IV	intravenous
lb	pound
MACT	maximum achievable control technology
m^3	cubic meter
MW	megawatt
MSA	Metropolitan Statistical Area
Mg	megagram
mg	milligram
MM	million
MWI	medical waste incinerator(s)
MWTA	Medical Waste Tracking Act
MWC	municipal waste combustor
ng	nanogram
NO_X	Oxides of nitrogen
NRDC	Natural Resources Defense Council
NSPS	new source performance standards
NYSDOH	New York State Department of Health
O_2	oxygen
Pb	lead
PM	particulate matter
ppmdv	parts per million by volume (dry basis)
SO_2	sulfur dioxide
STAATT	State and Territorial Association of Alternate Treatment Technologies
SWDA	Solid Waste Disposal Act
TEQ	Toxic Equivalency Quality (dioxin emissions)
TTN	Technology Transfer Network
TCLP	Toxicity Characteristics Leachate Procedure
yr	year

Outline of this Notice. The information in this section is organized as follows:

I. Introduction

A. The Clean Air Act

The Clean Air Act amendments of 1990 added section 129, which includes specific requirements for solid waste combustion units. Section 129 requires the EPA, under section 111(b), to establish NSPS for new MWI and under section 111(d), to establish EG for existing MWI based on maximum achievable control technology (MACT). Section 129 establishes specific criteria that must be analyzed in developing these standards and guidelines. In general, this involves (1) determining appropriate subcategories within a source category; (2) determining the ‘‘MACT floor’’ for each subcategory; (3) assessing available air pollution control technology with regard to achievable emission limitations and costs; and (4) examining the cost, nonair-quality health and environmental impacts, and energy requirements associated with standards and guidelines more stringent than the MACT floor. Section 129 also directs EPA to establish operator training requirements for new and existing MWI as well as siting requirements for new MWI.

Section 129 requires the EPA to include numerical emission limitations in the standards and guidelines for the following air pollutants: particulate matter (PM), opacity, sulfur dioxide (SO_2), hydrogen chloride (HCl), oxides of nitrogen (NO_x), carbon monoxide (CO), lead (Pb), cadmium (Cd), mercury (Hg), and dioxins and dibenzofurans (referred to in this notice as ‘‘dioxin’’). Section 129 requires that these emission limitations reflect the maximum degree of reduction in air emissions that the Administrator determines is achievable, taking into consideration the cost of achieving such emission reduction and any nonair-quality health and environmental impacts and energy requirements. This requirement is referred to as MACT.

The MACT for new MWI may not be less stringent than the emissions control achieved in practice by the best controlled similar unit. The guidelines for existing MWI may be less stringent than the standards for new MWI; however, the guidelines may be no less stringent than the average emission limitation achieved by the best performing 12 percent of units in the category. These requirements that the standards and guidelines must be no less stringent than certain levels are referred to as the ‘‘MACT floor.’’

The Clean Air Act requires EPA to consider standards and guidelines more stringent than the MACT floor, considering costs and other impacts described above. If EPA concludes that more stringent standards and/or guidelines are achievable considering costs and other impacts, then the standards and/or guidelines would be established at these more stringent levels (i.e., MACT would be more stringent than the MACT floor). The EPA may establish NSPS or EG at the MACT floor only if it concludes that NSPS or EG more stringent than the MACT floor are not achievable, considering costs and other impacts. In no case may EPA establish emission limitations less stringent than the MACT floor.

Because standards and guidelines developed under Section 129 are to reflect the performance capabilities of air pollution control technology, EPA must assess air pollution control technologies and draw conclusions regarding their performance. This is often misunderstood and some assume that the regulations require the use of specific technology. However, the control technology used to achieve the standards or guidelines is not specified in the regulations. The regulations only include specific air pollution emission limits that a source (i.e., an MWI) must achieve. Any control technology that can comply with the final emission limits may be used.

B. February 1995 Proposal

On February 27, 1995 (60 FR 10654), EPA published proposed NSPS and EG for MWI. The proposal was the result of several years of effort reviewing available information in light of the Clean Air Act requirements described above.

During the data-gathering phase of the project, it was difficult to get an accurate count of MWI nationwide. In addition, it was difficult to find MWI with add-on air pollution control systems in place. Information from a few State surveys led to an estimated population of 3,700 existing MWI.

Subcategories were determined based on design differences among different types of incinerators: continuous, intermittent, and batch. These three design types roughly correlate to MWI size.

A few MWI with various levels of combustion control (no add-on air pollution control) were tested to determine the performance of combustion control in reducing MWI emissions. One MWI equipped with a wet scrubber (add-on control) was tested to determine the performance capabilities of wet scrubbing systems. A few other MWI equipped with dry scrubbing systems (add-on control) were tested to determine the performance capabilities of dry scrubbing systems. These systems were considered typical of air pollution control systems available at the time, and the data indicated that dry scrubbing systems could achieve much lower emissions than wet scrubbing systems.

As mentioned above, the MACT floor for new MWI is to reflect the emissions control achieved by the best controlled similar unit. Dry scrubbing systems were identified on at least one MWI in each of the three subcategories (continuous, intermittent, and batch). Consequently, the MACT floor emission levels for the proposed NSPS reflected the performance capabilities of dry scrubbing systems.

For existing MWI under the emission guidelines, State regulations and permits were used to calculate the average emission limitation achieved by the best performing 12 percent of units. These results were then compared with the results of the emission tests on wet and dry scrubbing systems. This comparison led to the conclusion that the MACT floor for existing MWI would require the use of a dry scrubbing system, even for small existing batch MWI.

Following determination of the MWI population, subcategories, performance of technology, and MACT floors, the Clean Air Act requires EPA to consider standards and guidelines that are more stringent than the floors. However, because the MACT floors calculated for the proposal were so stringent, EPA was left with few options to consider. Emission limits reflecting the capability of dry scrubbing systems were proposed for all sizes and types of new and existing MWI.

As mentioned earlier, the proposed standards and guidelines included numerical emission limits reflecting the performance capabilities of dry scrubbing systems; however, the proposed regulations would not require the use of a dry scrubbing system. Emission limits are included in these regulations rather than control equipment requirements to encourage competition and further the development of new technologies. Any technology capable of achieving the emission limitations in the regulations may be used.

C. New Information Since Proposal

A proposal is essentially a request for public comment on the information used, assumptions made, and conclusions drawn from the evaluation of available information. Following proposal, more than 700 comment letters were received, some including new information and some indicating that commenters were in the process of gathering information for EPA to consider. The large amount of new information that was ultimately submitted addressed every aspect of the proposed standards and guidelines, including: the existing population of MWI, the performance capabilities of air pollution control systems, monitoring and testing, operator training, alternative medical waste treatment technologies, and the definition of medical waste. In almost every case, the new information has led to different conclusions, as outlined below.

D. Purpose of This Supplemental Notice

This notice announces the availability of new information, reviews EPA's assessment of the new information, provides EPA's inclination as to how the new information might change the final standards and guidelines, and solicits comments on EPA's assessments and inclinations. This new information and these assessments are documented in more detail in a series of memoranda included in Air Docket No. A–91–61. A listing of these documents can be found at the beginning of this notice. This action also reopens the public comment period for the development of standards and guidelines for MWI. Today's action serves not only as a review of new information and request for comment, but also as a response to comments on the proposed rule.

This notice is not a reproposal. The proposal date for the MWI standards and guidelines remains February 27, 1995. Any MWI that has commenced construction after February 27, 1995, is considered a new MWI and will be subject to the NSPS, while any MWI that commenced construction on or before February 27, 1995, is considered an existing MWI.

E. New Timeline for Promulgation

In 1993, the EPA, the Sierra Club, and the Natural Resources Defense Council (NRDC) filed a consent decree with the U.S. District Court for the Eastern District of New York (Nos. CV–92–2093 and CV–93–0284) that required the EPA Administrator to sign a notice of proposed rulemaking no later than February 1, 1995 and a notice of final rulemaking no later than April 15, 1996.

Because of the large amount of new information and conclusions drawn from the new information, the EPA deemed it necessary to issue this supplemental Federal Register notice to provide the public sufficient opportunity to comment on all information used by the Agency in developing the NSPS and EG. The Agency requested an extension of the April 15, 1996 court-ordered deadline, and the court order has been revised to require the EPA Administrator to sign a notice of final rulemaking no later than July 25, 1997.

II. Review of New Information

As mentioned earlier, more than 700 comment letters were received following the February 27, 1995 proposal. An assessment of this information and some of EPA's inclinations in light of this new information are presented below.

In general, the following process was used to assess the new information. The public comment letters were reviewed and categorized by area of comment. Information related to specific issues (e.g., wet scrubber performance) was reviewed; meetings were then held to discuss specific areas of comment with relatively small groups who were believed to have expertise in specific areas. For example, meetings with wet scrubber vendors were held to discuss the new information related to the performance capabilities of wet scrubbers. During the smaller meetings, additional information was received and comment was taken. Following the smaller meetings, EPA conducted larger public meetings on June 15, 1995, September 26, 1995, and February 14, 1996, to review the assessment of new information and take further public comment. This Federal Register notice provides EPA's review of all information received since proposal.

A. MWI Inventory

One of the essential starting points in developing EG and NSPS is compiling an inventory of existing sources and projecting the number of new sources expected to be built in the future. The MWI inventory is the basis for the development of MACT floors, environmental impacts, cost impacts, and economic impacts. The results of these analyses are then used to determine MACT.

The inventory of existing sources used in this analysis is a "snapshot" of the current population of existing MWI. The inventory of new MWI potentially subject to the NSPS is a prediction of the number of MWI that will be built over the next 5 years in the absence of Federal regulations. The MWI inventories are not exact, but are representative of current and future MWI populations. Consequently, they are adequate to allow EPA to make informed decisions in developing standards and guidelines for new and existing MWI.

1. Existing Population

To estimate the nationwide population of existing MWI at proposal, available State MWI inventory information was gathered. Where MWI information was not available for a particular State, the State's human population was used to estimate the MWI population. Human population was selected as the basis for extrapolation because it is logical that the amount of medical waste generated (and, therefore, the MWI population) would correlate with human population. This extrapolation was a straightforward computation with readily available data; however, detailed State inventory data were only available from 11 States. This method resulted in an estimated 3,700 MWI burning general medical waste.

Following proposal, a number of comments were received regarding the inventory of existing MWI. Several commenters suggested that the population of MWI was overestimated. The American Hospital Association (AHA) submitted comments that included a compilation of approximately 2,200 existing MWI.

To compile a new EPA inventory, the AHA inventory was used as a starting point. Other sources of information, including State surveys and a data base of MWI operating permits, were also used to refine the inventory. Following this initial compilation, the inventory contained approximately 2,600 MWI. During the September 26, 1995 public meeting, several stakeholders voiced concern that many of the incinerators listed in EPA's MWI inventory had ceased operation. To address this concern, the Agency requested additional information to update the inventory. Additional information was received from State agencies, commercial medical waste disposal companies, and MWI vendors. Medical waste incinerator units were deleted or added based on the new information provided. Following these revisions, the final EPA inventory contains approximately 2,400 MWI; this inventory is located in the docket as item No. IV–B–45.

The inventory also contains information such as MWI type (continuous/intermittent or batch fed), capacity, and location, as well as State regulatory or permit emission limits. Every MWI in the inventory is assigned an MWI capacity in pounds per hour (lb/hr) or pounds per batch (lb/batch). Location information includes rural or urban designations based on Metropolitan Statistical Area (MSA) boundaries for the U.S. Facilities within MSA boundaries were considered urban MWI; facilities outside MSA boundaries were considered rural MWI. Emission limitations were determined by examining air quality permits, where available, or examining the emission limitations included in State regulations.

2. Future Installations

Projections of new MWI were made to estimate the costs and other impacts associated with NSPS. To estimate the number of new MWI that would be subject to the NSPS, historical sales data were obtained from MWI vendors. For the proposal, it was estimated that, in the absence of Federal regulations, 700 MWI would be installed during the 5 years following proposal (140 MWI per year). This projection was based on historical sales data gathered from 1985 through 1989.

To update the projection of new MWI that would be subject to the NSPS, additional data were gathered from MWI vendors following the proposal. Historical sales data were gathered covering years 1990 to 1995. Based on this new data, 235 MWI are expected to be installed in the next 5 years in the absence of the NSPS (47 per year). This projection covers the years 1996 to 2000. The memorandum documenting the procedures used to estimate the population of new MWI is located in the docket as item IV–B–37.

B. Subcategorization

Section 129 of the Clean Air Act states that the Administrator may distinguish among classes, types, and sizes of units within a category in establishing the standards and guidelines. At proposal, the Agency concluded the MWI population should be divided into three subcategories: (1) Continuous MWI, (2) intermittent MWI, and (3) batch MWI. While these three subcategories were based on design differences of the MWI, they also correlate roughly with size or MWI capacity.

During the public comment period, a number of comments were received regarding subcategorization. Several commenters suggested that EPA subcategorize directly by MWI size. Others suggested that EPA subcategorize MWI based on heat input capacity. Other commenters suggested that the Agency set standards based on the location of MWI; these commenters expressed concern about the lack of medical waste disposal options in remote rural locations.

Three criteria were subsequently considered in reexamining potential subcategories: size (capacity to burn medical waste); type (continuous/intermittent versus batch); and location (urban versus rural). The first two are clearly identified in Section 129 and have been used in other Federal regulations as criteria for subcategorization. Location, by itself, is not a valid criterion for subcategorization. However, in this case, it is used as a surrogate measure of the availability of alternative waste disposal options. Medical waste incinerators located in remote areas might be considered as a separate ‘‘class’’ of incinerator because of the limited availability of alternative waste disposal options in rural areas.

As mentioned earlier, the MACT floor is the least stringent regulatory option allowed under the Clean Air Act. Consequently, the MACT floors were examined using the EPA MWI inventory for various potential MWI subcategories. Because PM is, by far, the most common type of emission limitation in State regulations and permits, the PM MACT floor was the focus in this analysis. Subcategories were established when significant differences in PM MACT floors were identified.

The most common size breaks used by States in regulating MWI occur at 100, 200, 500, 1,000, and 2,000 lb/hr. The MACT floor emission levels for these size breaks were evaluated to determine appropriate size breaks for regulation. Significant differences in MACT floors were identified at 200 lb/hr and 500 lb/hr. Consequently, the three size ranges determined to be appropriate for the purpose of regulating MWI are presented in Table 2.

TABLE 2.—NUMBER OF MWI AND SIZE RANGES FOR SUBCATEGORIES

MWI subcategory	Size range, lb/hr	Number of MWI
Small	≤200	1,139
Medium	>200 and ≤500	692
Large	>500	542

The three basic design types of MWI are continuous, intermittent, and batch. A distinction between continuous and intermittent MWI based on design type may not be appropriate because these two types of units are essentially identical with the exception of the ash handling system. Also, the information used to develop the population of existing MWI does not distinguish between continuous and intermittent MWI. Batch MWI, however, are very different from intermittent and continuous units. As a result, batch MWI were further examined to determine if the MACT floor emission levels are different than those for continuous and intermittent MWI within the same size range; no significant difference in MACT floor emission levels was found.

The final criterion considered was location (urban vs. rural). This analysis focused on the small MWI because commenters were particularly concerned about small, rural MWI. The MACT floor emission levels for small urban MWI and small rural MWI, however, were found to be essentially the same.

Based on the new information, the Agency is inclined to subcategorize the existing and new population of MWI into three subcategories as shown in Table 2: small (≤200 lb/hr), medium (>200 and ≤500), and large (>500). The memorandum that details the procedures used to assess the subcategories is found in the docket as item IV–B–23. Further subcategorization may be considered in examining standards and guidelines more stringent than the MACT floors (see Sections III and IV).

Directly related to the question of using size or burning capacity to subcategorize MWI, the proposal requested comment on a ‘‘standard’’ method of determining MWI size for the purpose of consistent, uniform, and equitable application of whatever standards and guidelines are adopted. Comments responding to this request focused on the design heat release rate of the MWI expressed in British thermal units per hour per cubic foot (Btu/hr-ft_3) in the primary combustion chamber and the heat content of medical waste expressed in British thermal units per pound (Btu/lb). Most MWI manufacturers base their design capacities on these two factors.

In considering and/or adopting a ‘‘standard’’ means of determining MWI size, EPA is not attempting to establish design requirements for MWI manufacturers. Instead, the only purpose of adopting a standard method for determining the size of MWI is to ensure that all MWI of the same ‘‘size’’ are subject to the same requirements.

The design heat release rate used by most vendors of continuous and intermittent MWI is typically 15,000 Btu/hr-ft_3. The heat content of medical waste can vary substantially from 1,000 Btu/lb for pathological waste to over 10,000 Btu/lb for waste with a high plastics content. The heat content generally associated with medical waste for the purpose of determining nameplate capacity has been 8,500 Btu/lb. The combination of 15,000 Btu/hr-ft_3 and 8,500 Btu/lb results in a volumetric waste burning capacity of 1.76 lb/hr-ft_3. The volume of the primary chamber is multiplied by 1.76 to determine the size of the MWI. A continuous or intermittent MWI with a primary chamber volume of 500 ft_3 would be sized at 880 lb/hr for the purpose of determining regulatory requirements.

For batch MWI, the calculation is slightly different. Batch MWI charge all waste to be burned when the unit is cold. No additional waste is added during the combustion cycle. The unit is then allowed to cool before ash is removed and more waste is charged. These units are given a designation of pounds per batch (lb/batch) rather than lb/hr and usually take about 12 hours to completely burn the waste. The density of medical waste is about 4.5 lb/ft_3. Consequently, the combination of 4.5 lb/ft_3 and 12 hours per batch yields a volumetric waste burning capacity of 0.375 lb/hr-ft_3. The volume of the primary chamber would be multiplied by 0.375 to determine the size of the MWI. A batch MWI with a primary chamber volume of 500 ft_3 would be sized at 188 lb/hr for the purpose of determining regulatory requirements. A more detailed description of the MWI size methods described above for continuous, intermittent, and batch MWI can be found in the docket as item IV–B–44.

During a meeting with MWI vendors, it was suggested that MWI size should be determined by the unit's operating permit rather than its design capacity. Many States allow MWI to meet less stringent requirements associated with smaller MWI as long as the MWI is subject to a permit condition limiting the amount of waste burned. Consequently, while EPA is inclined to determine MWI size by the criteria described above, EPA is also considering inclusion of an option to allow an MWI to change its size designation by operating under a Federally enforceable requirement limiting the amount of waste burned (i.e., waste feed rate—lb/hr). For example, a continuous or intermittent MWI with a 340 ft_3 primary chamber, with a design capacity of about 600 lb/hr (i.e., ''large''), using the procedure outlined above, could be considered a ''medium'' MWI by operating under a Federally enforceable requirement limiting its charge rate to no more than 500 lb/hr. A batch MWI with a 1,000 ft_3 primary chamber, with a design capacity of about 4,500 lb/batch or 375 lb/hr (i.e., ''medium''), using the procedure outlined above, could be considered a ''small'' MWI by operating under a Federally enforceable requirement limiting its charge rate to no more than 2,400 lb/batch (200 lb/hr).

Finally, some commenters expressed concern about facilities installing multiple small MWI at one location in an effort to be subject to less stringent requirements. Commenters believed this should not be allowed. Consequently, EPA is inclined to combine the waste burning capacity of multiple units at one location to determine size. As stated above, such facilities could still operate under a Federally enforceable permit limiting their operating capacity to change their size designation.

C. Performance and Cost of Technology

Section 129 of the Clean Air Act directs the EPA to develop regulations for MWI that are based on the use of MACT, which is defined as the maximum reduction in emissions of air pollution the EPA considers achievable, considering costs, environmental, and energy impacts. However, Section 129 also states that, for existing MWI, these regulations can be no less stringent than the average of the best 12 percent of existing MWI, and for new MWI, they can be no less stringent than the best similar MWI. These minimum stringency requirements for the regulations are referred to as the ''MACT floors.'' The emission limits in the final regulations can be no less stringent than the ''MACT floor'' emission levels.

The ''MACT floors'' for the regulations are discussed in detail in another section of this notice. However, these ''MACT floors'' are only the starting point for determining MACT. Since MACT is the maximum reduction in air pollution emissions that is achievable, considering costs, environmental and energy impacts, if more stringent emission levels than the MACT floor emission levels are achievable, the EPA must identify these more stringent emission levels and consider them in selecting the MACT emission limits for MWI.

The EPA determines whether more stringent emission levels than the MACT floor emission levels are achievable by identifying various air pollution control technologies used to reduce emissions from MWI. Next, the EPA gathers and analyzes data on these technologies and draws conclusions regarding their performance—in terms of their ability to reduce air pollution emissions. The EPA then is able to determine MACT as follows.

After the MACT floors have been determined, the EPA can identify what air pollution control technologies would need to be used by MWI to achieve or comply with regulations based on these MACT floors. Then the EPA can identify those air pollution control technologies that are capable of achieving more stringent emission levels than the MACT floors. The EPA is then able to analyze and consider these more stringent emission levels in terms of the cost, environmental, and energy impacts associated with their use compared to the use of the air pollution control technologies that can achieve the MACT floor emission levels. This analysis and consideration serves as the basis for the EPA to determine MACT.

All of this analysis, with its focus and discussion of air pollution control technology, is often misunderstood and leads some to assume that the regulations require the use of a specific air pollution control technology, which is not the case. The air pollution control technology used to achieve or comply with the regulations is not specified in the regulations. The regulations only include emission limits (i.e., concentration levels in the gases released to the atmosphere) for specific air pollutants (e.g., hydrogen chloride, lead, etc.) that an MWI must achieve. The decision on how to meet these emission limits is left to the MWI owner or operator; an MWI owner or operator may select any equipment or any means available to comply with these emission limits.

At the time of proposal, relatively few emission test reports were available to the EPA from which to draw conclusions regarding the performance capabilities of various air pollution control systems. The data indicated that dry scrubbing systems could achieve much lower emission levels than wet scrubbing systems and that either type of scrubbing system could achieve much lower emission levels than combustion controls (i.e., good combustion) alone.

Following proposal, a number of emission test reports were submitted to EPA. Many commenters believe that EPA misjudged the performance capabilities of various air pollution control technologies, especially the capabilities of wet scrubbing systems. The EPA has reviewed the data contained in these emission test reports and, as summarized below, EPA's conclusions regarding the performance capabilities of various air pollution control technologies have been revised.

Relatively few comments were received regarding EPA's estimates of the costs of air pollution control technology. The majority of the comments regarding cost pertained to wet scrubbing systems. The reassessment of costs is discussed briefly below for each control technology.

1. Good Combustion

Combustion controls (i.e., good combustion) are effective in reducing emissions of combustion-related pollutants, such as PM, CO, and dioxin, but are not effective in reducing emissions of waste-related pollutants, such as acid gases or metals. For the combustion-related pollutants, combustion controls can be divided into two levels (i.e., 1-second and 2-second residence time) and the achievable emission levels associated with the use of each of these levels have been reassessed. In addition, achievable emission levels for waste-related pollutants were also reassessed. For waste-related pollutants, performance between the two levels of combustion control is not distinguishable. The results of the reassessment of combustion control are shown in Table 3 and are available as item Nos. IV–B–46 and IV–B–47 in the docket.

TABLE 3.—ACHIEVABLE EMISSION LEVELS FOR COMBUSTION CONTROL

Pollutant/combustion level	Achievable emission levels
PM, gr/dscf:	
1-sec	0.35
2-sec	0.25
Dioxin, ng/dscm:	
1-sec	9,000
2-sec	800
TEQ dioxin, ng/discm:	
1-sec	275
2-sec	15
CO, ppmdv:	
1-sec	700
2-sec	40
HCl, ppmdv	3,100
SO_2, ppmdv	55
NO_x, ppmdv	250
Pb, mg/dscm	10
Cd, mg/dscm	4
Hg, mg/dscm	7.5

Most of the achievable emission levels associated with combustion control have changed little from the proposal; the exceptions are the achievable emission levels for dioxin and Hg. The conclusion drawn at proposal regarding the achievable emission level for dioxin was driven by two relatively high data points from two different MWI. A thorough review of these two MWI and the tests conducted at these two MWI raise numerous questions and doubts about whether good combustion was actually employed at these MWI during the emission tests. Consequently, EPA no longer considers these emission tests representative of good combustion.

The situation is similar with regard to achievable Hg emission levels; at proposal, the conclusion regarding achievable emission level for Hg was driven by one very high data point. Following proposal, the hospital operating this MWI instituted several common waste management practices employed by other hospitals, and the MWI was retested by the EPA. The new data point is very similar to all the other data points. Consequently, the earlier data point is no longer considered representative of achievable Hg emission levels.

While no specific comments were received regarding the cost of good combustion, the costs were reassessed and updated for consistent comparison with other costs. This information is described in more detail in item IV–B–33 in the docket.

2. Wet Scrubbers

Following proposal, a number of comments were submitted to the EPA concerning the performance capabilities of wet scrubbing systems. Some commenters claimed that the wet scrubbing system tested by EPA was not representative of current wet scrubber technology and that the scrubber was not designed for high efficiency PM removal. The commenters submitted a number of emission test reports from wet scrubbing systems and urged EPA to reconsider the performance capabilities of these systems.

The EPA has reviewed these emission test reports and revised its previous conclusions on the performance capabilities of wet scrubbing systems. Wet scrubbing systems are capable of achieving three different levels of performance, depending on their design and operation. For convenience, these three levels of performance have been termed low efficiency, moderate efficiency, and high efficiency. A summary of EPA's revised conclusions regarding achievable emission levels associated with the use of wet scrubbing systems is shown in Table 4. A full discussion of these revised conclusions is available as item No. IV–B–48 in the docket.

TABLE 4.—ACHIEVABLE EMISSION LEVELS FOR WET SCRUBBERS

Pollutant, units	Achievable emission levels		
	Low	Moderate	High
PM, gr/dscf	0.05	0.03	0.015.
dioxin, ng/dscm	125	125	125.
TEQ dioxin, ng/dscm	2.3	2.3	2.3.
HCl, ppmdv	15 or 99%	15 or 99%	15 or 99%.
Pb, mg/dscm	1.2 or 70%	1.2 or 70%	1.2 or 70%.
Cd, mg/dscm	0.16 or 65%	0.16 or 65%	0.16 or 65%.
Hg, mg/dscm	0.55 or 85%	0.55 or 85%	0.55 or 85%.

Percent reflects achievable percentage reduction in emissions. No levels are shown for CO, SO_2, or NO_x because wet scrubbers on MWI achieved no further reductions beyond good combustion for these pollutants.

Note that for the waste-related pollutants, the achievable emission levels in the table are expressed as a numerical concentration level or a percent reduction. The composition of the waste burned in an MWI is not uniform; as a result, the concentration levels of waste-related pollutants from an MWI varies. On occasion, however, a momentary rise or ‘‘spike’’ in the concentration level of a waste-related pollutant may occur; while a wet scrubbing or dry scrubbing system can reduce this concentration level considerably, the system can not necessarily reduce it to the concentration levels shown in the table. For this reason, conclusions regarding achievable emission levels associated with the use of wet or dry scrubbing systems for waste-related pollutants must include a percent reduction component to accurately reflect the performance capabilities of wet and dry scrubbing systems.

Also note that the EPA has no emission data upon which to assess the performance capabilities of wet scrubbing systems that might utilize activated carbon. The EPA knows of no wet scrubbing system currently operating on an MWI using activated carbon, although vendors have mentioned this technique could be done. Activated carbon used with a dry scrubber (discussed below) provides enhanced removal of Hg and dioxin. Thus, the use of activated carbon with a wet scrubbing system, in an appropriate manner such as a fixed bed, should achieve the same enhanced performance levels.

Along with new information regarding the performance of wet scrubbers, EPA received new information regarding the cost of wet scrubbing systems. Figure 1 shows the relationship between cost and size of MWI for each level of wet scrubber performance. These costs are not substantially different from those used at proposal. The key difference is the distinction in costs between wet scrubbers of different efficiency. This information is described in more detail in item IV–B–30 in the docket.

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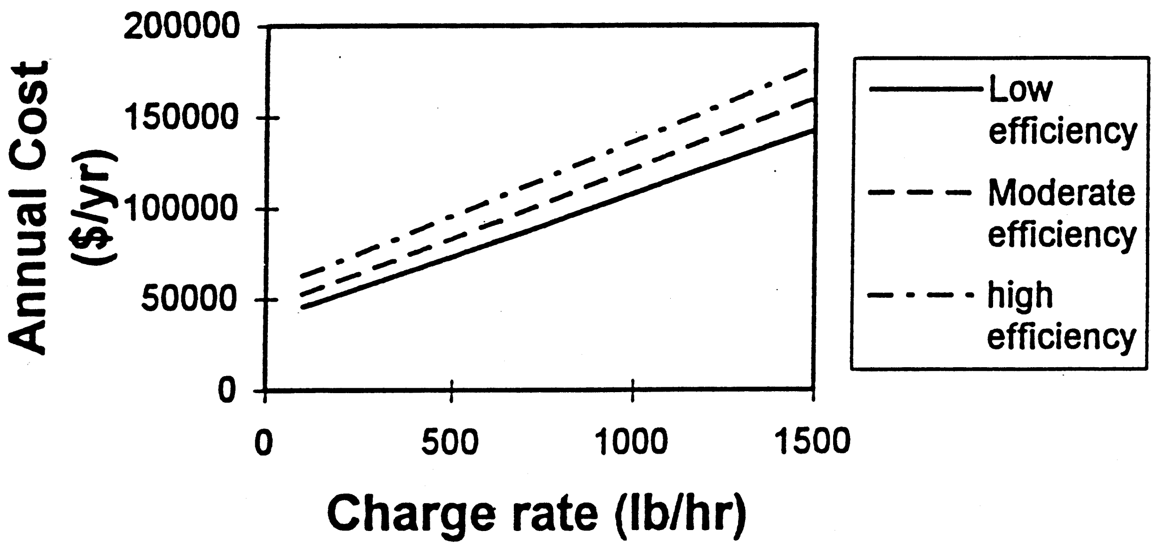

Figure 1. Annual costs for wet scrubbers without boiler.

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3. Dry Scrubbers

Very few comments were submitted to EPA following proposal that questioned EPA's conclusions on the performance capabilities of dry scrubbing systems. These capabilities were reassessed, however, to consider data contained in several emission test reports submitted to EPA from dry scrubbing systems using activated carbon.

The results of this reassessment of dry scrubbing system performance is shown in Table 5. The conclusions summarized in this table are similar to those at proposal. Note, however, that as discussed above under wet scrubbing systems, the achievable emission levels associated with the use of dry scrubbing systems for waste-related pollutants are now expressed as a numerical concentration level or a percent reduction. A discussion of this reassessment is available as item No. IV–B–49 in the docket.

TABLE 5.—ACHIEVABLE EMISSION LEVELS FOR DRY SCRUBBERS WITH ACTIVATED CARBON INJECTION

Pollutant, units	Achievable emission levels
PM, gr/dscf	0.015.
dioxin, ng/dscm	25.
TEQ dioxin, ng/dscm	0.6.
HCl, ppmdv	100 or 93%.
Pb, mg/dscm	0.07 or 98%.
Cd, mg/dscm	0.04 or 90%.
Hg, mg/dscm	0.55 or 85%.

Percent reflects achievable percentage reduction in emissions. No levels are shown for CO, SO_2, or NO_x because dry scrubbers on MWI's achieved no further reductions beyond good combustion for these pollutants.

While no specific comments were received regarding the cost of dry scrubbers, the costs were reassessed and updated for consistent comparison with other costs. Figure 2 shows the relationship between cost and size of MWI for dry scrubbing systems. This information is described in more detail in item IV–B–32 in the docket.

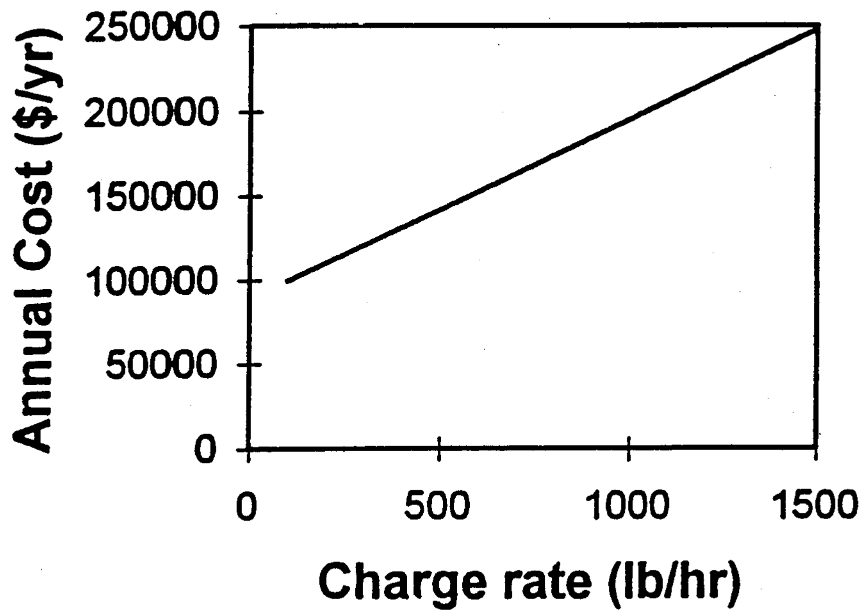

Figure 2. Annual cost for dry scrubbers with carbon.

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D. MACT Floor

1. Existing MWI

The Clean Air Act specifies in Section 129 that the degree of reduction in emissions that is deemed achievable for existing MWI shall not be less stringent than the average emission limitation achieved by the best performing 12 percent of units in a category; this requirement is referred to as the ''MACT floor'' for existing MWI. Section 302(k) of the Clean Air Act defines the term ''emission limitation'' as ''a requirement established by the State or Administrator which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis.''

Air quality permits and State regulations were examined to determine the average emission limitations achieved by the best performing 12 percent of MWI in each of the three subcategories considered at proposal (continuous, intermittent, and batch MWI). Table 6 presents the MACT floor emission levels identified at proposal.

TABLE 6.—PROPOSED MACT FLOOR EMISSION LEVELS FOR EXISTING MWI

[February 1995]

Pollutant, units	MWI subcategory		
	Batch	Intermittent	Continuous
PM, gr/dscf	0.03	0.03	0.02
CO, ppmdv	91	90	76
Dioxin, ng/dscm	NF	NF	NF
HCl, ppmdv	911 (35%)	115 (92%)	43 (97%)
SO_2, ppmdv	NF	NF	NF
NO_X, ppmdv	NF	NF	NF
Pb, mg/dscm	NF	NF	NF
Cd, mg/dscm	NF	NF	NF
Hg, mg/dscm	NF	NF	NF

NF=No Floor—the MACT floor emission levels for these pollutants reflect uncontrolled emissions. Numbers in parentheses indicate percent reduction.

Note that the table indicates no floor for most pollutants. While a numerical value was calculated for each pollutant, most pollutant MACT floors reflected uncontrolled emissions. Nevertheless, based on conclusions drawn at proposal regarding performance of technology, the MACT floor values included in Table 6 for CO, PM, and HCl indicated, at proposal, that all existing MWI would need good combustion and dry scrubbers to meet the MACT floors for CO, PM, and HCl.

As discussed in earlier sections, the new information submitted following proposal led to changes to the MWI inventory and subcategories. Because these factors can influence the MACT floors, a review of the MACT floors was conducted. Recall that the inventory includes emission limitations for each pollutant based on State permits and regulations. For each pollutant, the MWI inventory was sorted by subcategory and then by stringency of emission limit (most stringent to least stringent) within each subcategory. For each pollutant, the emission limitations for the top 12 percent of units in each subcategory were averaged to determine the MACT floor emission levels. The results of these calculations to determine the MACT floor emission levels for existing MWI in each subcategory based on the new MWI inventory are presented in Table 7.

TABLE 7.—REVISED MACT FLOOR EMISSION LEVELS FOR EXISTING MWI

Pollutant, units	MWI subcategory		
	Small	Medium	Large
PM, gr/dscf	0.086	0.043	0.021
CO, ppmdv	156	98	87
Dioxin, ng/dscm	NF	NF	NF
HCl, ppmdv	NF	589 (57%)	101 (93%)
SO_2, ppmdv	NF	NF	NF
NO_X, ppmdv	NF	NF	NF
Pb, mg/dscm	NF	NF	NF
Cd, mg/dscm	NF	NF	NF
Hg, mg/dscm	NF	NF	NF

NF=No Floor—the MACT floor emission levels for these pollutants reflect uncontrolled emissions. Numbers in parentheses indicate percent reduction.

Based on the recalculated MACT floors and the new conclusions drawn regarding the performance capabilities of air pollution control technologies (Section II.C.), it appears that large MWI would have to use good combustion and a high efficiency wet scrubber to achieve the MACT floor emission levels, while a medium-sized MWI would have to install at least good combustion and a moderate efficiency wet scrubber. Dry scrubbers could also be used in conjunction with good combustion to meet the MACT floor emission levels for medium and large MWI. Available data showing the performance capabilities of good combustion appears to indicate that the 0.086 gr/dscf PM MACT floor for small MWI is not achievable with good combustion alone. However, MWI manufacturers have indicated they routinely guarantee achieving 0.08 gr/dscf with good combustion. Consequently, the MACT floor for small MWI would require the use of good combustion practices; based on the claims of MWI manufacturers, add-on scrubbing systems would not be needed in all cases to meet the MACT floor. Regulatory options reflecting more stringent guidelines for existing MWI are examined in Section III of this notice. A memorandum that documents the procedures used to determine the MACT floors for existing MWI is located in the docket as item IV–B–24.

2. New MWI

The Clean Air Act specifies in Section 129 that the degree of reduction in emissions that is deemed achievable for new MWI shall not be less stringent that the emissions control achieved by the best-controlled similar unit; this requirement is referred to as the ‘‘MACT floor’’ for new MWI. The MACT floor emission levels identified at proposal for new MWI are presented in Table 8. These MACT floor values reflect conclusions at proposal about the performance capabilities of dry scrubbing systems because such systems were identified on at least one MWI in each subcategory and because dry scrubbing systems were considered capable of achieving lower emissions than wet scrubbing systems.

TABLE 8.—PROPOSED MACT FLOOR EMISSION LEVELS FOR NEW MWI

[February 1995]

Pollutant, units	MWI subcategory		
	Batch	Intermittent	Continuous
PM, gr/dscf	0.013	0.013	0.013
CO, ppmdv	50	50	50
Dioxin, ng/dscm	1,500	450	80
HCl, ppmdv	42 (97%)	42 (97%)	42 (97%)
SO_2, ppmdv	NF	NF	NF
NO_X, ppmdv	NF	NF	NF
Pb, mg/dscm	0.1	0.1	0.1
Cd, mg/dscm	0.05	0.05	0.05
Hg, mg/dscm	NF	NF	0.47 (85%)

NF=No Floor—the MACT floor emission levels for these pollutants reflect uncontrolled emissions. Numbers in parentheses indicate percent reduction.

Again, the new information submitted following proposal led to changes to the MWI inventory, subcategories, and conclusions about performance of technology. Because these factors can influence the MACT floors, a review of the MACT floors was conducted. The revised inventory of existing MWI was examined to identify the best-controlled

MWI in each subcategory. The revised MACT floor emission levels for new MWI are shown in Table 9.

TABLE 9.—REVISED MACT FLOOR EMISSION LEVELS FOR NEW MWI

Pollutant, units	MWI subcategory		
	Small	Medium	Large
PM, gr/dscf	0.03	0.015	0.015
CO, ppmdv	40	40	40
Dioxin, ng/dscm	125	125	25
HCl, ppmdv	15 (99%)	15 (99%)	15 (99%)
SO_2, ppmdv	NF	NF	NF
NO_x, ppmdv	NF	NF	NF
Pb, mg/dscm	1.2 (70%)	0.07 (98%)	0.07 (98%)
Cd, mg/dscm	0.16 (65%)	0.04 (90%)	0.04 (90%)
Hg, mg/dscm	0.55 (85%)	0.55 (85%)	0.55 (85%)

NF=No Floor—the MACT floor emission levels for these pollutants reflect uncontrolled emissions. Numbers in parentheses indicate percent reduction.

The small MWI subcategory consists of MWI operating at a throughput of 200 pounds per hour (lb/hr) or less of medical waste. The MACT floor for new small MWI consists of the emission levels that are achievable with good combustion and a moderate efficiency wet scrubber. The MACT floor is based on these emissions levels because small existing MWI equipped with this air pollution control have been identified. No small existing MWI have been identified with high-efficiency wet scrubbers or dry scrubbers.

The medium MWI category consists of MWI operating at a throughput of greater than 200 lb/hr and less than or equal to 500 lb/hr of medical waste. The MACT floor for new medium-sized MWI is based on emission levels that are achievable with good combustion and a combination of two control technologies, the high efficiency wet scrubber and the dry injection/fabric filter (DI/FF) dry scrubber system without carbon. At least one existing MWI in the medium subcategory is controlled with a high efficiency wet scrubber and another is equipped with a DI/FF system without carbon. The MACT floor is based on both of these technologies (i.e., a combined dry/wet scrubber system) because the wet scrubber achieves the lowest dioxin, HCl, and Hg emissions, but the DI/FF without carbon injection achieves the lowest Pb and Cd emissions. While no combined dry/wet scrubber systems were identified on medium MWI, several such systems are currently in operation on large MWI, as mentioned below. In addition, as also mentioned below, spray dryer/fabric filter systems could also meet the MACT floor emission levels for medium-sized MWI.

The large MWI subcategory consists of all MWI operating at a throughput of greater than 500 lb/hr of medical waste. As with the MACT floor for new medium MWI, the MACT floor for new large MWI is based on the emission levels that are achievable with good combustion and a combination of two control technologies, the high efficiency wet scrubber and the DI/FF dry scrubber system with carbon. Several existing facilities in the large category currently control emissions with a combined dry/wet system. In addition, one existing MWI equipped with a spray dryer/fabric filter system with carbon was tested during the EPA testing program and this test demonstrated that this scrubbing technology could also meet the MACT floor emission levels presented in Table 9.

Regulatory options reflecting more stringent standards for new MWI are examined in Section IV of this notice. A memorandum that documents the procedures used to determine the MACT floors for new MWI is located in the docket as item IV–B–38.

E. Baseline Emissions

To estimate the environmental impacts of the standards and guidelines for MWI, an estimate of baseline emissions must be made (i.e., emissions in the absence of Federal regulations). In the February 1995 proposal, baseline emissions were estimated for PM, CO, dioxin, HCl, SO_2, NO_x, Pb, Cd, and Hg. When this estimate was developed, very little information was available regarding the actual number of MWI and the level of air pollution control associated with each. The emission estimate was derived from an estimated 3,700 MWI assumed to be operating with little, if any, air pollution control.

As discussed in previous sections, new information has led to new conclusions about the MWI inventory, performance of technology, and control levels associated with each existing MWI. As a result, revised estimates of baseline emissions from existing MWI have been calculated and are presented in Table 10.

TABLE 10.—ANNUAL BASELINE EMISSIONS FOR EXISTING MWI

Pollutant, units	Baseline emissions
PM, Mg/yr	940
CO, Mg/yr	460
Dioxin g/yr	7,200
Dioxin g TEQ/yr	150
HCl, Mg/yr	5,700
SO_2, Mg/yr	250
NO_x, Mg/yr	1,200
Pb, Mg/yr	11
Cd, Mg/yr	1.2
Hg, Mg/yr	15

To convert Mg/yr to ton/yr, multiply by 1.1. To convert g/yr to lb/yr, divided by 453.6.

The results of these emission estimates are significantly lower than estimates developed at proposal. For example, the estimate of baseline emissions of dioxin toxic equivalency (TEQ) was 5,100 grams per year (g/yr) at proposal; the current estimate is 150 g/yr. At proposal, the estimate of Hg emissions from existing MWI was 64.6 tons per year (tons/yr); the current estimate is 16.0 tons/yr.

The primary reason for the lower baseline emission estimate is the much greater level of emission control found at existing MWI than was assumed at proposal. Comment is requested on the methodology and assumptions used to estimate baseline emissions from existing MWI. Where information on specific air pollution control equipment was not available, EPA used State regulatory emission limits to predict the type of air pollution control equipment installed on each existing MWI. Information is requested which would more accurately reflect the actual air pollution control equipment installed on each existing MWI. In addition, emission factors for each type of air pollution control equipment were developed based on compliance test reports. Comment is requested on whether these emission factors reflect actual air emissions from these control devices over the life of the equipment.

At proposal, baseline emissions were also estimated for new MWI in the fifth year after adoption of the NSPS. These estimates were based on a projected number of new MWI and their associated emission controls that would be installed in the five years following promulgation of the standards. As with the estimation of baseline emissions for existing MWI, the estimate of baseline emissions for new MWI has also changed significantly. This change is due primarily to the lower projected number of new MWI and the emission control level associated with each MWI. The revised baseline emissions estimates for new MWI are presented in Table 11.

TABLE 11.—ANNUAL BASELINE EMISSIONS FOR NEW MWI

Pollutant, units	Baseline emissions
PM, Mg/yr	28
CO, Mg/yr	14
Dioxin g/yr	47
Dioxin g TEQ/yr	1.1
HCl, Mg/yr	64
SO_2, Mg/yr	28
NO_x, Mg/yr	130
Pb, Mg/yr	0.39
Cd, Mg/yr	0.051
Hg, Mg/yr	0.21

To convert Mg/yr to ton/yr, multiply by 1.1.
To convert g/y to 1b/yr, divided by 453.6.

The memoranda documenting these revised estimates of baseline emissions from new and existing MWI can be found in the docket as items IV-B–51 and IV-A–6.

F. Operator Training and Qualification

The proposed standards and guidelines included operator training and qualification requirements for each MWI operator. These operator training and qualification requirements included completion of (1) 24 hours of classroom instruction, (2) 4 hours of hands-on training, (3) an examination developed and administered by the course instructor, and (4) a handbook or other documentation covering the subjects presented during the course. The instructor of the operator training course was not to be employed by the owner or operator of the facility. To obtain qualification, an operator was to complete the training course and have either a minimum level of experience or satisfy comparable or more stringent criteria established by a national professional organization. The proposed standards and guidelines also required the owner or operator of the facility to develop and annually update a site-specific operating manual. This manual would summarize regulations, operating procedures, and reporting and recordkeeping requirements in accordance with the proposed standards and guidelines. The proposal required that each MWI be operated by a trained and qualified operator or by an individual under the direct supervision of a trained and qualified operator. The trained and qualified operator would have to be on duty and at the facility at all times while the incinerator is in operation.

Many comments were received on the proposed operator training and qualification requirements. The majority of the public comments on operator training and qualification were related to the third party training requirement and to the duration that operators must be present while the MWI is burning waste. Many commenters stated that the EPA should allow facilities the option of providing training by in-house personnel because the facility's own personnel would be most familiar with the operation and maintenance of the incinerator. The commenters indicated that smaller facilities that do not have the personnel could use the services of trainers and inspectors that are not affiliated with the facility.

Many commenters stated that the amount of time that the operator was required to be present was excessive. Under the proposal, the operator would have to be on-duty and at the facility during the time that the combustion air blowers are operating. Several commenters suggested that this would require operators to be at the incinerator even when waste was not being burned. Several commenters also suggested that the trained and qualified operator should be easily accessible (either at the facility or on-call) while the incinerator is operating.

The EPA is inclined to adopt the operator training and qualification requirements briefly summarized below and discussed in greater length in document number IV–B–26, which is available in the Docket. Cost estimates for operator training and qualification are documented in item IV–B–39.

The owner or operator of an MWI would be responsible for ensuring that one or more operators at the facility are qualified. Operator training may be obtained through a State-approved program or by completing a training course with (1) 24 hours of classroom instruction, (2) an examination designed and administered by the course instructor, and (3) reference material distributed to the attendees covering course topics.

Operators may obtain qualification by completing a training course and having one of the following levels of experience: (1) at least 6-months' experience as an MWI operator, (2) at least 6-months' experience as the direct supervisor of a qualified MWI operator, or (3) completion of at least two burn cycles under the observation of two qualified operators. To maintain qualification, the operator would be required to complete and pass an annual review or refresher course of at least 4 hours.

A fully trained and qualified operator would have to be easily accessible, either at the facility or on-call at all times while the incinerator is in operation. The trained and qualified operator may operate the MWI directly or be the direct supervisor of one or more individuals that charge waste, remove ash, etc. As proposed, the emission guidelines for existing MWI would require that, 1 year after approval of the State plan, MWI must be operated by a trained and qualified operator.

G. Testing, Monitoring, and Inspection

Section 129(c) of the Clean Air Act requires the EPA to develop regulations that include monitoring and testing requirements. The purpose of these requirements is to allow the EPA to determine whether a source is operating in compliance with the regulations.

As mentioned earlier, at proposal relatively few emission test reports were available to EPA to judge the performance of air pollution control technologies. These test reports were the result of EPA emission testing at several MWI. For a variety of reasons, EPA gathered data during these emission tests using three, 4-hour test runs. The results of the three test runs were then averaged at each MWI to calculate a measured emission level. This calculated emission level represented an average emission value over the 12-hour period (i.e., three, 4-hour runs).

As a result, EPA's assessments of the performance capabilities of air pollution control technologies and conclusions regarding the appropriate emission limits to include in the proposed regulations were based on the measured performance of technology averaged over a 12-hour period. Emission levels, however, tend to fluctuate somewhat as part of normal operation. Consequently, during short periods of time, emission levels may occasionally be greater or lower than the average emission level over a 12 hour period.

In developing a regulation based on the performance of a particular technology, the level of performance demanded by the regulation must be consistent with the level of performance that technology can achieve. The period of time over which emissions are measured and then averaged to determine compliance with the regulation, therefore, must correspond to the period of time over which emission levels were measured and averaged in determining the emission limits included in the regulation. If this is not the case, a regulation could include emission limits that a technology can achieve if emissions are averaged over a relatively long period of time, but not if emissions are averaged over a much shorter period of time. For this reason, the proposed regulation required emission testing to determine compliance by averaging the results of three, 4-hour test runs, consistent with the procedures followed in gathering the emission data used to establish the emission limits included in the regulation.

Many comments were received regarding this proposed requirement to determine compliance using three, 4-hour test runs. These commenters noted that a 4-hour test run was much longer than the more conventional test run of about 1-hour; additionally, many hospitals and healthcare facilities would normally not have sufficient waste on hand to accommodate three, 4-hour test runs. Finally, several commenters stated that the proposed emission testing requirements would substantially increase the costs associated with emission testing. Consequently, these commenters urged EPA to revise the emission testing requirements and adopt the more conventional approach of relying on test runs of about an hour in length.

As mentioned earlier, more than two dozen test reports were submitted to EPA following the proposal, and these test reports now form the basis for revised conclusions regarding the performance capabilities of technology and the emission limits these technologies can achieve. The EPA test methods were used to perform the emission testing summarized in these reports. These methods include procedures that require the collection of a sufficient sample to accurately measure emission levels. For most air pollutants, this sample generally corresponds to a test run of about an hour. The revised conclusions discussed earlier, therefore, regarding the performance capabilities of emission control technologies and the emission limits these technologies can achieve, are based (for the most part) on emission test data generated by averaging the results of three test runs of about an hour each (i.e., a 3-hour test).

For this reason, the EPA is inclined to state in the final regulations adopted for MWI that EPA test methods be followed when performing any emission testing required to determine compliance with the regulations. This requirement will ensure that compliance testing follows the same procedures used to generate the emission data upon which the emission limits in the final regulation were based. In most cases, three test runs of about an hour each would be necessary to determine compliance with the final regulations.

An exception to this requirement is emission testing to measure dioxin emissions. The procedures in the EPA test method to ensure sufficient sample is gathered to accurately measure dioxin emissions frequently leads to test runs longer than 1 hour. Whatever the length of the emission test, however, the emission testing procedures included in the EPA test method for measuring dioxin emissions were followed in the emission test reports submitted to EPA following proposal. As discussed earlier, these emission test reports serve as the basis for the dioxin emission limits included in the final regulations and, as a result, the length of testing necessary to determine compliance will automatically be consistent with the length of testing used to determine the emission limits included in the regulations.

The proposed regulations also would have required annual emission testing to determine compliance. While some commenters supported emission testing annually or even more frequently (such as every 6 months), a number of commenters believed that annual testing would be unnecessary or that testing should be required no more than every 5 years. Commenters felt that the requirements for inspections, monitoring, and operator training are sufficient and much less expensive than annual emission testing.

Other commenters suggested that the annual emission testing requirement be replaced with a requirement for annual equipment inspection/maintenance to ensure that burner settings, air flow rates, and other operation parameters are properly adjusted. While the proposal includes a requirement for annual equipment inspection and maintenance, this requirement would have applied only to existing MWI until air pollution control equipment had been installed and the MWI was in compliance with all the emission limits in the regulations. The purpose of the proposed annual equipment inspection and maintenance requirements was to ensure that the MWI was in good working order and physically capable of operating as well as it could operate until compliance with the emission limits was demonstrated. A MWI in poor operating condition will likely have higher emissions than a MWI in good operating condition.

While some commenters stated inspections are not necessary and others suggested that EPA should let the States decide whether inspections are necessary, most commenters were generally supportive of annual inspection and maintenance requirements. Several commenters also stated that biannual inspections would not be unreasonable. Many of the commenters supportive of inspection requirements, however, suggested that the requirement for a ''third party'' inspection be deleted. These commenters stated in-house personnel are more familiar with the details and operating intricacies of the equipment installed at their sites. In addition, serious liability concerns could arise from injury or damage caused by ''third party'' inspection or maintenance. At this point, EPA is inclined to include inspection and maintenance requirements wherever annual stack testing is not required (see document IV-B–26 in the docket for a description of injection/maintenance requirements). The inspection would not have to be conducted by a third party.

The proposal also included various monitoring requirements, requiring the use of continuous emission monitoring systems (CEMS) for some pollutants and the monitoring of operating parameters for other pollutants. Some commenters supported the proposed requirements for CO, opacity, and oxygen (O_2) CEMS. Another commenter suggested that the requirements should be extended to require CEMS for Hg, HCl, and PM; the commenter suggested that such instruments are available. On the other hand, several other commenters objected to the CEMS requirements in the proposed rule. These commenters stated that CEMS are not justified, especially for small MWI, because they are too expensive. These commenters believe that monitoring operating parameters is a sufficient substitute for CEMS once compliance has been demonstrated by an initial emission test.

The monitoring requirements in the proposal for monitoring operating parameters were structured around the use of dry scrubber systems. Those who commented on these specific requirements generally agreed that monitoring of these operating parameters was appropriate for dry scrubbing systems.

No monitoring requirements were included for monitoring operating parameters for wet scrubbing systems. The EPA solicited information regarding an appropriate set of operating parameters for wet scrubbing systems. The EPA was inclined and is still inclined to include specific operating parameter monitoring requirements in the final regulations for wet scrubbing systems as well as for dry scrubbing systems. To accommodate MWI using an air pollution control system other than a dry or wet scrubbing system, EPA is inclined to include provisions in the final regulations for petitioning the Administrator to monitor specific operating parameters associated with the other air pollution control system.

A number of commenters responded to EPA's request for suggestions of monitoring requirements for operating parameters suitable for wet scrubbing systems. Suggested parameters included pressure drop across the system, liquor flow rate, flue gas temperature, liquor pH, and horsepower or amperage. While EPA is inclined to include the same requirements in the final regulations for monitoring operating parameters for dry scrubbing systems as proposed, EPA is inclined to include requirements in the final regulations for monitoring the following operating parameters for wet scrubbing systems: scrubber exit temperature, scrubber liquor pH, scrubber liquor flow rate, and energy input to the scrubber (e.g., pressure drop or horsepower).

To consider the comments outlined above regarding the frequency of emission testing and the proposed inspection and monitoring requirements, a matrix of options was developed. This matrix of options and their annual costs are summarized in Table 12. Each cell or box in this table represents a combination of emission testing and monitoring requirements (some combinations also include inspection requirements). The range in the costs shown in each cell is a reflection of how the cost of emission testing and monitoring is likely to vary depending on the emission limits included in the final regulation (i.e., whether the emission limits are based on the use of good combustion alone or good combustion *and* wet or dry scrubbing). These costs vary somewhat because the operating parameters monitored in each case would be somewhat different.

TABLE 12.—MONITORING/TESTING OPTIONS AND ANNUAL COSTS

[Thousand $/yr]

Monitoring options	Testing options		
	A Initial and repeat stack testing	B Initial stack testing; inspection	C Substitute stack testing; inspection
1—CO CEMS (App F); Opacity CEM (no App F); Operating Parameters	110–119	100–104	99–102
2—Opacity and CO CEMS (no App F); Operating Parameters	96–104	85–89	83–86
3—Opacity CEMS (no App. F); Operating Parameters	37–46	27–31	26–29
4—Operating Parameters; Quarterly Method 9	10–15	7.5–11	5.8–8.8

Table 12 presents the 12 possible combinations of three emission testing options and four monitoring options that the EPA is considering including in the final regulations. A more detailed explanation of these emission testing and monitoring options, as well as their costs, is available in the docket as item IV–B–54. The following discussion, however, briefly outlines the essential requirements of each of the monitoring and emission testing options.

Monitoring Option 1 requires a CO CEMS with Appendix F requirements (Appendix F requirements ensure the data generated is reliable), an opacity CEMS without Appendix F requirements, and operating parameter monitoring requirements for the MWI and, if applicable, for the air pollution control device. Because the use of Appendix F is required under this option, the CO CEMS would be used for direct enforcement of the CO emission limit. The opacity CEMS without Appendix F requirements would simply provide an indication of opacity and would not be used for direct enforcement of the opacity limit. Routine opacity testing with Reference Method 9 is included in Monitoring Option 1 to compensate for not including Appendix F requirements on the opacity CEMS.

Monitoring Option 2 is the same as Monitoring Option 1, except that it would not include Appendix F requirements for the CO CEMS, which would reduce costs. Without Appendix F requirements, the CO CEMS would provide an indication of CO emissions and would not be used for direct enforcement of the CO emission limit. Emission testing for CO is included in Monitoring Option 2 to compensate for excluding Appendix F requirements on the CO CEMS. An opacity CEMS and operating parameter monitoring would be required as in Monitoring Option 1.

Monitoring Option 3 is the same as Monitoring Option 2, except that, instead of the more expensive CO CEMS, stack emission testing for CO would be required. An opacity CEMS and operating parameter monitoring would be required as in Monitoring Options 1 and 2.

Monitoring Option 4 would require no CEMS. Instead, it would rely on manual emission test methods (including more frequent Method 9 opacity tests) and operating parameter monitoring.

For each of these monitoring options, three emission testing options have been developed. Emission testing Option A would require initial and annual/skip tests. With the annual/skip test requirement, emission tests would be required for the first 3 years. If these tests show that the facility was in compliance each of these 3 years, then subsequent testing would be done every third year. Emission testing Option A, under all four monitoring options, would require an initial stack test for all pollutants. Annual or skip emission testing under Monitoring Options 1, 2, and 3 would also require emission testing of all pollutants. However, annual or skip emission testing under Monitoring Option 4 would only require emission testing of a few key or critical pollutants (i.e., only those necessary to gain a good indication that the air pollution control system is operating properly).

Emission testing Option B would require an initial emission test for all pollutants, but would not require annual emission tests. In lieu of annual or skip emission testing, MWI inspection/maintenance would be required. This inspection/maintenance would be required annually under Monitoring Options 1 and 2; however, it would be required quarterly under Monitoring Options 3 and 4, where no CO CEMS is required. The inspection/maintenance could be done by in-house personnel. With regard to any necessary repairs arising from the inspection/maintenance, the owner or operator of the MWI would be required to contact the State (or local, if delegated by the State) air pollution control agency and negotiate a date, within 10 operating days following the date of the inspection/maintenance, by which the repairs must be completed.

Emission testing Option C would permit substitute emission testing. A substitute emission test is an emission test conducted on another, but identical MWI. An MWI would be required to petition the State (or local, if delegated by the State) air pollution control agency for approval, however, and the ''burden of proof'' would be on the MWI to demonstrate to the satisfaction of the agency that the substitute emission test is on an identical MWI. In addition, an initial emission test for Hg would be required; this test would ensure that appropriate measures for managing the mercury content of the waste are utilized (e.g., material separation, material purchasing, etc.). Inspection/maintenance requirements would be the same as under Emission Testing Option B.

The most direct means of ensuring compliance with emission limits included in regulations is the use of CEMS. As a matter of policy, the first and foremost option considered by EPA is to require the use of CEMS in regulations to demonstrate and ensure compliance on a continuous basis with the regulations. Only when the impacts of including such requirements are considered unreasonable, does the EPA consider other options.

For MWI, it appears that almost all of the emission testing and monitoring options under consideration cost more than the emission control system that would be installed to meet the emission limits in the regulations; in some cases, the emission testing and monitoring requirements could cost twice as much as the emission control system. Consequently, the Agency is inclined to include the emission testing and monitoring requirements under Monitoring Option 4 in the final regulations to minimize costs. Where the regulations are based on good combustion *and* wet and/or dry scrubbing systems, the EPA is inclined to require Monitoring Option 4 with Emission Testing Option A; where the regulations are based, in part, on the use of good combustion alone, the EPA is inclined to require Monitoring Option 4 with Emission Testing Option B.

The appropriate choice of emission testing and monitoring requirements (as well as inspection/maintenance requirements) is an area in which the EPA specifically solicits comments. Many of the MWI visited or inspected by the EPA in the course of gathering data and information often appeared poorly maintained and operated. Inadequate maintenance and/or operation can cause even the best equipment to perform poorly and result in excess emissions. The inspection/maintenance and operator training requirements included in the final regulations are expected to address this problem in a satisfactory manner; however, the EPA is interested in whether others feel the inspection/maintenance requirements and operator training requirements should be supplemented with more extensive emission testing and/or monitoring requirements.

In addition, CEMS vendors have expressed concern with the costs developed by EPA for the various CEMS and operating parameter monitoring requirements. In particular, they believe the costs of CEMS are much lower than those estimated by EPA. As mentioned, a detailed breakdown of the EPA estimates of the costs of these requirements is available in the docket as item IV–B–54. The EPA solicits comments on these costs and if costs are indeed much lower than estimated, EPA may consider more comprehensive monitoring requirements in the final rule. Finally, even if the costs remain similar to those previously estimated, the EPA is considering more comprehensive emission testing and monitoring requirements (including CEMS) for large MWI that burn medical waste generated offsite (i.e., generated at another location than that of the MWI).

Definition of Medical Waste

Section 129 of the Clean Air Act directs the EPA to adopt regulations for solid waste incineration units that combust (1) municipal waste; (2) hospital, medical, and infectious waste; (3) commercial or industrial waste; and (4) all other solid waste. The regulations limiting air emissions from solid waste incineration units combusting municipal waste (otherwise known as municipal waste combustor(s) or MWC) were promulgated on December 19, 1995 (60 FR 65387). In developing regulations to limit air emissions from solid waste incineration units combusting hospital, medical, and infectious waste (otherwise known as medical waste incinerator(s) or MWI), medical waste was defined as any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals.

Section 129(g)(6) states that the term ''medical waste'' shall have the meaning ''established by the Administrator pursuant to the Solid Waste Disposal Act'' (SWDA). For the proposed air emission standards and guidelines for MWI, EPA adopted the definition of ''medical waste'' from solid waste regulations codified in 40 CFR part 259, subpart B because this definition was ''established by the Administrator pursuant to the [SWDA],'' as amended by the Medical Waste Tracking Act (MWTA). However, 40 CFR part 259 has since been withdrawn. Consequently, there is no definition of medical waste which has been ''established by the Administrator pursuant to the [SWDA],'' and EPA now has the flexibility to examine and consider other definitions of medical waste. While EPA is inclined to adopt a specific definition described below, EPA is considering all of the definitions discussed in this section as well as the proposed definition and solicits comment on the merits of each definition discussed as well as other definitions EPA should consider.

During the public comment period, the majority of the comments on the definition of medical waste stated that the proposed definition was too broad and that it should be narrowed. Several commenters stated that this definition would aggravate an already confusing situation, where the public distinction between the terms medical waste and infectious waste has become blurred and in most cases lost; these terms are often used synonymously in public discourse.

These commenters believed that a broad definition of medical waste in the regulations for MWI would have the undesirable impact of fostering and encouraging the use and adoption of this definition in other areas and by other regulatory authorities. They suggested that as this definition becomes more widespread and adopted by others, healthcare facilities would eventually be forced to handle most, if not all, medical waste as infectious waste—whether it was burned in an incinerator or not.

These commenters stated the proposed definition of medical waste, because of the loss of public distinction between this term and the term infectious waste, and the resulting impact of eventually forcing healthcare facilities to treat most waste as infectious waste, would lead to a massive increase in the volume of infectious waste. This increase would, in turn, lead to a major increase in the costs of disposal of waste from hospitals, since most waste would have to be handled as infectious waste.

These commenters stated that, as in implementing the MWTA, healthcare facilities should be viewed as generating two waste streams: a medical waste stream, which is usually defined by the potential for disease transmission and requires special handling; and a noninfectious waste or ''healthcare trash'' waste stream, which has no potential for infection and is treated and handled as municipal waste. These commenters urged EPA to narrow the definition of medical waste used in the MWI regulations to one of infectious waste, analogous to the term ''regulated medical waste'' adopted in regulations resulting from the MWTA.

In most—if not all—cases, these commenters indicated that, where healthcare facilities operate medical waste incinerators, they burn infectious medical waste or a mixture of infectious medical waste and noninfectious waste (i.e., healthcare trash). These commenters stated that there were very few, if any, medical waste incinerators operated by healthcare facilities that burned only noninfectious waste or healthcare trash.

Consequently, by defining medical waste narrowly, in a manner consistent with infectious or regulated medical waste, and by applying the regulations to incinerators that burn this waste or any mixture of this waste and other waste, the EPA could achieve the objective, which is regulating air pollution from medical waste incinerators at healthcare facilities; this objective would be achieved without adding to the confusion or leading to the serious impacts outlined above.

These commenters further stated the proposed definition of medical waste would subject MWC, which burn general nonregulated and noninfectious waste from hospitals, to the same requirements as those proposed for MWI. Consequently, even if healthcare facilities were not eventually forced to handle most waste as infectious waste (because MWC that burn general nonregulated and noninfectious waste from hospitals would be subject to the MWI regulations) this broad definition would result in higher disposal costs for healthcare facilities which send their general nonregulated and noninfectious waste to MWC for disposal.

Some commenters, on the other hand, support the proposed broad definition of medical waste. These commenters pointed out that there is little difference in the air emissions created by burning infectious medical waste (e.g., regulated medical waste or ''red bag'' waste) and by burning noninfectious waste (e.g., nonregulated medical waste or healthcare trash). As a result, the regulations should apply to the burning of all medical waste, as EPA proposed. These commenters believe that EPA's use of the broad definition of medical waste, solely for the purpose of defining what type of incinerator the regulations apply to, does not imply that more waste or that all medical waste will be considered infectious waste. Merely requiring that incinerators that burn medical waste must limit air pollution will not require all healthcare facilities to handle all their medical waste as infectious waste.

In fact, these commenters indicated that many healthcare facilities today routinely separate their waste into two types: infectious waste (''red bag'') and noninfectious waste (''black bag''). Numerous items of waste from healthcare facilities are not, nor need not be considered infectious waste. On the other hand, many healthcare facilities today do little to separate their waste streams; most waste is handled and treated as infectious waste. If waste disposal costs were of paramount concern to healthcare facilities, those that do little separation today could reduce their present waste disposal costs by more carefully segregating their waste into infectious and noninfectious waste streams and properly disposing of these two waste streams.

Finally, several commenters questioned whether animal carcasses and pathological waste should be included in the definition of medical waste. These commenters were uncertain as to whether pathological waste incinerators were to be regulated as MWI or separately. These commenters requested clarification of this situation and urged EPA to regulate pathological wastes separately from medical waste.

Similarly, several commenters questioned whether ''out-of-date'' or ''off-spec'' drugs, or radio-active type medical wastes, should be included in the definition of medical waste. These commenters requested special treatment for these types of wastes, similar to that proposed for pathological wastes.

The EPA did not intend to add or contribute to the confusion that presently exists in the public discourse regarding the distinction or lack of distinction between the terms medical waste, regulated medical waste, and infectious medical waste. In fact, the EPA would like to state very clearly that numerous items within the medical waste stream are noninfectious and need not be treated as infectious. In fact, the majority of items in the medical waste stream are noninfectious, and in terms of percentages, most authorities conclude that only 10 to 15 percent of the items in the medical waste stream are infectious, or potentially infectious, and warrant special treatment or handling.

In considering the public comments, an interesting and unanimous agreement emerges, even if it is not stated as such. All of the commenters seem to agree that healthcare facilities can be viewed as generating two waste streams: an infectious medical waste stream and a noninfectious healthcare trash, or ''municipal waste'' type, waste stream. The challenge for EPA, therefore, is to reconcile the agreement in this area with the requirement of the Clean Air Act to develop regulations for incinerators burning hospital, medical, and infectious waste.

The Clean Air Act requires EPA to develop regulations for the burning of medical waste; but it also requires EPA to develop regulations for the burning of municipal waste. In fact, EPA adopted regulations limiting air pollution from the burning of municipal waste on December 19, 1995 (60 FR 65387). As a result, if healthcare facilities are viewed as generating two types of waste streams, an infectious waste stream and a municipal waste stream, then the burning of the municipal waste stream is already covered by regulations.

The definition of municipal waste included in the regulations covering the burning of municipal waste states:

> Municipal solid waste * * * means household, commercial/retail, and/or institutional waste * * * Commercial/retail waste includes material discarded by stores,

offices, restaurants * * * Institutional waste includes materials discarded by schools, nonmedical waste discarded by hospitals, * * * and material discarded by other similar establishments or facilities.

The regulations cover the burning of municipal waste discarded from offices and institutions. Hospitals are cited as an example of an institution and clinics and nursing homes are considered ''similar establishment(s)''. Offices include doctors' offices, dentists' offices, etc. Consequently, noninfectious, municipal-type waste discarded from healthcare facilities is considered part of the municipal waste stream and is covered by the regulations adopted for the burning of municipal waste.

The remaining need, therefore, is to regulate the burning of the infectious waste stream discarded from healthcare facilities, which can be achieved by redefining medical waste in terms of infectious or potentially infectious materials. Thus, the EPA is inclined to narrow the applicability of the proposed regulations by adopting a definition of medical waste that focuses on that portion of the overall medical waste stream that is generally considered infectious or potentially infectious.

Given the confusion and number of varying definitions of medical waste, regulated medical waste, infectious waste, etc., at the Federal and State level, and within the healthcare community, transportation sector, etc., EPA does not intend to add to this confusion by creating another definition. As a result, EPA is inclined to adopt a definition of medical waste, for the MWI regulations, from among those already in use.

As mentioned, numerous definitions are currently in use, such as the definition of infectious waste created by the U.S. Department of Transportation, the definition of regulated medical waste created by EPA, as well as other definitions created by other regulatory agencies and national associations, such as the Occupational Safety and Health Administration, the New York State Department of Health, the American Hospital Association, etc. While these are just a few of the agencies or associations that have developed definitions of medical waste that are currently in use, they are the ones most often cited or suggested in the public comments. Each of these definitions are slightly different, but all focus on infectious or potentially infectious medical waste. These definitions are discussed in more detail in document number IV–B–25, available in the Docket.

For the most part, infectious or potentially infectious wastes are defined through the use of categories or classes of wastes. The classes of wastes most commonly used include:

1. Cultures and stocks of infectious agents;
2. Human pathological wastes;
3. Human blood and blood products;
4. Used sharps;
5. Animal wastes;
6. Isolation wastes; and
7. Unused sharps.

These seven waste classes are commonly used by various agencies and associations as the basis for defining medical wastes. However, while the classes of wastes included in two different definitions may be identical, the specific items included under each class and the definitions for these items may be very different. Each agency or association has developed different language to define each of these waste classes in a way that best serves their purposes. For example, some definitions include intravenous (IV) bags under class 3 wastes, while others do not.

It appears that adoption of any one of these definitions or any definition at all will be controversial. No uniform or widespread agreement on a definition exists, and for each commenter who argued strongly for adoption of one particular definition, another commenter argued equally strongly for adoption of a different one.

Of all these definitions, EPA is inclined to adopt the New York State Department of Health (NYSDOH) definition, which is one of the more recently developed definitions for use in the MWI air pollution emission regulations. This definition was subjected to intense discussion, consideration, and review within the medical and healthcare community. Because it was adopted fairly recently, this definition also benefits from the various controversies and discussions generated by adoption of earlier definitions by other agencies and associations. Further, this definition seems to be among the more comprehensive ones in terms of identifying and defining the various classes of infectious or potentially infectious medical waste mentioned above.

The NYSDOH definition includes six of the seven waste classes; isolation wastes (class 6) are not listed as a separate category. The definitions used for waste classes 1, 2, 4, and 7 are similar to those used by the MWTA definition. As with the AHA definition, the NYSDOH definition differs from the MWTA definition in the specifics of class 3 wastes. Class 3 waste under the NYSDOH definition does not include items caked with dried blood or IV bags. These wastes are included in the MWTA definition of class 3 waste. The definitions for class 5 waste only includes wastes from animals exposed to infectious agents during research, the production of biologicals, or the testing of pharmaceuticals. Pathological waste from veterinary facilities is excluded from the MWTA definition. The NYSDOH defines class 5 wastes as wastes from animals known to be contaminated with infectious agents or from animals inoculated during research, the production of biologicals, or pharmaceutical testing. Unlike the MWTA definition, the NYSDOH definition seems to include some wastes (from animals contaminated with infectious agents) generated by general veterinary practices. The specifics of this definition are included in item IV–J–078 in the docket).

Also, as stated at proposal, the EPA is inclined to exclude crematories and incinerators used solely for burning pathological waste (human or animal remains and tissues) from the medical waste incinerator regulation. However, MWI that burn animal and pathological waste co-mingled with other classes of medical waste would be subject to the regulation. Because MWI that burn mixtures of medical and pathological (or animal) waste would be covered by the regulation, it is necessary to include a description of pathological and animal waste in the definition of medical waste. Human pathological waste and animal waste are included in the NYSDOH definition of medical waste.

In addition, the EPA is inclined to exclude from the regulation incinerators used solely for burning ''off-spec'' or ''out of date'' drugs or pharmaceuticals, as well as incinerators used solely for burning radio-active type medical wastes. In other words, as several comments suggested, the EPA is inclined to treat these wastes in a manner similar to pathological waste.

While EPA is inclined to exclude these types of wastes from the regulation for MWI, this exclusion does not mean that EPA will not develop regulations which will cover these wastes. The Clean Air Act clearly directs the EPA to develop regulations to cover burning of these wastes. Thus, this inclination to exclude them is only to temporarily defer regulation.

The Clean Air Act directs the EPA to develop regulations for all solid waste incinerators, and burning these wastes will be covered by regulations developed within the next few years. The Clean Air Act also directs the EPA to announce a schedule for development of these other regulations, and the EPA has announced these regulations will be developed by the year 2000.

I. Pyrolysis Units

Incineration is only one of several medical waste treatment technologies. Other treatment technologies, such as autoclaves, microwaves, and chemical treatment, where there is clearly no combustion occurring, are referred to in this notice as ''alternative technologies'' and are discussed further in Section II.J. These ''alternative technologies'' clearly are not subject to MWI regulations. On the other hand, some medical waste treatment technologies employ plasma or gasification processes (i.e., pyrolysis). Because it appears that at least some combustion is taking place in these devices, EPA considered these pyrolysis technologies covered by the proposed MWI regulations.

Comments from the vendors of pyrolysis technologies indicated they believed they could easily meet the emission limitations included in the proposed MWI standards and guidelines. However, they believed that their processes are unique enough to warrant a separate category for regulation. The vendors were particularly concerned that the proposed compliance and monitoring requirements for MWI do not apply to pyrolysis technologies. The proposal, therefore, requested comment on whether pyrolysis units should be regulated as MWI or as a separate source category.

Numerous comments and suggestions were received following proposal from vendors of pyrolysis treatment technologies. Based on these comments and suggestions, a draft regulation for pyrolysis treatment technologies has been developed and is available in the docket as item IV–B–56. This draft regulatory text is incomplete at this time. It includes placeholders and requests for information where such information is lacking. Comments are requested to help EPA fill in this missing information.

A separate regulation for pyrolysis treatment technologies would look very similar to the MWI regulation in that it would contain definitions, emissions limitations, monitoring and testing requirements to demonstrate compliance, and reporting and recordkeeping requirements. It would differ from the MWI regulations in that some definitions would be different, the emission limitations would, in many cases, be more stringent than the MWI regulations, and the monitoring and testing requirements would reflect the operating parameters that are unique to pyrolysis systems.

The EPA is inclined to adopt separate regulations for pyrolysis treatment technologies. The EPA specifically requests comment on the merits of continued development of separate regulations for pyrolysis systems. These systems appear to be very different than incinerators. Because they are emerging technologies, however, the normal process of determining a MACT floor and MACT for these systems is not possible at this time. In fact, because they appear to be inherently clean technologies, regulation of these systems may not be warranted at this time.

J. Alternative Medical Waste Treatment Technologies

In the proposal, it was estimated that many owners of existing onsite MWI would discontinue use of their existing MWI in favor of less expensive medical waste disposal options to avoid the high cost of add-on air pollution control equipment. In addition, many facilities that would have chosen to purchase a new onsite MWI were estimated to be likely to choose some other method of waste disposal. This phenomenon was labeled as ''switching'' in the proposal, and it has already occurred in a few States that have adopted stringent MWI regulations in the past few years.

Next to onsite incineration, the two most common methods of medical waste disposal are (1) offsite contract disposal, which usually involves larger, commercial incinerators dedicated to medical waste and (2) onsite alternative medical waste treatment technologies, which include steam autoclaving, chemical treatment, and microwave irradiation. Because the MWI regulation may encourage switching and the use of onsite alternatives, the possible impacts of other waste disposal methods were assessed. Although autoclaves, chemical treatment systems, and microwave systems are not covered by the MWI standards and guidelines, commercial medical waste incinerators would be subject to the MWI standards and guidelines.

Following proposal, new data on commercial disposal facilities throughout the U.S. were obtained. Information on the costs of commercial disposal for medical waste generators in both urban and rural locations was obtained. Also, information on the environmental impacts of increased transportation of medical waste was developed. This new information pertaining to commercial disposal was factored into the economic and environmental impacts analyses presented in Sections III and IV of this notice. The remainder of this section will focus on information relating to nonincineration alternative technologies (i.e., autoclaves, chemical treatment, microwave irradiation, etc.).

During the public comment period following proposal, several concerns were raised regarding the availability, effectiveness, costs, and environmental impacts of onsite alternative treatment technologies. Concerns were also raised regarding alternative technology operator safety and State acceptance of alternative technologies. Because of the concerns raised during the public comment period, the Agency has examined the available information on the effects that switching from onsite incineration to alternative technologies could have on medical waste generators and the environment.

Following proposal, a great deal of information on alternative technologies was received. This information was compiled and is presented in document No. IV–B–43. The material presented in document IV–B–43 should not be considered an in-depth study of alternative technologies. Instead, it is a review of the available information. Based on this information, there appears to be no significant or substantial adverse economic, environmental, or health and safety issues associated with the increased use of these nonincineration alternative medical waste treatment technologies.

The most widely used nonincineration alternative technologies are autoclaves, chemical treatment systems, and microwave systems. In autoclaves, the effects of heat from saturated steam and increased pressure are used to decontaminate the medical waste. In chemical treatment systems, an antimicrobial chemical, such as sodium hypochlorite, chlorine dioxide, or peracetic acid, is used to decontaminate the waste. In microwave technologies, medical waste is wetted and heated to decontaminating temperatures with microwave irradiation.

Most alternative technologies are equipped with a shredder or grinder that is used to reduce the volume of the waste by up to 80 percent and render the waste unrecognizable. In some alternative technologies, the waste is compacted, and the waste volume is reduced by 50 percent. With most alternative technologies, the mass of the waste is not reduced due to the entrainment of liquids that are added during treatment.

Because shredding or grinding pathological and animal waste may present aesthetically unacceptable results, most alternative technologies are not suitable treatment methods for these types of waste. Also, alternative technologies are usually unable to effectively treat chemotherapy, hazardous, or low-level radioactive wastes. The total waste stream at a typical hospital contains less than 3 percent by weight of pathological, animal, chemotherapy, hazardous, and low level radioactive wastes. Facilities using alternative technologies usually package this portion of the waste and send it to a commercial disposal facility.

The efficacy of autoclave, microwave, and other thermal treatment technologies depends primarily on the treatment time and temperature. The efficacy of chemical treatment systems depends on the treatment time and the chemical concentration. The most widely used criteria for determining the efficacy of an alternative technology in decontaminating the waste was developed by the State and Territorial Association of Alternate Treatment Technologies (STAATT). The STAATT criteria recommends, as a safe and satisfactory level of medical waste treatment, the inactivation of vegetative bacteria, fungi, lipophilic/hydrophilic viruses, and mycobacteria at a 6 Log_{10} reduction or greater and the inactivation of Bacillus subtilis or Bacillus stearothermophilus at a 4 Log_{10} or greater. Efficacy test reports indicate that autoclave systems, chemical treatment systems, and microwave systems can meet and exceed the STAATT efficacy criteria. Therefore, the most widely used alternative treatment technologies seem to be effective methods of decontaminating medical waste.

In most States, alternative technologies must undergo an approval or permitting process before they can be installed in the State. As long as the technology can demonstrate that it meets the State's efficacy requirements, which are usually similar to, if not the same as, the STAATT criteria, the technology can be installed, unless the State determines that the technology is unacceptable for some other reason. The State approval or permitting process usually takes less than a year. Many alternative technology vendors have gained approval of their systems in a number of States so that less time will be required for review of the technology by State regulatory agencies before the system is installed.

There are some 20 vendors of alternative technologies (i.e. autoclaves, chemical treatment systems, and microwave systems) that have a considerable number of installations. These vendors, when combined, have about 150 years of experience in the medical waste business. Some of these vendors have more than 15 years of experience alone. These vendors are responsible for approximately 975 alternative technology installations, which range in capacity from 12 to 8,000 pounds of medical waste treated per hour. An additional 17 alternative technology vendors were identified with systems that are under development and are expected to appear on the market in the near future.

Alternative technologies seem to be available, and many vendors have been in the medical waste business for many years. With the number of vendors that have alternative technologies under development, the alternatives industry appears to be growing. Alternative technology vendors claim they will be able to meet any increased demand for onsite alternative systems due to switching.

The results from reports on the air emissions from autoclaves show that there are some emissions of volatile organics from autoclaves. However, the test reports also show that the emissions of Pb, Cd, Hg, HCl, and PM from autoclaves are insignificant when compared to emissions of the same pollutants from MWI. No information on dioxin emissions from autoclaves was available. The available data on the air emissions from autoclaves shows that these emissions are more organic than the acid gas and metal emissions from MWI. Furthermore, it appears that on a pound of pollutant per pound of waste basis, far less total emissions are produced from treating medical waste in an autoclave than from burning waste in an MWI.

No data is available on the air emissions from chemical treatment systems and microwave systems. However, some States require chemical treatment systems to obtain air permits. The emissions from microwave systems are likely to be similar to those from an autoclave since lower temperatures are used during microwaving and the only component added is water.

Based on the information received, there does not appear to be any water pollution from the liquid effluents of autoclaves and chemical treatment systems and no liquid effluent from microwave treatment systems. The results of Toxicity Characteristics Leachate Procedure (TCLP) tests conducted on waste treated in an autoclave and a chemical treatment system were far below the regulatory threshold for metals and organics. Since the only component added to waste that is treated in a microwave system is water, the TCLP tests conducted on microwaved waste should produce similar results to those of autoclaved waste.

The annualized price per pound of medical waste treatment with an alternative technology is comparable to the price per pound associated with other methods of medical waste treatment and disposal. For facilities that wish to treat their medical waste onsite with an alternative technology, but do not have the capital to purchase an alternative system, options for leasing or renting an alternative technology are available. According to alternative technology vendors, leasing onsite medical waste treatment technologies is a common practice. Most lease agreements are available either through the alternative vendor directly or through a third party leasing company.

The results from a survey of hospitals that are currently using autoclaves, chemical treatment systems, and microwave systems indicate that these hospitals are pleased with the operation of their alternative medical waste treatment systems. The hospitals indicated that problems with shredder jams are rare and that odors are minimal with the alternative systems. The surveyed hospitals reported that the alternative technologies are cost effective and easy to operate. The hospitals also indicated that the waste treated in their alternative systems is readily accepted at local landfills. Further, the hospitals indicated that they would recommend their alternative technology as a method of medical waste treatment.

The potential hazards associated with medical waste treatment arise primarily from the presence and handling of infectious waste. Therefore, the potential hazards of medical waste treatment are similar for operators of all medical waste treatment technologies, including MWI. Few, if any, additional hazards are associated with alternative technologies that have not already been associated with medical waste incineration.

III. Regulatory Options and Impacts for Existing MWI

As discussed earlier, the MACT ''floor'' defines the least stringent emission guidelines the EPA may adopt for existing MWI. However, as also discussed earlier, the Clean Air Act requires the EPA to examine alternative emission guidelines (i.e., regulatory options) more stringent than the MACT floor. The EPA must consider the cost, environmental, and energy impacts of these regulatory options and select one that reflects the maximum reduction in emissions that EPA determines is achievable (i.e., MACT).

At proposal, the EPA concluded all existing MWI would need good combustion and dry scrubbers to meet the MACT floors for CO, PM, and HCl. Consequently, EPA was left to consider only two regulatory options for MACT. The first regulatory option reflected the floor (i.e., emission limitations achievable with good combustion and dry scrubbers). The second reflected emission limitations achievable with good combustion and dry scrubbers with activated carbon injection. Based on the cost, environmental, and energy impacts of the second regulatory option relative to the first option, EPA selected the second option as MACT. Consequently, EPA proposed emission guidelines for existing MWI based on the use of good combustion and dry scrubbers with activated carbon injection.

As discussed earlier in this notice, EPA received numerous comments containing substantial new information following proposal. Based on this information, new conclusions concerning the MWI inventory, MWI subcategories, performance of emission control technologies, MACT floors, and monitoring and testing options have been reached. As a result, EPA now believes there are several new regulatory options that merit consideration in selecting MACT for existing MWI. The following sections summarize these new regulatory options and the EPA's initial assessment of their merits.

A. Regulatory Options

As discussed earlier, new MACT floor emission levels were developed for small, medium, and large MWI. To assess the impacts of regulatory options, EPA must first consider what emission control technology(s) existing MWI may need to meet regulations based on these floor emission limits. The floor for small existing MWI appears to require good combustion; add-on wet scrubbing systems would not be necessary to meet the MACT floor. For medium existing MWI, the MACT floor appears to require good combustion and a moderate efficiency wet scrubber. The MACT floor for large existing MWI appears to require good combustion and a high efficiency wet scrubber.

Having identified these control technologies, the EPA is now able to review the performance capabilities of other emission control technologies and identify those that are capable of achieving even greater emission reductions. This review enables EPA to identify regulatory options more stringent than the floor that could be selected as MACT.

For small existing MWI, as mentioned above, good combustion is the emission control technology most MWI would probably need to meet the MACT floor emission levels. Therefore, this technology serves as the basis for the first regulatory option for the MACT emission guidelines for small existing MWI. Based on the performance capabilities of various emission control technologies, however, using low efficiency wet scrubbing systems in addition to good combustion could achieve greater emission reductions. This combination would achieve further emission reductions in PM and dioxins, as well as HCl, Pb, Hg, and Cd. Therefore, these controls used together are a possible option beyond the MACT floor emission levels for small existing MWI.

As discussed earlier in Section II.B., the availability of alternatives for the treatment and disposal of medical waste is generally more limited in rural areas than in urban areas. Therefore, the potential impact of MACT regulations on small existing MWI may be greater in rural than in urban areas. This concern was expressed in many comments EPA received following proposal. As also discussed earlier in Section II.B., section 129 of the Clean Air Act permits EPA to subcategorize the MACT emission guidelines by class, consequently, subcategorizing small existing MWI into rural and urban classes was examined. In terms of the MACT floor emission limits, however, subcategorizing small existing MWI into rural and urban classes made no difference—the MACT floor emission limits are the same. As a result, for purposes of the MACT floor, there is no merit to subcategorizing small existing MWI into rural and urban classes.

Although subcategorizing based on location was rejected for purposes of the MACT floor, it was considered again in identifying regulatory options more stringent than the MACT floor. Thus, the regulatory option of MACT emission guidelines for small existing MWI based on the use of good combustion and low efficiency wet scrubbing systems was subdivided to create two options. The first regulatory option beyond the MACT floor is to base the MACT guidelines for small existing MWI located in rural areas on good combustion only, as required by the MACT floor, but to base MACT guidelines for small existing MWI located in urban areas on good combustion and low efficiency wet scrubbing systems. If this option were selected as the basis for the final MACT emission guidelines, the emission limits for small existing MWI located in rural areas would be different than the emission limits for small existing MWI located in urban areas.

As discussed in Section II.B., location, by itself, is not a valid criterion for subcategorization under the Clean Air Act. In addition, use of location as surrogate measure of the availability of technology may not be a valid criterion for subcategorization either. There may be statutory limitations to this approach. As a result, the previous discussion regarding differences in regulatory requirements based on the location of an MWI may not be allowed under the Clean Air Act, and EPA specifically requests comment on the validity of this approach. As discussed later in Section V., one of the options EPA is considering would reflect good combustion and wet scrubbers on all small existing MWI except where an individual MWI could meet certain ''criteria,'' in which case the individual MWI would be subject to emission limits based on good combustion alone. Consequently, in addition to seeking comment on the validity of identifying urban and rural MWI as separate ''classes,'' EPA also requests comment on other criteria that could be used to make distinctions in regulatory requirements.

A third regulatory option is MACT emission guidelines for small existing MWI located in both rural and urban areas based on good combustion and low efficiency wet scrubbing systems. In other words, no difference in the MACT emission limits between small existing MWI located in rural or urban areas would exist. This third option would achieve greater emission reductions than the second option.

Beyond these three regulatory options (i.e., the MACT floor option and the two options more stringent than the floor), a review of the performance capabilities of various emission control technologies readily identifies a fourth regulatory option for small existing MWI. This regulatory option is to base the MACT emission guidelines for small existing MWI on the use of good combustion and moderate efficiency wet scrubbing systems. This regulatory option would further reduce PM emissions, however, it would not achieve further reductions in emissions of other pollutants. As summarized earlier, moderate and high efficiency wet scrubbing systems do not appear to achieve greater emission reductions of dioxins, acid gases (e.g., HCl), or the metals (i.e., Hg, Pb, or Cd) than low efficiency wet scrubbing systems.

Option 4 could also be subdivided into two options: (1) MACT emission guidelines for small existing MWI in rural areas based on good combustion and low efficiency wet scrubbing systems; and MACT guidelines for small existing MWI in urban areas based on good combustion and moderate efficiency wet scrubbing systems and (2) MACT emission guidelines for small existing MWI in both rural and urban areas based on good combustion and moderate efficiency wet scrubbing systems. However, the cost difference between using a low efficiency wet scrubbing system or a moderate efficiency wet scrubbing system is not as great as that between using a low efficiency wet scrubbing system or not using a wet scrubbing system at all. Consequently, at this point, to limit the number of regulatory options under consideration, the EPA has chosen not to further subdivide this regulatory option.

Reviewing the performance capabilities of emission control technologies identifies a fifth regulatory option for small existing MWI. This option is to base the MACT emission guidelines for small existing MWI on the use of good combustion and high efficiency wet scrubbing systems. This would further reduce PM emissions, but as outlined above, would not further reduce emissions of other air pollutants such as dioxins, acid gases (e.g., HCl), or the metals (i.e., Pb, Hg, Cd).

A sixth regulatory option for small existing MWI also is apparent. This option is to base the MACT emission guidelines for small existing MWI on the use of good combustion and dry scrubbing systems with activated carbon injection. This possibility would further reduce emissions of Pb, Cd, and dioxins, but would not further reduce emissions of other air pollutants. Dry scrubbing systems, however, generally cost about one and a half times what high-efficiency wet scrubbing systems cost to operate annually, and the overall difference in the emissions control performance between the two systems is relatively small. Therefore, at this point, to limit the total number of regulatory options under consideration, the EPA has chosen not to include this sixth regulatory option for small existing MWI.

For medium existing MWI, as discussed earlier, the use of good combustion and moderate efficiency wet scrubbing systems appears to be necessary to meet the MACT floor emission limits. This option, therefore, is the first regulatory option for medium existing MWI. The second regulatory option is to base the emission guidelines on good combustion and high efficiency wet scrubbing systems.

Finally, for large existing MWI, as discussed earlier, the use of good combustion and high efficiency wet scrubbing systems appears to be necessary to meet the MACT floor emission limits. Thus, the EPA is not inclined at this point to consider other regulatory options for large existing MWI.

As mentioned above, a review of the performance capabilities of emission control technologies indicates that dry scrubbing systems can reduce emissions of some pollutants (i.e., Pb, Cd, and dioxins) greater than high-efficiency wet scrubbing systems. Additional regulatory options for both medium and large existing MWI could be structured, therefore, around the use of dry scrubbing systems. However, as also mentioned above, the cost of these systems is much higher than that of high-efficiency wet scrubbing systems and the overall difference in emission control performance is relatively small. For existing MWI already equipped with wet scrubbers, replacing a wet scrubber with a dry scrubber would be exorbitantly expensive. As a result, at this point, the EPA has chosen not to develop additional regulatory options for medium and large existing MWI based on the use of dry scrubbing systems to keep the total number of regulatory options under consideration to a manageable number.

The regulatory options outlined above are compiled in Table 13. This table summarizes the technology basis for the regulatory options for the various MACT emission guidelines the EPA believes merit consideration as MACT for existing MWI. This table is constructed *only* to organize and structure an analysis of the cost, environmental, and energy impacts associated with the various MACT emission guidelines in order to consider these impacts in selecting MACT for existing MWI. In reviewing this table, therefore, there are several important points to keep in mind.

TABLE 13.—LEVEL OF AIR POLLUTION CONTROL ASSOCIATED WITH EACH REGULATORY OPTION FOR EXISTING MWI

MWI size	Regulatory options					
	1	2	3	4	5	6
Small ≤200 lb/hr ...	Good combustion	Good combustion on rural; Good combustion and low efficiency wet scrubber on urban.	Good combustion and low efficiency wet scrubber.	Good combustion and moderate efficiency wet scrubber.	Good combustion and moderate efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.
Medium 201–500 lb/hr.	Good combustion and moderate efficiency wet scrubber.	Good combustion and moderate efficiency wet scrubber.	Good combustion and moderate efficiency wet scrubber.	Good combustion and moderate efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.
Large 500 lb/hr	Good combustion and high efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.	Good combustion and high efficiency wet scubber.	Good combustion and high efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.

First, the MACT emission guidelines for existing MWI will *not* include requirements to use a specific emission control system or technology; the MACT emission guidelines will only include emission limits, which may be met by any means or by using any control system or technology the owner or operator of the MWI decides to use to meet these emission limits. Second, to the extent possible (i.e., within the constraints imposed by Section 129 of the Clean Air Act), the EPA plans to adopt emission limits in the MACT emission guidelines that can be met through the use of several emission control systems or technologies. Consequently, where not constrained by the Clean Air Act, the actual emission limits associated with some of the regulatory options shown in Table 13 have been selected at a level designed to encourage or permit the use of both wet and dry scrubbing control systems, as outlined below.

The emission limits associated with each of the regulatory options for small, medium, and large existing MWI are presented in Table 14.

TABLE 14.—EMISSION LIMITATIONS ASSOCIATED WITH EACH REGULATORY OPTION FOR SMALL, MEDIUM, AND LARGE EXISTING MWI

Pollutant, units	Regulatory options	Small MWI's	Medium MWI's	Large MWI's					
	1	2 (rural)	2 (urban)	3	4 and 5	6	1–4	5 and 6	1–6
PM, gr/dscf	0.086	0.086	0.05	0.05	0.03	0.015	0.03	0.015	0.015.
CO, ppmdv	40	40	40	40	40	40	40	40	40.
CDD/CDF, ng/dscm.	800	800	125	125	125	125	125	125	125.
TEQ CDD/CDF, ng/dscm.	15	15	2.3	2.3	2.3	2.3	2.3	2.3	2.3.
HCl, ppmdv	3,100	3,100	100 or 93%.	100 or 93%.	100 or 93%.	100 or 93%.	100 or 93%.	100 or 93%.	100 or 93%.
SO_2, ppmdv	55	55	55	55	55	55	55	55	55.
NO_x, ppmdv	250	250	250	250	250	250	250	250	250.
Pb, mg/dscm	10	10	1.2 or 70%	1.2 or 70%	1.2 or 70%	1.2 or 70%	1.2 or 70%	1.2 or 70%	1.2 or 70%.
Cd, mg/dscm	4	4	0.16 or 65%.	0.16 or 65%.	0.16 or 65%.	0.16 or 65%.	0.16 or 65%.	0.16 or 65%.	0.16 or 65%.
HG, mg/dscm	7.5	7.5	0.55 or 85%.	0.55 or 85%.	0.55 or 85%.	0.55 or 85%.	0.55 or 85%.	0.55 or 85%.	0.55 or 85%.

Regulatory Option 1 in Table 14 reflects the performance of the emission control system or technology needed to meet the MACT floor. For small existing MWI, Regulatory Option 1 reflects emission limits based on good combustion. For medium existing MWI, Regulatory Option 1 reflects emission limits based on good combustion and moderate efficiency wet scrubbers, except for HCl (discussed below). For large existing MWI, Regulatory Option 1 reflects emission limits based on good combustion and high efficiency wet scrubbers, except for HCl (discussed below).

Dry scrubbers with activated carbon injection can achieve the emission limits associated with moderate or high efficiency wet scrubbers, with the exception of HCl. While dry scrubbers cannot reduce HCl emissions to the same levels as wet scrubbers, dry scrubbers can achieve the MACT floor emission level for HCl. Consequently, Regulatory Option 1 reflects the HCl emission limit achievable with a dry scrubber for both medium and large existing MWI. Both technologies (wet or dry scrubber) are capable of achieving the emission limits shown for Regulatory Option 1.

Regulatory Option 2 is the same as Regulatory Option 1 for medium and large existing MWI. Small existing MWI located in urban areas would be required to meet emission limits associated with good combustion and low efficiency wet scrubbers. Small existing MWI located in rural areas would remain subject to the same emission limits as Regulatory Option 1 (based on good combustion). Regulatory Option 3 would establish emission limits for all small existing MWI (urban and rural) based on good combustion and low efficiency wet scrubbers. Regulatory Option 4 would establish emission limits for all small existing MWI based on good combustion and moderate efficiency wet scrubbers. Requirements for medium and large existing MWI would remain the same under Regulatory Options 1, 2, 3, and 4. As discussed above, HCl emission limits in all cases would allow the use of dry scrubbers.

Regulatory Option 5 would establish emission limits for small existing MWI based on good combustion and moderate efficiency wet scrubbers; medium existing MWI based on good combustion and high efficiency wet scrubbers; and large existing MWI based on good combustion and high efficiency wet scrubbers. The sixth and final regulatory option would require all existing MWI to meet emission limitations associated with good combustion and high efficiency wet scrubbers. As discussed above, the HCl emission limit under Regulatory Options 5 and 6 would allow the use of dry scrubbing systems.

B. National Environmental and Cost Impacts

This section presents a summary of the air, water, solid waste, energy, and cost impacts of the six regulatory options described above for existing MWI. Economic impacts are discussed in Section III.C. All impacts are nationwide impacts resulting from the implementation of the emission guidelines on existing MWI.

1. Analytical Approach

As discussed at proposal and within this notice, healthcare facilities may choose from among a number of alternatives for treatment and disposal of their medical wastes; however, these alternatives are generally more limited for healthcare facilities located in rural areas than for those in urban areas. In fact, as stated at proposal, most estimates are that less than half of hospitals today currently operate onsite medical waste incinerators. The clear trend over the past several years has been for more and more hospitals to turn to the use of alternative onsite medical waste treatment technologies or commercial offsite treatment and disposal services. Consequently, even fewer hospitals are now likely to operate onsite medical waste incinerators.

More than half of existing hospitals today, therefore, have chosen to use other means of treatment and disposal of their medical waste than operation of an onsite incinerator. This is a clear indication that alternatives to the use of onsite incinerators exist and that they are readily available in many cases. (Although as mentioned above, these alternatives—particularly the availability and competitive cost of offsite commercial treatment and disposal services—tend to be more limited in rural areas than in urban areas). For other healthcare facilities, such as nursing homes, outpatient clinics, doctors and dentists offices, etc., only very few facilities currently operate onsite medical waste incinerators. Therefore, for these types of healthcare facilities, the percentage of such facilities using alternative means of treatment and disposal of medical waste—particularly commercial treatment and disposal services—is much higher, probably higher than 95 percent. This high percentage is further confirmation of the availability of alternatives to onsite incinerators for the treatment and disposal of medical waste.

A very likely reaction and outcome associated with the adoption of MACT emission guidelines for existing MWI, therefore, is an increase in the use of these alternatives by healthcare facilities for treatment and disposal of medical waste. The EPA's objective is not to encourage the use of alternatives or to discourage the continued use of onsite medical waste incinerators; the EPA's objective is to adopt MACT emission guidelines for existing MWI that fulfill the requirements of Section 129 of the Clean Air Act. In doing so, however, one outcome associated with adoption of these MACT emission guidelines is likely to be an increase in the use of alternatives and a decrease in the continued use of onsite medical waste incinerators. Consequently, EPA should acknowledge and incorporate this outcome into the analyses of the cost, environmental, and energy impacts associated with the MACT emission guidelines.

In these analyses of the cost, environmental, and energy impacts, the selection of an alternative form of medical waste treatment and disposal by a healthcare facility, rather than the operation of an onsite medical waste incinerator and purchase the emission control technology necessary to meet the MACT emission limits, is referred to as ''switching''. Switching was incorporated in the analyses at proposal and was the basis for the conclusion at proposal that adoption of the proposed MACT emission guidelines could lead to as many as 80 percent of healthcare facilities with MWI to choose an alternative means of medical waste treatment and disposal over continued operation of their MWI. Although switching was not EPA's objective, it was a potential outcome of the regulations that EPA believed should be acknowledged, considered, and discussed at proposal.

Switching has also been incorporated into the new analyses of the cost, environmental, and energy impacts associated with the six new regulatory options. The new analyses, however, incorporate three scenarios; one scenario that ignores switching and two scenarios that consider switching. Scenario A assumes that each existing MWI remains in operation and complies with the appropriate regulatory option (i.e., no switching). This scenario results in the highest costs because it assumes no existing MWI will switch to a less expensive waste disposal method. This scenario is clearly unrealistic and grossly overstates the national costs associated with MACT emission guidelines. It should *not* be viewed as representative or even close to representative of the impacts associated with the MACT emission guidelines. This scenario is so misleading that the EPA considered not including it in the analysis; some may take it out of context and use it as representative, when it is in no way representative of the impacts of the MACT emission guidelines. The EPA finally decided to include this scenario in the analysis only because some may ask ''what if * * *?'' and the EPA wanted to be in a position to answer such questions.

Switching Scenarios B and C are much more realistic and more representative of the cost, environmental, and energy impacts associated with the MACT emission guidelines for existing MWI. Only these scenarios merit serious review and consideration in gauging the potential impacts associated with the MACT emission guidelines. Both Scenarios B and C assume switching occurs when the cost associated with purchasing and installing the air pollution control technology or system necessary to comply with the MACT emission guideline (i.e., a regulatory option) is greater than the cost of choosing an alternative means of treatment and disposal.

The difference in Scenarios B and C is the assumption of how much separation of the medical waste stream into an infectious medical waste stream and a noninfectious medical waste stream currently occurs at healthcare facilities that today operate a medical waste incinerator. Some have stated that, for the most part, hospitals that are currently operating onsite medical waste incinerators practice little separation of medical waste into infectious and noninfectious waste; generally all the waste at the facility is incinerated.

Based on estimates in the literature that only 10 to 15 percent of medical waste is potentially infectious and the remaining 85 to 90 percent is noninfectious, Scenario B assumes that only 15 percent of the waste currently being burned at a healthcare facility operating an onsite medical waste incinerator is potentially infectious medical waste. The 85 percent noninfectious waste is municipal waste that needs no special handling, treatment, transportation, or disposal. It can be sent to a municipal landfill or municipal combustor for disposal. Thus, under Scenario B, when choosing an alternative to continued operation of an onsite medical waste incinerator, in response to adoption of MACT emission guidelines, a healthcare facility need only choose an alternative form of medical waste treatment and disposal for 15 percent of the waste stream currently burned onsite and may send the remaining 85 percent to a municipal landfill. In other words, if a hospital is burning 100 pounds of waste, Scenario B assumes 85 pounds are noninfectious and 15 pounds are potentially infectious. This scenario results in the lowest costs because 85 percent of the waste is disposed at the relatively inexpensive cost of municipal waste disposal.

On the other hand, it is unlikely that all healthcare facilities that currently operate an MWI will be able to or will decide to segregate the waste stream currently being burned in their incinerator. If a hospital is already separating medical waste into infectious and noninfectious waste streams, for example, this hospital would be unable to separate the waste stream any further. In other words, if a hospital is burning 100 pounds of waste, Scenario C assumes all 100 pounds are potentially infectious. Scenario C, therefore, assumes that all medical waste being burned at a healthcare facility currently operating a medical waste incinerator is potentially infectious medical waste and must be treated and disposed of accordingly. As a result, Scenario C leads to higher costs than Scenario B.

For the purposes of determining impacts of the emission guidelines under switching Scenarios B and C, the MWI inventory was separated into commercial (offsite) incinerators and onsite incinerators used to burn healthcare waste. The commercial incinerators were not subjected to the switching analyses under Scenarios B and C because switching to an alternative method of waste disposal (e.g., commercial disposal) is not feasible for commercial facilities. An assumption was made that commercial facilities would add on the control associated with the emission guidelines. Only the onsite MWI in the inventory were subject to the switching analyses under Scenarios B and C.

Scenarios B and C represent the likely range of impacts associated with the MACT emission guidelines for existing MWI. The actual impacts of a MACT emission guideline (i.e., a regulatory option) is most likely to fall somewhere within the range represented by Scenarios B and C.

2. Air Impacts

As outlined above, the impacts associated with six MACT emission guidelines or regulatory options, under three scenarios reflecting switching, have been assessed. Baseline emissions (i.e., emissions today in the absence of adoption of the MACT emission guidelines) and emissions under each MACT emission guideline or regulatory option are summarized in Tables 15, 16, and 17. Emissions under Scenario A (no switching) are summarized in Table 15; emissions under Scenario B (switching with waste separation) are summarized in Table 16; and emissions under Scenario C (switching without waste separation) are summarized in Table 17.

TABLE 15.—BASELINE EMISSIONS COMPARED WITH EMISSIONS AFTER IMPLEMENTATION OF THE EMISSION GUIDELINES

[Scenario A]

[Metric Units]

Pollutant, units	Baseline	Regulatory options					
		1	2	3	4	5	6
PM, Mg/yr	940	190	160	140	120	110	100
CO, Mg/yr	460	120	120	120	120	120	120
CDD/CDF, g/yr	7,200	420	360	300	300	300	300
TEQ CDD/CDF, g/yr	150	9.4	8.2	7.1	7.1	7.1	7.1
HCl, Mg/yr	5,700	880	490	86	86	86	86
SO_2 Mg/yr	250	250	250	250	250	250	250
NO_X, Mg/yr	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Pb, Mg/yr	11	3.3	2.7	2.1	2.1	2.1	2.1
Cd, Mg/yr	1.2	0.42	0.36	0.29	0.29	0.29	0.29
Hg, Mg/yr	15	1.4	1.2	1.1	1.1	1.1	1.1

To convert Mg/yr to ton/yr, multiply by 1.1. To convert g/yr to lb/yr, divide by 453.6

TABLE 16.—BASELINE EMISSIONS COMPARED WITH EMISSIONS AFTER IMPLEMENTATION OF THE EMISSION GUIDELINES

[Scenario B]

[Metric Units]

Pollutant, units	Baseline	Regulatory options					
		1	2	3	4	5	6
PM, Mg/yr	940	91	78	67	67	65	65
CO, Mg/yr	460	83	83	82	82	81	81
CDD/CDF, g/yr	7,200	240	220	210	210	200	200
TEQ CDD/CDF, g/yr	150	5.5	5.1	4.8	4.8	4.7	4.7
HCl, Mg/yr	5,700	310	180	77	77	77	77
SO_2, Mg/yr	250	180	170	170	170	170	170
NO_X, Mg/yr	1,200	830	820	810	810	810	810
Pb, Mg/yr	11	1.7	1.5	1.3	1.3	1.3	1.3
Cd, Mg/yr	1.2	0.23	0.20	0.18	0.18	0.18	0.18
Hg, Mg/yr	15	0.87	0.81	0.76	0.76	0.75	0.75

To convert Mg/yr to ton/yr, multiply by 1.1. To convert g/yr to lb/yr, divide by 453.6

TABLE 17.—BASELINE EMISSIONS COMPARED WITH EMISSIONS AFTER IMPLEMENTATION OF THE EMISSION GUIDELINES

[Scenario C]

[Metric Units]

Pollutant, units	Baseline	Regulatory options					
		1	2	3	4	5	6
PM, Mg/yr	940	170	140	110	110	100	100
CO, Mg/yr	460	120	120	120	120	120	120
CDD/CDF, g/yr	7,200	400	350	300	300	300	300
TEQ CDD/CDF, g/yr	150	9.0	8.0	7.1	7.1	7.1	7.1
HCl, Mg/yr	5,700	740	410	86	86	86	86
SO_2, Mg/yr	250	250	250	250	250	250	250
NO_X, Mg/yr	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Pb, Mg/yr	11	3.1	2.6	2.1	2.1	2.1	2.1
Cd, Mg/yr	1.2	0.40	0.34	0.29	0.29	0.29	0.29
Hg, Mg/yr	15	1.3	1.2	1.1	1.1	1.1	1.1

To convert Mg/yr to ton/yr, multiply by 1.1. To convert g/yr to lb/yr, divide by 453.6.

As discussed in previous sections, new information has led to new conclusions about the MWI inventory, performance of technology, and control levels associated with each existing MWI. As a result, revised estimates of annual baseline emissions and emissions under each regulatory option are significantly lower than estimates developed at proposal. There are two primary reasons for the lower emission estimates. First, existing MWI are equipped with better emission control than was assumed at proposal. Second, many more MWI were assumed to exist at proposal than in the current inventory.

3. Water and Solid Waste Impacts

Estimates of wastewater impacts were developed for only Regulatory Option 6, Scenario A, which reflects all existing MWI equipped with wet scrubbers in the absence of switching. Assessing these impacts under Scenario A without any consideration of the effect of switching grossly overstates the magnitude of these impacts. Under Scenarios B and C more than half of the existing MWI are expected to switch, resulting in significantly lower impacts. This approach of estimating and summarizing impacts under Scenario A, at this point, was taken as a matter of expediency to share new information and provide an opportunity for public comment.

Under Scenario A and Regulatory Option 6, 198 million gallons of additional wastewater would be generated annually by existing MWI as a result of the MACT emission guideline. This amount is the equivalent of wastewater produced annually by four large hospitals. Therefore, when considering the wastewater produced annually at healthcare facilities nationwide, the increase in wastewater resulting from the implementation of the MACT emission guidelines for existing MWI is insignificant.

With regard to solid waste impacts, about 767 million Mg (846 million tons) of medical waste are burned annually in existing MWI producing about 76,700 Mg/yr (84,600 tons/yr) of solid waste (bottom ash) disposed of in landfills. To estimate the solid waste impacts for the MACT emission guidelines, impacts were developed only for Regulatory Option 6, Scenario B. This option is associated with the most switching and the most separation of waste for disposal in municipal landfills and, thus, produces the greatest estimated impact.

Under Regulatory Option 6, Scenario B, 210,000 Mg/yr (231,000 tons/yr) of additional solid waste would result from the adoption of the MACT emission guideline. Compared to municipal waste, which is disposed in landfills at an annual rate of over 91 million Mg/yr (100 million tons/yr), this increase from the implementation of the MACT emission guideline for existing MWI is insignificant.

4. Energy Impacts

The emission control technologies used by existing MWI to comply with the MACT emission limits consume energy. Estimates of energy impact were developed for Regulatory Option 6, Scenario A. Under Scenarios B and C, which include switching, it is not clear whether overall national energy consumption would increase, decrease, or remain the same. Alternatives to incineration require energy to operate, however, information is not available to estimate whether these alternatives use more or less energy than MWI.

The energy impacts associated with the MACT emission guidelines could include additional auxiliary fuel (natural gas) for combustion controls and additional electrical energy for operation of the add-on control devices, such as wet scrubbers and dry scrubbers. Regulatory Option 6, Scenario A, could increase total national usage of natural gas for combustion controls by about 16.6 million cubic meters per year (MMm^3/yr) (586 million cubic feet per year [10^6 ft^3/yr]). Total national usage of electrical energy for the operation of add-on control devices could increase by about 259,000 megawatt hours per year (MW-hr/yr) (883 billion British thermal units per year [10^9 Btu/yr]). Once again, compared to the amount of energy used by healthcare facilities such as hospitals (approximately 2,460 MMm^3/yr of natural gas and 23.2 million MW-hr/yr of electricity) the increase in energy usage that results from implementation of the MACT emission guideline for existing MWI is insignificant.

5. Cost Impacts

The cost impacts on individual healthcare facilities that currently operate an MWI vary depending on the MACT emission guideline or regulatory option; the actual cost to purchase and install any additional air pollution control equipment; the cost of alternative means of treatment and disposal where they are located; and other factors, such as liability issues related to disposal and State and local medical waste treatment and disposal requirements. In general, facilities with smaller MWI will have a greater incentive to use alternative means of treatment and disposal because their onsite incineration cost (per pound of waste burned) will be higher.

Large healthcare facilities with larger amounts of waste to be treated or healthcare facilities that serve as regional treatment centers for waste generated at other healthcare facilities in the area may have some cost advantages compared to smaller facilities. Due to economies of scale, their cost of burning waste may be lower (i.e., dollars per pound burned), and they may have already installed some air pollution control equipment. These facilities may only have to upgrade this equipment to comply with the MACT emission guideline rather than purchase and install a complete air pollution control system.

Table 18 contains the estimated increase in national annual costs associated with each of the MACT emission guidelines or regulatory options under Scenario A (no switching), Scenario B (switching with separation of waste), and Scenario C (switching with no separation of waste). As discussed earlier, Scenario A is unrealistic and grossly overstates the national cost impacts. The costs associated with the MACT emission guidelines under Scenarios B and C represent the likely range of national cost impacts, and only these costs merit serious consideration and review.

TABLE 18.—COSTS OF THE REGULATORY OPTIONS OF THE EMISSION GUIDELINES [SCENARIOS A, B, AND C]

[Million $year]

Scenario	Regulatory options					
	1	2	3	4	5	6
A	120	145	173	181	190	201
B	57.0	57.1	57.4	57.4	57.7	57.7
C	108	113	118	119	122	123

The nationwide annual costs presented in Table 18, excluding Scenario A, range from $57 million/yr for Regulatory Option 1 and Scenario B to $123 million/yr for Regulatory Option 6 and Scenario C. These nationwide annual costs are significantly lower than the $351 million/yr estimated for the proposed emission guidelines. The primary reason for the difference in the proposed and the current nationwide annual cost estimates is the greater level of emissions control found at existing MWI than was assumed at proposal. The costs of upgrading from the current level of control now known to be on existing MWI are far less than the costs of upgrading from the mere ¼ sec combustion controls assumed to be on most MWI at proposal. Also, the annual cost of the MACT emission levels discussed in this notice is significantly less than the proposed MACT emission level (DI/FF with activated carbon). Another reason for the difference is that the number of MWI assumed to exist at proposal was much greater than the number of MWI in the current inventory. For example, the cost estimates at proposal were based on an estimated 3,700 MWI; currently, there are approximately 2,400 MWI in the inventory.

C. Economic Impacts

Section III.B.1 described assumptions pertaining to three analysis scenarios: no switching, switching with waste segregation, and switching with no waste segregation. Section III.B.5 presented annual cost estimates that have been developed for each of the six regulatory options. This section incorporates these assumptions and cost data to estimate potential economic impacts that might result from implementation of these regulatory options.

The goal of the economic impact analysis is to estimate the market response of affected industries to the emission guidelines and to identify any adverse impacts that may occur as a result of the regulation. Industries that operate onsite waste incinerators (hospitals, nursing homes, research labs, and commercial waste incinerators) and those that utilize offsite medical waste incinerators (hospitals, nursing homes, medical/dental laboratories, funeral homes, physicians' offices, dentist offices, outpatient care, freestanding blood banks, fire and rescue operations, and correctional facilities) will potentially be affected by the regulation. Industrywide impacts, including changes in market price, output or production, revenues, and employment for the affected industries are estimated for each regulatory option assuming the three switching scenarios. Facility-specific impacts are estimated for hospitals of varying sizes, ownerships, and operating characteristics; nursing homes; commercial research labs; and commercial waste incineration based on engineering model plant cost estimates under each of the three switching scenarios.

1. Analytical Approach

The analytical approach to estimate industrywide and facility specific economic impacts and evaluate the economic feasibility of switching are briefly described. For a more detailed description refer to docket item IV–A–8. Prices are stated at 1993 levels.

The average price changes anticipated to occur in each industry sector for each of the regulatory options are estimated by comparing the annual control cost estimates to annual revenues for each affected industry. This calculation provides an indication of the magnitude of a price change that would occur for each industry sector to fully recover its annual control costs. The resulting cost-to-revenue ratio represents the price increase necessary on average for firms in the industry to recover the increased cost of environmental controls. Percent changes in output or production are estimated using the price impact estimate and a high and low estimate of the price elasticity of demand. Resulting changes in revenues are estimated based upon the estimated changes in price and output for an industry. Employment or labor market impacts result from decreases in the output for an industry and are assumed to be proportional to the estimated decrease in output for each industry.

Facility-specific economic impacts are estimated by using model plant information under the three switching scenarios. The assumption of no switching (Scenario A) represents the highest cost and economic impact scenario for most affected industries, while the assumption of switching with waste segregation (Scenario B) represents the lowest cost and economic impact scenario for most of the affected industries. As previously stated, EPA considers Scenario A to be an unlikely scenario; therefore, the economic impacts presented under Scenarios B and C should be regarded as the impacts most likely to occur.

2. Industry-Wide Economic Impacts

Industry-wide impacts include estimates of the change in market price for the services provided by the affected industries, the change in market output or production, the change in industry revenue, and the impact on affected labor markets in terms of full time equivalent workers lost. These impacts are summarized in Tables 19 and 20.

TABLE 19.—MEDICAL WASTE INCINERATION INDUSTRY-WIDE PRICE IMPACTS—EXISTING SOURCES PERCENT INCREASE [a]

[In percent]

Industry	Range for regulatory options 1–6		
	Scenario A No switching	Scenario B Switching with waste segregation	Scenario C Switching with no waste segregation
Hospitals	0.03–0.05	0.01	0.02–0.03
Nursing homes	0.03–0.04	0.01	0.02–0.03
Laboratories:			
Research	0.08–0.13	0.04	0.07–0.08
Medical/dental	0	0	0
Funeral homes	0	0	0
Physicians' offices	0	0	0
Dentists' offices and clinics	0	0	0
Outpatient care	0	0	0
Freestanding blood banks	0	0	0
Fire and rescue operations	0	0	0
Correctional facilities	0	0	0

TABLE 19.—MEDICAL WASTE INCINERATION INDUSTRY-WIDE PRICE IMPACTS—EXISTING SOURCES PERCENT INCREASE [a]—Continued

[In percent]

Industry	Range for regulatory options 1–6		
	Scenario A No switching	Scenario B Switching with waste segregation	Scenario C Switching with no waste segregation
Commercial incineration	2.6	2.6	2.6

[a] The price increase percentages reported represent the price increase necessary to recover annualized emission control costs for each industry.

TABLE 20.—MEDICAL WASTE INCINERATION INDUSTRY-WIDE OUTPUT, EMPLOYMENT AND REVENUE IMPACTS—EXISTING SOURCES

Industry	Range for regulatory options 1–6		
	Scenario A No switching	Scenario B Switching with waste segregation	Scenario C Switching with no waste segregation
Hospitals:			
Output decrease (%)	0–0.02	0	0–0.01
Employment decrease (FTE's)	0–647	0–174	0–388
Revenue increase or (decrease) (%)	0.02–0.05	0.01	0.02–0.03
Nursing homes:			
Output decrease (%)	0.01–0.03	0–0.01	0.01–0.02
Employment decrease (FTE's)	139–484	63–130	126–290
Revenue increase or (decrease) (%)	0.01–0.03	0–0.01	0.01–0.02
Laboratories:			
Research:			
Output decrease (%)	0.08–0.18	0.04–0.05	0.07–0.11
Employment decrease (FTE's)	124–281	56–76	112–169
Revenue increase or (decrease) (%)	(0.04)–0	(0.01)–0	(0.03)–0
Medical/dental:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	2–3	2–3	2–3
Revenue increase or (decrease) (%)	0	0	0
Funeral homes:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Physicians' offices:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0–1	0–1	0–1
Revenue increase or (decrease) (%)	0	0	0
Dentists' offices and clinics:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	1	1	1
Revenue increase or (decrease) (%)	0	0	0
Outpatient care:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0–1	0–1	0–1
Revenue increase or (decrease) (%)	0	0	0
Freestanding blood banks:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Fire and rescue operations:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Correctional facilities:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0

Output decreases and full time equivalents (FTE's) employment losses as a result of the regulation are shown in this table. Revenue increases and decreases are presented with decreases noted in brackets.

As shown in Table 19, industries that generate medical waste (i.e., hospitals, nursing homes, etc.) are expected to experience average price increases in the range of 0.00 to 0.13 percent, depending on the industry, regulatory option, and scenario. Table 20 shows that these industries are expected to experience output and employment impacts in the range of 0.00 to 0.18 percent. In addition, the revenue impacts for these industries are expected to range from an increase of 0.05 percent to a decrease of 0.04 percent. An increase in industry revenue is expected in cases where the price elasticity of demand for an industry's product is less than one. A price elasticity of less than one indicates that the percentage decrease in output will be less than the percentage increase in price. Since total revenue is a product of price and output, a less than proportional change in output compared to price means that total revenue should increase.

The following example illustrates how the above price impacts could be interpreted for the hospital industry. Table 19 shows that for hospitals, 0.03 percent is estimated as the price increase necessary to recover annual control costs assuming Regulatory Option 6, the most stringent regulatory option, and Scenario C, switching with no waste segregation. This change in price can be expressed in terms of the increased cost of hospitalization due to the regulation. The 1993 estimate of adjusted patient days nationwide totals 304,500,000 days. This estimate of adjusted patient-days is based on a combined estimate of in-patient and out-patient days at hospitals. Calculating the ratio of annual control cost ($86,167,082) to the number of adjusted patient days provides an estimate of $0.28/day. Therefore, the average price increase that an individual would experience for each hospital patient-day is expected to equal 28 cents.

Table 19 also shows that the average price impact for the commercial medical waste incinerator industry is approximately a 2.6 percent increase in price. Cost and economic impact estimates are the same for the commercial MWI industry regardless of the regulatory option analyzed because all six regulatory options specify identical regulatory requirements for large MWI. Average industrywide output, employment, and revenue impacts were not estimated for this sector because data such as price elasticity estimates and employment levels were not available.

3. Facility-Specific Economic Impacts

Facility-specific impacts were also estimated for the affected industries. These estimates, presented in Tables 21 and 22, were calculated for the three switching scenarios. A cost as a percent of revenue ratio was calculated to provide an indication of the magnitude of the impact of the regulation on an uncontrolled facility in each industry sector. This calculation was then compared to the industrywide price impact to determine if the facility's impacts differ significantly from the average industrywide impacts (i.e., if there is greater than a 1 percent difference).

TABLE 21.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING NO SWITCHING AND ONSITE INCINERATION—EXISTING SOURCES ANNUALIZED CONTROL COST AS A PERCENT OF REVENUE/BUDGET

[In percent]

Industry	Scenario A—No switching					
	Option					
	1	2	3	4	5	6
Hospitals—Short-term, excluding psychiatric:						
Federal Government:						
Small:						
Urban	0.09	0.37	0.37	0.41	0.41	0.46
Rural	0.09	0.09	0.37	0.41	0.41	0.46
Medium	0.20	0.20	0.20	0.20	0.22	0.22
Large	0.13	0.13	0.13	0.13	0.13	0.13
State Government:						
Small:						
Urban	0.20	0.80	0.80	0.87	0.87	0.99
Rural	0.20	0.20	0.80	0.87	0.87	0.99
Medium	0.21	0.21	0.21	0.21	0.23	0.23
Large	0.07	0.07	0.07	0.07	0.07	0.07
Local Government:						
Small:						
Urban	0.31	1.24	1.24	1.36	1.36	1.53
Rural	0.31	0.31	1.24	1.36	1.36	1.53
Medium	0.32	0.32	0.32	0.32	0.36	0.36
Large	0.10	0.10	0.10	0.10	0.10	0.10
Not-for-profit:						
Small:						
Urban	0.21	0.84	0.84	0.92	0.92	1.04
Rural	0.21	0.21	0.84	0.92	0.92	1.04
Medium	0.23	0.23	0.23	0.23	0.26	0.26
Large	0.11	0.11	0.11	0.11	0.11	0.11
For-profit:						
Small:						
Urban	0.23	0.95	0.95	1.04	1.04	1.18
Rural	0.23	0.23	0.95	1.04	1.04	1.18
Medium	0.25	0.25	0.25	0.25	0.25	0.28
Large	0.14	0.14	0.14	0.14	0.14	0.14

TABLE 21.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING NO SWITCHING AND ONSITE INCINERATION—EXISTING SOURCES ANNUALIZED CONTROL COST AS A PERCENT OF REVENUE/BUDGET—Continued

[In percent]

Industry	Scenario A—No switching					
	Option					
	1	2	3	4	5	6
Hospitals—Psychiatric, short-term and long-term:						
Small:						
Urban	0.32	1.30	1.30	1.43	1.43	1.62
Rural	0.32	0.31	1.30	1.43	1.43	1.62
Medium	0.57	0.57	0.57	0.57	0.64	0.64
Large	0.46	0.46	0.46	0.46	0.46	0.46
Nursing homes:						
Tax-paying:						
Urban	0.35	1.41	1.41	1.55	1.55	1.75
Rural	0.35	0.35	1.41	1.55	1.55	1.75
Tax-exempt:						
Urban	0.36	1.45	1.45	1.59	1.59	1.79
Rural	0.36	0.36	1.45	1.59	1.59	1.79
Commercial research labs:						
Tax-paying	0.40	0.40	0.40	0.40	0.46	0.46
Tax-exempt	0.40	0.40	0.40	0.40	0.46	0.46
Commercial incineration facilities	8.02	8.02	8.02	8.02	8.02	8.02

TABLE 22.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING SWITCHING FROM ONSITE INCINERATION TO COMMERCIAL DISPOSAL ALTERNATIVES—ALTERNATIVE WASTE DISPOSAL COST AS A PERCENT OF REVENUE/BUDGET

[In percent]

Industry	Scenario B Switching with waste segregation	Scenario C Switching without waste segregation
Hospitals—Short-term, excluding psychiatric:		
Federal Government:		
Small:		
Urban	0.03	0.10
Rural	0.03	0.17
Medium:		
Urban	0.05	0.17
Rural	0.05	0.27
Large:		
Urban	0.08	0.29
Rural	0.09	0.47
State Government:		
Small:		
Urban	0.06	0.22
Rural	0.06	0.36
Medium:		
Urban	0.05	0.18
Rural	0.05	0.29
Large:		
Urban	0.05	0.16
Rural	0.05	0.27
Local Government:		
Small:		
Urban	0.09	0.34
Rural	0.10	0.56
Medium:		
Urban	0.07	0.27
Rural	0.08	0.44
Large:		
Urban	0.06	0.22
Rural	0.06	0.36
Not-for-profit:		
Small:		
Urban	0.06	0.23
Rural	0.07	0.38
Medium:		
Urban	0.05	0.20
Rural	0.06	0.32

TABLE 22.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING SWITCHING FROM ONSITE INCINERATION TO COMMERCIAL DISPOSAL ALTERNATIVES—ALTERNATIVE WASTE DISPOSAL COST AS A PERCENT OF REVENUE/BUDGET—Continued

[In percent]

Industry	Scenario B Switching with waste segregation	Scenario C Switching without waste segregation
Large:		
Urban	0.07	0.25
Rural	0.07	0.41
For-profit:		
Small:		
Urban	0.07	0.26
Rural	0.08	0.43
Medium:		
Urban	0.06	0.21
Rural	0.06	0.34
Large:		
Urban	0.09	0.32
Rural	0.09	0.52
Hospitals—Psychiatric, short-term and long-term:		
Small:		
Urban	0.10	0.36
Rural	0.11	0.59
Medium:		
Urban	0.13	0.48
Rural	0.14	0.78
Large:		
Urban	0.29	1.05
Rural	0.31	1.70
Nursing homes:		
Tax-paying:		
Urban	0.11	0.39
Rural	0.11	0.64
Tax-exempt:		
Urban	0.11	0.40
Rural	0.12	0.65
Commercial research labs:		
Tax-paying:		
Urban	0.09	0.34
Rural	0.10	0.56
Tax-exempt:		
Urban	0.09	0.34
Rural	0.10	0.56

Tables 21 and 22 show that facilities with onsite MWI that are currently uncontrolled may experience impacts ranging from 0.03 to 1.79 percent, depending on the industry, regulatory option, and scenario. A comparison of the economic impacts expected to occur under the three switching scenarios, presented in Tables 21 and 22, indicates that the option of switching will be attractive to some facilities currently operating an onsite incinerator. For many of the uncontrolled model facilities, the economic impacts of switching to an alternative method of waste disposal are much lower than the economic impacts of choosing to install emission control equipment. The decision to switch to an alternative should preclude any facilities from experiencing a significant economic impact. These results support EPA's assertion that implementation of the regulation will likely result in either Scenarios B or C and that the costs and economic impacts of Scenario A are unlikely to occur.

Table 23 shows the impacts that would be incurred by medical waste generators that currently use an offsite medical waste incineration service. These impacts range from 0.00 to 0.02 percent and are considered negligible impacts. These results indicate that the incremental cost for the vast majority of medical waste generators are expected to be small.

TABLE 23.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS FOR FIRMS THAT UTILIZE OFFSITE WASTE INCINERATION—EXISTING SOURCES INCREMENTAL ANNUAL COST AS A PERCENT OF REVENUE/BUDGET

[In percent]

Industry	Incremental annual cost as a percent of revenue
Hospitals:	
<50 Beds	0–0.01
50–99 Beds	0–0.01
100–299 Beds	0–0.01
300 + Beds	0–0.01
Nursing homes:	
0–19 Employees:	
Tax-paying	0
Tax-exempt	0

TABLE 23.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS FOR FIRMS THAT UTILIZE OFFSITE WASTE INCINERATION—EXISTING SOURCES INCREMENTAL ANNUAL COST AS A PERCENT OF REVENUE/BUDGET—Continued

[In percent]

Industry	Incremental annual cost as a percent of revenue
20–99 Employees:	
Tax-paying	0
Tax-exempt	0
100 + Employees:	
Tax-exempt	0
Tax-paying	0
Commercial research labs:	
Tax-paying:	
0–19 Employees	0
20–99 Employees	0
100 + Employees	0
Tax-exempt	0
Outpatient care clinics:	
Physicians' clinics (Amb. Care)	
Tax-paying	0
Tax-exempt	0
Freestanding kidney dialysis facilities:	
Tax-paying	0
Tax-exempt	0–0.01
Physicians' offices	0
Dentists' offices and clinics:	
Offices	0
Clinics	....
Tax-paying	0
Tax-exempt	0
Medical & dental labs:	
Medical	0–0.01
Dental	0–0.01
Freestanding blood banks	0–0.02
Funeral homes	0
Fire & Rescue	0
Corrections:	
Federal Government	0
State Government	0
Local Government	0

Table 22 also presents price impact estimates for the commercial medical waste incinerator sector. The analysis shows that uncontrolled medical waste incinerators required to meet any of the regulatory options would need to increase their prices by approximately 8 percent in order to recoup their control costs. Several factors indicate that it is unlikely these particular facilities would be able to increase the price of their service by 8 percent.

An examination of the MWI inventory indicates that a majority of facilities the commercial MWI sector have already implemented controls that would enable them to meet the requirements of any of the six regulatory options. Only a small number of facilities in this sector would be ''uncontrolled'' in the baseline and would, therefore, incur the majority of the costs estimated for this sector. This distribution suggests that commercial MWI that must install emission control equipment will not be able to freely increase their prices due to competition from already controlled commercial MWI. As indicated in the industrywide impact calculations, the average industrywide price increase is expected to be approximately 3 percent. Therefore, commercial MWI having to incur regulatory costs will most likely be forced to absorb some portion of their cost increase instead of passing the increase to their customers.

Another factor indicating the likely possibility that these commercial MWI would be required to absorb some portion of their cost increases is based on model plant capacity information. Many MWI are operating below full capacity, indicating that medical waste incinerator operators with excess capacity will act as a competitive force to keep incineration prices from rising.

One advantage that commercial MWI operators will experience due to the regulation will be increasing demand for commercial incineration service. Table 22 presents impact information under the assumption that some facilities with onsite incinerators will choose to switch to a lower cost alternative for medical waste disposal rather than install emission control equipment to meet the requirements of the regulation. Some facilities will probably choose one of these lower cost options, which in many cases may be to switch to commercial incineration. If implementation of the regulation will have such an effect, demand for commercial incineration should increase and commercial MWI operators should be able to offset some of their absorbed cost increases due to increased demands for their service.

Another consideration regarding the current state of the commercial MWI industry is that the small number of uncontrolled commercial MWI may currently be enjoying a cost advantage compared to the majority of controlled firms in the industry. Commercial MWI facilities that currently operate with emission control equipment presumably operate at a higher cost per unit than uncontrolled facilities. If the majority of the facilities in this industry are controlled and are able to charge prices that enable them to recapture their costs and earn reasonable profits, then uncontrolled facilities that are probably operating at a lower cost are likely to be enjoying profits exceeding the levels earned by the controlled facilities in the industry.

Based on these explanations, EPA estimates that the price of commercial incineration is likely to increase by an average of approximately 2.6 percent. Some uncontrolled facilities in this industry may need to absorb some of their cost increases due to implementation of this regulation. However, due to factors such as increased demand for commercial incineration and possible cost advantages currently enjoyed by these facilities, the cost of the regulation should be achievable.

This economic impact section examines possible economic impacts that may occur in industries that will be directly affected by this regulation. Therefore, the analysis includes an examination of industries that generate medical waste or dispose medical waste. Secondary impacts such as subsequent impacts on air pollution device vendors and MWI vendors are not estimated due to data limitations. Air pollution device vendors are expected to experience an increase in demand for their products due to the regulation. This regulation is also expected to increase demand for commercial MWI services. However, due to economies of scale, this regulation is expected to shift demand from smaller incinerators to larger incinerators. Therefore, small MWI vendors may be adversely affected by the regulation. Lack of data on the above effects prevents quantification of the economic impacts on these secondary sectors.

IV. Regulatory Options and Impacts for New MWI

As discussed earlier, the MACT ''floor'' defines the least stringent emission standards the EPA may adopt for new MWI. However, as also discussed earlier, the Clean Air Act requires EPA to examine alternative emission standards (i.e., regulatory options) more stringent than the MACT floor. The EPA must consider the cost, environmental, and energy impacts of these regulatory options and select one that reflects the maximum reduction in emissions that EPA determines is achievable (i.e., MACT).

At proposal, the EPA concluded all new MWI would need good combustion and dry scrubbers to meet the MACT floors for CO, PM, and HCl. Consequently, EPA was left to consider only two regulatory options for MACT. The first regulatory option reflected the floor (i.e., emission limitations achievable with good combustion and dry scrubbers). The second reflected emission limitations achievable with good combustion and dry scrubbers with activated carbon injection. Based on the cost, environmental, and energy impacts of the second regulatory option relative to the first option, EPA selected the second option as MACT. Consequently, EPA proposed emission standards for new MWI based on the use of good combustion and dry scrubbers with activated carbon injection.

As discussed earlier in this notice, EPA received numerous comments containing substantial new information following the proposal. Based on this new information, new conclusions concerning the MWI inventory, MWI subcategories, performance of emission control technologies, MACT floors, and monitoring and testing options have been reached. As a result, EPA now believes there are several new regulatory options that merit consideration in selecting MACT for new MWI. The following sections summarize these new regulatory options and the EPA's initial assessment of their merits.

A. Regulatory Options

As discussed earlier, new MACT floor emission levels were developed for small, medium, and large MWI. To assess the impacts of regulatory options, EPA must first consider what emission control technology(s) new MWI may need to meet regulations based on these floor emission limits. The floor for small new MWI appears to require good combustion and moderate efficiency wet scrubbers. For medium new MWI, the MACT floor appears to require good combustion and a combined wet/dry scrubbing system without activated carbon injection. The MACT floor for large new MWI appears to require good combustion and a combined wet/dry scrubbing system with activated carbon injection.

Having identified these control technologies, the EPA is now able to review the performance capabilities of other control technologies and to identify those technologies capable of achieving even greater emission reductions. This review enables EPA to identify regulatory options more stringent than the floor that could be selected as MACT.

For small new MWI, as mentioned above, good combustion and a moderate efficiency wet scrubber system are the emission control technologies most MWI would probably need to meet the MACT floor emission levels. Therefore, these technologies serve as the basis for the first regulatory option for the MACT emission standards for small new MWI. A review of the performance capabilities of various emission control technologies summarized earlier readily identifies a second option for small new MWI. This option is to base the MACT emission standards for small new MWI on the use of good combustion and high efficiency wet scrubbing systems. This would achieve further reductions in PM emissions, but it would not further reduce other pollutants. As summarized earlier, high efficiency wet scrubbing systems do not appear to achieve greater reductions in emissions of dioxins, acid gases (e.g., HCl), or metals (i.e., Hg, Pb, or Cd) than do moderate efficiency wet scrubbing systems.

Reviewing the performance capabilities of emission control technologies also identifies a third option for small new MWI. This regulatory option is to base the MACT emission standards for small new MWI on the use of good combustion and a combined dry/wet scrubbing system with activated carbon injection. This alternative would further reduce emissions of Pb, Cd, and dioxins, but would not further reduce emissions of other air pollutants. The combined system, however, generally costs about two and a half times what high-efficiency wet scrubbing systems cost to operate annually, and the overall difference in the emissions control performance between the two systems is relatively small. As a result, at this point, to limit and manage the total number of regulatory options under consideration, the EPA has chosen not to include this third regulatory option for small new MWI.

For medium new MWI, as discussed earlier, the use of good combustion and a combined wet/dry scrubbing system without activated carbon injection appears to be necessary to meet the MACT floor emission limits. Therefore, this option is the first regulatory option for medium new MWI. The second regulatory option is to base the emission standards for medium new MWI on good combustion and a combined wet/dry scrubbing system with activated carbon injection.

Finally, for large new MWI, as discussed earlier, the use of good combustion and a combined wet/dry scrubbing system with activated carbon injection appears necessary to meet the MACT floor emission limits. Because no other air pollution control technologies have been identified that can achieve more stringent emission limits, the EPA is not inclined at this point to consider other regulatory options for large new MWI.

The regulatory options outlined above are combined in Table 24. This table summarizes the technology basis for the regulatory options for the various MACT standards the EPA believes merit consideration as MACT for new MWI. This table is constructed *only* to organize and structure an analysis of the cost, environmental, and energy impacts associated with the various MACT standards in order to consider these impacts in selecting MACT for new MWI. As mentioned earlier, the MACT standards for new MWI will not include requirements to use a specific emission control system or technology; the MACT standards will only include emission limits, which may be met by any means or by using any control system or technology the owner or operator of the MWI decides to use to meet these emission limits.

TABLE 24.—LEVEL OF AIR POLLUTION CONTROL ASSOCIATED WITH EACH REGULATORY OPTION FOR NEW MWI

MWI size	Regulatory options		
	1	2	3
Small ≤200 lb/hr	Good combustion and moderate efficiency wet scrubber.	Good combustion and moderate efficiency wet scrubber.	Good combustion and high efficiency wet scrubber.
Medium 201–500 lb/hr	Good combustion, dry injection/fabric filter system, and high efficiency wet scrubber.	Good combustion, dry injection/fabric filter system with carbon, and high efficiency wet scrubber.	Good combustion, dry injection/fabric filter system with carbon, and high efficiency wet scrubber.
Large >500 lb/hr	Good combustion, dry injection/fabric filter system with carbon, and high efficiency wet scrubber.	Good combustion, dry injection/fabric filter system with carbon, and high efficiency wet scrubber.	Good combustion, dry injection/fabric filter system with carbon, and high efficency wet scrubber.

The emission limits associated with each of the regulatory options for small, medium, and large new MWI are presented in Table 25.

TABLE 25.—EMISSION LIMITATIONS ASSOCIATED WITH EACH REGULATORY OPTION FOR SMALL, MEDIUM, AND LARGE NEW MWI

	1 and 2	3	1	2 and 3	1–3
PM, gr/dscf	0.03	0.015	0.015	0.015	0.015
CO, ppmdv	40	40	40	40	40
CDD/CDF, ng/dscm	125	125	125	25	25
TEQ CDD/CDF, ng/dscm	2.3	2.3	2.3	0.6	0.6
HCl, ppmdv	15 or 99%	15 or 99%	15 or 99%	15 or 99%	15 or 99%
SO_2, ppmdv	55	55	55	55	55
NO_x, ppmdv	250	250	250	250	250
Pb, mg/dscm	1.2 or 70%	1.2 or 70%	0.07 or 98%	0.07 or 98%	0.07 or 98%
Cd, mg/dscm	0.16 or 65%	0.16 or 65%	0.04 or 90%	0.04 or 90%	0.04 or 90%
Hg, mg/dscm	0.55 or 85%	0.55 or 85%	0.55 or 85%	0.55 or 85%	0.55 or 85%

Regulatory Option 1 in Table 25 reflects the performance of the emission control system or technology needed to meet the MACT floor. For small new MWI, Regulatory Option 1 reflects emission limits based on good combustion and moderate efficiency wet scrubbers. For medium new MWI, Regulatory Option 1 reflects emission limits based on good combustion and a combined wet/dry scrubbing system without carbon. For large new MWI, Regulatory Option 1 reflects emission limits based on good combustion and a combined wet/dry scrubbing system with activated carbon injection.

Regulatory Option 1 does not reflect the most stringent emission limits achievable for all subcategories. Consequently, the Clean Air Act requires EPA to examine the costs and other impacts of regulatory options more stringent than Regulatory Option 1. Each regulatory option examined reflects slightly more stringent emission standards.

Regulatory Option 2 is the same as Regulatory Option 1 for small and large MWI. Medium MWI would be required to meet emission limits associated with good combustion and a combined wet/dry scrubbing system with activated carbon injection. Regulatory Option 3 would establish emission limits for small MWI based on good combustion and high efficiency wet scrubbers. Requirements for medium and large MWI would remain the same under Regulatory Option 3 as under Regulatory Option 2.

B. National Environmental and Cost Impacts

This section presents a summary of the air, water, solid waste, energy, and cost impacts of the three regulatory options for new MWI. Economic impacts are discussed in Section IV.C. All impacts are nationwide resulting from the implementation of the new source performance standards for new MWI.

1. Analytical Approach

As discussed at proposal and within this notice, healthcare facilities may choose from among a number of alternatives for treatment and disposal of their medical wastes; however, these alternatives are generally more limited for healthcare facilities located in rural areas than for those located in urban areas. In fact, as stated at proposal, most estimates are that less than half of hospitals today currently operate onsite medical waste incinerators. The clear trend over the past several years has been for more and more hospitals to turn to the use of alternative onsite medical waste treatment technologies or commercial offsite treatment and disposal services. Consequently, even fewer hospitals are now likely to operate onsite medical waste incinerators.

More than half of existing hospitals today, therefore, have chosen to use other means of treatment and disposal of their medical waste than operation of an onsite incinerator. This is a clear indication that alternatives to the use of onsite incinerators exist and that they are readily available in many cases (although as mentioned above, these alternatives—particularly the availability and competitive cost of offsite commercial treatment and disposal services—tend to be more limited in rural areas than in urban areas). For other healthcare facilities, such as nursing homes, outpatient clinics, doctors and dentists offices, etc., only very few facilities currently operate onsite medical waste incinerators. Therefore, for these types of healthcare facilities, the percentage of such facilities using alternative means of treatment and disposal of medical waste—particularly commercial treatment and disposal services—is much higher, probably higher than 95 percent. This high percentage is further confirmation of the availability of alternatives to onsite incinerators for the treatment and disposal of medical waste.

A very likely reaction and outcome associated with the adoption of MACT standards for new MWI, therefore, is an increase in the use of these alternatives by healthcare facilities for treatment and disposal of medical waste. The EPA's objective is not to encourage the use of alternatives or to discourage the use of onsite medical waste incinerators; EPA's objective is to adopt MACT emission standards for new MWI that fulfill the requirements of Section 129 of the Clean Air Act. In doing so, however, one outcome associated with adoption of these MACT standards is likely to be an increase in the use of alternatives and a decrease in the use of onsite medical waste incinerators. Consequently, EPA should acknowledge and incorporate this outcome into the analyses of the cost, environmental, and energy impacts associated with the MACT emission standards.

In these analyses of the cost, environmental, and energy impacts, the selection of an alternative form of medical waste treatment and disposal by a healthcare facility, rather than the purchase of an onsite medical waste incinerator and the emission control technology necessary to meet the MACT emission limits, is referred to as ‘‘switching’’. Switching was incorporated in the analyses at proposal and was the basis for the conclusion at proposal that adoption of the proposed MACT emission standards could lead to as many as 80 percent of healthcare facilities to choose an alternative means of medical waste treatment and disposal over the purchase of an MWI. Although switching was not EPA's objective, it was a potential outcome of the regulations that EPA believed should be acknowledged, considered, and discussed at proposal.

Switching has also been incorporated into the new analyses of the cost, environmental, and energy impacts associated with the three new regulatory options. The new analyses, however, incorporate three scenarios: one scenario that ignores switching and two scenarios that consider switching. Scenario A assumes that each new MWI will be installed and will comply with the appropriate regulatory option (i.e., no switching). This scenario results in the highest costs because it assumes no potential new MWI owner will switch to a less expensive waste disposal method. This scenario is clearly unrealistic and grossly overstates the national costs associated with MACT emission standards. It should *not* be viewed as representative or even close to representative of the impacts associated with the MACT emission standards. This scenario is so misleading that EPA considered not including it in the analysis; some may take it out of context and use it as representative, when it is in no way representative of the impacts of the MACT emission standards. The EPA finally decided to include this scenario in the analysis only because some may ask ''what if * * *?'' and the EPA wanted to be in a position to answer such questions.

Switching Scenarios B and C are much more realistic and more representative of the cost, environmental, and energy impacts associated with the MACT emission standards for new MWI. Only these scenarios merit serious review and consideration in gauging the potential impacts associated with the MACT emission standards. Both Scenarios B and C assume switching occurs when the cost associated with purchasing and installing the air pollution control technology or system necessary to comply with the MACT emission standard (i.e., a regulatory option) is greater than the cost of choosing an alternative means of treatment and disposal.

The difference in Scenarios B and C is the assumption of how much separation of the medical waste stream into an infectious medical waste stream and a noninfectious medical waste stream currently occurs at healthcare facilities that today operate a medical waste incinerator. Some have stated that, for the most part, hospitals that are currently operating onsite medical waste incinerators practice little separation of medical waste into infectious and noninfectious waste; generally all the medical waste at the facility is incinerated.

Based on estimates in the literature that only 10 to 15 percent of medical waste is potentially infectious and the remaining 85 to 90 percent is noninfectious, Scenario B assumes that only 15 percent of the waste currently being burned at a healthcare facility operating an onsite medical waste incinerator is potentially infectious medical waste. The 85 percent noninfectious waste is municipal waste that needs no special handling, treatment, transportation, or disposal. It can be sent to a municipal landfill or municipal combustor for disposal. Thus, under Scenario B, when choosing an alternative to an onsite medical waste incinerator, in response to adoption of MACT emission standards, a healthcare facility need only chose an alternative form of medical waste treatment and disposal for 15 percent of the waste stream currently burned onsite and may send the remaining 85 percent to a municipal landfill. In other words, if a hospital plans to burn 100 pounds of waste, Scenario B assumes 85 pounds are noninfectious and 15 pounds are potentially infectious. This scenario results in the lowest costs because 85 percent of the waste is disposed at the relatively inexpensive cost of municipal waste disposal.

On the other hand, it is unlikely that all healthcare facilities that consider purchasing an MWI will be able to or will decide to segregate the waste stream to be burned in the incinerator. If a hospital already separates medical waste into infectious and noninfectious waste streams, for example, this hospital would be unable to separate the waste stream any further. In other words, if a hospital plans to burn 100 pounds of waste, Scenario C assumes all 100 pounds are potentially infectious. Scenario C, therefore, assumes that all medical waste to be burned at a healthcare facility that purchases a medical waste incinerator is potentially infectious medical waste and must be treated and disposed of accordingly. As a result, Scenario C leads to higher costs than Scenario B.

For the purposes of determining impacts of the emission standards under switching Scenarios B and C, new commercial (offsite) incinerators and onsite incinerators used to burn healthcare waste were treated separately. The commercial incinerators were not subjected to the switching analyses under Scenarios B and C because switching to an alternative method of waste disposal (e.g., commercial disposal) is not feasible for commercial facilities. An assumption was made that commercial facilities would add on the control associated with the emission standards. Only the new onsite MWI were subject to the switching analyses under Scenarios B and C. On the other hand, a commercial waste disposal company does have the option of purchasing an alternative technology (e.g., autoclave or microwave) rather than installing a new MWI. Consequently, while switching was not included in this analysis for commercial MWI, it is an option that could result in lower costs.

Scenarios B and C represent the likely range of impacts associated with the MACT emission standards for new MWI. The actual impacts of a MACT emission standard (i.e., a regulatory option) is most likely to fall somewhere within the range represented by Scenarios B and C.

2. Air Impacts

As outlined above, the impacts associated with three MACT emission standards or regulatory options, under three scenarios reflecting switching, have been assessed. Baseline emissions (i.e., emissions in the absence of adoption of the MACT emission standards) and emissions under each MACT emission standard or regulatory option are summarized in Tables 26, 27, and 28. Emissions under Scenario A (no switching) are summarized in Table 26; emissions under Scenario B (switching with waste separation) are summarized in Table 27; and emissions under Scenario C (switching without waste separation) are summarized in Table 28.

TABLE 26.—BASELINE EMISSIONS COMPARED WITH EMISSIONS IN THE FIFTH YEAR AFTER IMPLEMENTATION OF THE NSPS

[Scenario A]
[Metric Units]

Pollutant, units	Baseline	Regulatory Options		
		1	2	3
PM, Mg/yr	28	2.7	2.7	2.3

TABLE 26.—BASELINE EMISSIONS COMPARED WITH EMISSIONS IN THE FIFTH YEAR AFTER IMPLEMENTATION OF THE NSPS—Continued

[Scenario A]
[Metric Units]

Pollutant, units	Baseline	Regulatory Options		
		1	2	3
CO, Mg/yr	14	14	14	14
CDD/CDF, g/yr	47	12	7.2	7.2
TEQ CDD/CDF, g/yr	1.1	0.28	0.17	0.17
HC1, Mg/yr	64	3.1	3.1	3.1
SO_2, Mg/yr	28	28	28	28
NO_x, Mg/yr	130	130	130	130
Pb, Mg/yr	0.39	0.02	0.02	0.02
Cd, Mg/yr	0.001	3.5×10^{-3}	3.5×10^{-3}	3.5×10^{-3}
Hg, Mg/yr	0.21	0.12	0.12	0.12

To convert Mg/yr to ton/yr, multiply by 1.1. To convert g/yr to lb/yr, divide by 453.6.

TABLE 27.—BASELINE EMISSIONS COMPARED WITH EMISSIONS IN THE FIFTH YEAR AFTER IMPLEMENTATION OF THE EMISSION GUIDELINES

[Scenario B]
[Metric Units]

Pollutant, units	Baseline	Regulatory options		
		1	2	3
PM, Mg/yr	28	2.1	2.1	2.1
CO, Mg/yr	14	6.5	6.5	6.5
CDD/CDF, g/yr	47	5.9	5.9	5.9
TEQ CDD/CDF, g/yr	1.1	0.14	0.14	0.14
HC1, Mg/yr	64	1.5	1.5	1.5
SO_2, Mg/yr	28	14	14	14
NO_x, Mg/yr	130	65	65	65
Pb, Mg/yr	0.39	0.031	0.031	0.031
Cd, Mg/yr	0.051	4.6×10^{-3}	4.6×10^{-3}	4.6×10^{-3}
Hg, Mg/yr	0.21	0.056	0.056	0.056

To convert Mg/yr to ton/yr, multiply by 1.1 To convert g/yr to lb/yr, divide by 453.6.

TABLE 28.—BASELINE EMISSIONS COMPARED WITH EMISSIONS IN THE FIFTH YEAR AFTER IMPLEMENTATION OF THE NSPS

[Scenario C]
[Metric Units]

Pollutant, units	Baseline	Regulatory options		
		1	2	3
PM, Mg/yr	28	4.1	4.1	4.1
CO, Mg/yr	14	14	14	14
CDD/CDF, g/yr	47	12	12	12
TEQ CDD/CDF, g/yr	1.1	0.28	0.28	0.28
HC1, Mg/yr	64	3.1	3.1	3.1
SO_2, Mg/yr	28	28	28	28
NO_x, Mg/yr	130	130	130	130
Pb, Mg/yr	0.39	0.06	0.06	0.06
Cd, Mg/yr	0.051	8.9×10^{-3}	8.9×10^{-3}	8.9×10^{-3}
Hg, Mg/yr	0.21	0.12	0.12	0.12

To convert Mg/yr to ton/yr, multiply by 1.1 To convert g/yr to lb/yr, divide by 453.6.

As discussed in previous sections, new information has led to new conclusions about the MWI inventory, performance of technology, and control levels associated with each new MWI. As a result, revised estimates of annual baseline emissions and emissions under each regulatory option are significantly lower than estimates developed at proposal. There are two primary reasons for the lower emission estimates. First, a greater level of emission control is expected at new MWI than was assumed at proposal. Second, more MWI were projected to be built at proposal than current estimates.

3. Water and Solid Waste Impacts

Estimates of wastewater impacts were developed for only Regulatory Option 3, Scenario A, which reflects all new MWI equipped with wet scrubbers in the absence of switching. Assessing these impacts under Scenario A without any consideration of the effect of switching grossly overstates the magnitude of these impacts. Under Scenarios B and C more than half of the new MWI are expected not to be built, resulting in significantly lower impacts. This approach of estimating and summarizing impacts under Scenario A, at this point, was taken as a matter of expediency to share new information and provide an opportunity for public comment.

Under Regulatory Option 3, Scenario A, 3.3 million gallons of additional wastewater would be generated in the fifth year by MWI as a result of the NSPS. This amount is the equivalent of wastewater produced annually by one small hospital. Therefore, when considering the wastewater produced annually at healthcare facilities nationwide, the increase in wastewater resulting from the implementation of the MACT emission standards for new MWI is insignificant.

With regard to solid waste impacts, about 88,800 Mg (97,900 tons) of medical waste would be burned in the fifth year in new MWI in the absence of Federal regulations, producing about 8,880 Mg/yr (9,790 tons/yr) of solid waste (bottom ash) disposed of in landfills. To determine the solid waste impacts for the NSPS, impacts were developed for Regulatory Option 3, Scenario B. This option is associated with the most switching and the most separation of waste for disposal in municipal landfills and thus, produces the greatest estimated impact.

Under Regulatory Option 3, Scenario B, 43,600 Mg/yr (48,000 tons/yr) of additional solid waste would result from the adoption of the NSPS. However, compared to municipal waste, which is disposed in landfills at an annual rate of over 91 million Mg/yr (100 million tons/yr), the increase in solid waste from the implementation of the MWI standards is insignificant.

4. Energy Impacts

The emission control technologies used by new MWI to comply with the MACT emission limits consume energy. Estimates of energy impact were developed for Regulatory Option 3, Scenario A. Under Scenarios B and C, which include switching, it is not clear whether overall national energy consumption would increase, decrease, or remain the same. Alternatives to incineration require energy to operate; however, information is not available to estimate whether these alternatives use more or less energy than MWI.

The energy impacts associated with the MACT emission standards could include additional auxiliary fuel (natural gas) for combustion controls and additional electrical energy for operation of the add-on control devices, such as wet scrubbers and dry scrubbers. It was assumed that all new MWI would be installed with combustion controls in the absence of the NSPS in order to meet State regulations for new MWI. Therefore, there is no increase in the total national usage of natural gas for combustion controls under Regulatory Option 3, Scenario A. Total national usage of electrical energy for the operation of add-on control devices would increase by about 9,800 megawatt hours per year (MW-hr/yr) (33.4 billion British thermal units per year (10^9 Btu/yr)). Once again, compared to the amount of energy used by health care facilities such as hospitals (approximately 2,460 MMm^3/yr of natural gas and 23.2 million MW-hr/yr of electricity) the increase in energy usage that results from implementation of the MWI emission standards is insignificant.

5. Cost Impacts

The cost impacts on individual healthcare facilities that consider purchasing an MWI vary depending on the MACT emission standard or regulatory option; the actual cost to purchase and install any additional air pollution control equipment; the cost of alternative means of treatment and disposal where they are located; and other factors, such as liability issues related to disposal and State and local medical waste treatment and disposal requirements. In general, facilities considering purchasing smaller MWI will have a greater incentive to use alternative means of treatment and disposal because their onsite incineration cost (per pound of waste burned) will be higher.

Large healthcare facilities with larger amounts of waste to be treated or healthcare facilities that serve as regional treatment centers for waste generated at other healthcare facilities in the area may have some cost advantages compared to smaller facilities. Due to economies of scale, their cost of burning waste may be lower (i.e., dollars per pound burned), even after purchasing and installing a complete air pollution control system to comply with the emission standards.

Table 29 contains the estimated increase in national annual costs associated with each of the MACT emission standards or regulatory options under Scenario A (no switching), Scenario B (switching with separation of waste), and Scenario C (switching with no separation of waste). As discussed earlier, Scenario A is unrealistic and grossly overstates the national cost impacts. The costs associated with the MACT emission standards under Scenarios B and C represent the likely range of national cost impacts and only these costs merit serious consideration and review.

TABLE 29.—COSTS OF THE REGULATORY OPTIONS OF THE NSPS

[Scenarios A, B, and C]
[Million $/year]

Scenario	Regulatory options		
	1	2	3
A	32.3	32.8	33.7
B	10.8	10.8	10.8
C	24.0	24.0	24.0

The nationwide annual costs presented in Table 29, excluding Scenario A, range from $10.8 million/yr for the regulatory options under Scenario B to $24.0 million/yr for the regulatory options under Scenario C. These nationwide annual costs are significantly lower than the $74.5 million/yr estimated for the proposed emission standards. The difference in the proposed and the current nationwide annual cost estimates can be attributed to the difference in the number of new MWI that were predicted to be installed at proposal and the current estimate of the number of new MWI. For example, at proposal it was estimated that approximately 700 new MWI would be installed by the fifth year after adoption of the emission standards. It is now estimated that approximately 235 new MWI will be installed by the fifth year after adoption of the standards.

C. Economic Impacts

Section IV.B.1 described assumptions pertaining to three analysis scenarios: no switching, switching with waste segregation, and switching with no waste segregation. Section IV.B.5 presented annual cost estimates that have been developed for each of the six regulatory options. This section incorporates these assumptions and cost data to estimate potential economic impacts that might result from implementation of these regulatory options.

The goal of the economic impact analysis is to estimate the market response of affected industries to the emission guidelines and to identify any adverse impacts that may occur as a result of the regulation. Industries that operate onsite waste incinerators (hospitals, nursing homes, research labs, and commercial waste incinerators) and those that utilize offsite medical waste incinerators (hospitals, nursing homes, medical/dental laboratories, funeral homes, physicians' offices, dentist offices, outpatient care, freestanding blood banks, fire and rescue operations, and correctional facilities) will potentially be affected by the regulation. Industrywide impacts, including changes in market price, output or production, revenues, and employment for the affected industries, are estimated for each regulatory option assuming the three switching scenarios. Facility-specific impacts are estimated for hospitals of varying sizes, ownerships, and operating characteristics; nursing homes; commercial research labs; and commercial waste incineration based on engineering model plant cost estimates under each of the three switching scenarios.

1. Analytical Approach

The analytical approach to estimate industrywide and facility specific economic impacts and evaluate the economic feasibility of switching are briefly described. For a more detailed description refer to docket item IV–A–9. Prices are stated at 1993 levels.

Economic impacts for new MWI are calculated under several assumptions. First, the costs that are used to estimate the economic impacts of the NSPS include control costs from both the EG and NSPS. This approach is used to account for market adjustments (e.g., price, etc.) that would have had to occur under implementation of the EG first. This approach allows for the establishment of a future baseline scenario. Second, due to lack of information, revenue data for each of the affected industries were not adjusted for growth during the 5 year time period.

The average price changes anticipated to occur in each industry sector for each of the regulatory options are estimated by comparing the annual control cost estimates to annual revenues for each affected industry. This calculation provides an indication of the magnitude of a price change that would occur for each industry sector to fully recover its annual control costs. The resulting cost-to-revenue ratio represents the price increase necessary on average for firms in the industry to recover the increased cost of environmental controls. Percent changes in output or production are estimated using the price impact estimate and a high and low estimate of the price elasticity of demand. Resulting changes in revenues are estimated based upon the estimated changes in price and output for an industry. Employment or labor market impacts result from decreases in the output for an industry and are assumed to be proportional to the estimated decrease in output for each industry.

Facility-specific economic impacts are estimated by using model plant information under the three switching scenarios. The assumption of no switching (Scenario A) represents the highest cost and economic impact scenario for most affected industries, while the assumption of switching with waste segregation (Scenario B) represents the lowest cost and economic impact scenario for most of the affected industries. As previously stated, EPA considers Scenario A to be an unlikely scenario; therefore, the economic impacts presented under Scenarios B and C should be regarded as the impacts most likely to occur.

2. Industry-Wide Economic Impacts

Industry-wide impacts include estimates of the change in market price for the services provided by the affected industries, the change in market output or production, the change in industry revenue, and the impact on affected labor markets in terms of full time equivalent workers lost. These impacts are summarized in Tables 30 and 31.

TABLE 30.—MEDICAL WASTE INCINERATION INDUSTRY-WIDE PRICE IMPACTS—NEW SOURCES PERCENT INCREASE

[Percent][a]

Industry	Range for regulatory options 1–6		
	Scenario A No switching	Scenario B Switching with waste segregation	Scenario C Switching with no waste segregation
Hospitals	0.05	0.01	0.03
Nursing homes	0.05	0.01	0.03
Laboratories:			
Research	0.15–0.16	0.04	0.09
Medical/dental	....	0	0
Funeral homes	0	0	0
Physicians' offices	0	0	0
Dentists' offices and clinics	0	0	0
Outpatient care	0	0	0
Freestanding blood banks	0.01	0.01	0.01
Fire and rescue operations	0	0	0
Correctional facilities	0	0	0
Commercial incineration	3.8	3.8	3.8

[a] The price increase percentages reported represent the price increase necessary to recover annualized emission control costs for each industry.

TABLE 31.—MEDICAL WASTE INCINERATION INDUSTRY-WIDE OUTPUT, EMPLOYMENT AND REVENUE IMPACTS—NEW SOURCES

Industry	Range for regulatory options 1–6		
	Scenario A No switching	Scenario B Switching with waste segregation	Scenario C Switching with no waste segregation
Hospitals:			
Output decrease (%)	0–0.02	0–0.01	0–0.01
Employment decrease (FTE's)	0–767	0–200	0–457
Revenue increase or (decrease) (%)	0.02–0.05	0.01	0.02–0.03
Nursing homes:			
Output decrease (%)	0.02–0.04	0.01	0.01–0.02
Employment decrease (FTE's)	260–574	74–150	168–342
Revenue increase or (decrease) (%)	0.03–0.04	0–0.01	0.01–0.02
Laboratories:			
Research:			
Output decrease (%)	0.15–0.21	0.04–0.06	0.09–0.13
Employment decrease (FTE's)	231–333	65–87	149–199
Revenue increase or (decrease) (%)	(0.05)–0	(0.01)–0	(0.03)–0
Medical/dental:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	3–5	3–5	3–5
Revenue increase or (decrease) (%)	0	0	0
Funeral homes:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Physicians' offices:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0–2	0–2	0–2
Revenue increase or (decrease) (%)	0	0	0
Dentists' offices and clinics:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	1–2	1–2	1–2
Revenue increase or (decrease) (%)	0	0	0
Outpatient care:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0–1	0–1	0–1
Revenue increase or (decrease) (%)	0	0	0
Freestanding blood banks:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0–0.01	0–0.01	0–0.01
Fire and rescue operations:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Correctional facilities:			
Output decrease (%)	0	0	0
Employment decrease (FTE's)	0	0	0
Revenue increase or (decrease) (%)	0	0	0

Output decreases and full time equivalents (FTE's) employment losses as a result of the regulation are shown in this table. Revenue increases and decreases are presented with decreases noted in brackets.

As shown in Table 30, industries that generate medical waste (i.e., hospitals, nursing homes, etc.) are expected to experience average price increases in the range of 0.00 to 0.16 percent, depending on the industry, regulatory option, and scenario. Table 31 shows that these industries are expected to experience output and employment impacts in the range of 0.00 to 0.21 percent. In addition, the revenue impacts for these industries are expected to range from an increase of 0.05 percent to a decrease of 0.05 percent. An increase in industry revenue is expected in cases where the price elasticity of demand for an industry's product is less than one. A price elasticity of less than one indicates that the percentage decrease in output will be less than the percentage increase in price. Since total revenue is a product of price and output, a less than proportional change in output compared to price means that total revenue should increase.

The following example illustrates how the above price impacts could be interpreted for the hospital industry. Table 30 shows that for hospitals, 0.03 percent is estimated as the price increase necessary to recover annual control costs assuming Regulatory Option 3, the most stringent regulatory option, and Scenario C, switching with no waste segregation. This change in price can be expressed in terms of the increased cost of hospitalization due to the regulation. The 1993 estimate of adjusted patient days nationwide totals 304,500,000 days. This estimate of adjusted patient-days is based on a combined estimate of in-patient and out-patient days at hospitals. The total annual control cost for the EG and NSPS for hospitals required to comply with regulatory option 3 is estimated as $101,652,807. Assuming that the ratio of adjusted patient-days to revenue does not significantly change over time, the expected average price increase for each hospital patient-day is expected to equal 33 cents.

Table 30 also shows that the average price impact for the commercial medical waste incinerator industry is approximately a 3.8 percent increase in price. Cost and economic impact estimates are the same for the commercial MWI industry regardless of the regulatory option analyzed because all three regulatory options specify identical regulatory requirements for large MWI. Average industrywide output, employment, and revenue impacts were not estimated for this sector because data such as price elasticity estimates and employment levels were not available.

3. Facility-Specific Economic Impacts

Facility-specific impacts were also estimated for the affected industries. These estimates, presented in Tables 32 and 33, were calculated for the three switching scenarios. A cost as a percent of revenue ratio was calculated to provide an indication of the magnitude of the impact of the regulation on an uncontrolled facility in each industry sector. This calculation was then compared to the industrywide price impact to determine if the facility's impacts differ significantly from the average industrywide impacts (i.e., if there is greater than a 1 percent difference).

TABLE 32.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING NO SWITCHING AND ONSITE INCINERATION—NEW SOURCES ANNUALIZED CONTROL COST AS A PERCENT OF REVENUE BUDGET

[Percent]

Industry	Option 1	Option 2	Option 3
Hospitals—Short term, excluding psychiatric:			
Federal Government			
Small			
Urban	0.36	0.36	0.41
Rural	0.36	0.36	0.41
Medium	0.33	0.49	0.49
Large	0.16	0.16	0.16
State Government			
Small			
Urban	0.76	0.76	0.88
Rural	0.76	0.76	0.88
Medium	0.35	0.51	0.51
Large	0.09	0.09	0.09
Local Government			
Small			
Urban	1.18	1.18	1.36
Rural	1.18	1.18	1.36
Medium	0.53	0.78	0.78
Large	0.12	0.12	0.12
Not-for-profit			
Small			
Urban	0.80	0.80	0.93
Rural	0.80	0.80	0.93
Medium	0.39	0.58	0.58
Large	0.14	0.14	0.14
For-profit			
Small			
Urban	0.91	0.91	1.04
Rural	0.91	0.91	1.04
Medium	0.41	0.61	0.61
Large	0.17	0.17	0.17
Hospitals—Psychiatric, short term and long term:			
Small			
Urban	1.25	1.25	1.44
Rural	1.25	1.25	1.44
Medium	0.95	1.40	1.40
Large	0.56	0.56	0.56
Nursing Homes:			
Tax-Paying			
Urban	1.35	1.35	1.56
Rural	1.35	1.35	1.56
Tax-exempt			
Urban	1.39	1.39	1.59
Rural	1.39	1.39	1.59
Commercial research labs:			
Tax-paying	0.68	1.00	1.00
Tax-exempt	0.68	1.00	1.00
Commercial Incineration Facilities	11.82	11.82	11.82

TABLE 33.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING SWITCHING FROM ONSITE INCINERATION TO COMMERCIAL DISPOSAL ALTERNATIVES ALTERNATIVE WASTE DISPOSAL COST AS A PERCENT OF REVENUE BUDGET

[Percent]

Industry	Scenario B Switching with waste segregation	Scenario C Switching without waste segregation
Hospitals—Short-term, excluding psychiatric:		
Federal Government:		
Small		
Urban	0.03	0.10
Rural	0.03	0.17
Medium		
Urban	0.05	0.17
Rural	0.05	0.27
Large		
Urban	0.08	0.29
Rural	0.09	0.47
State Government:		
Small		
Urban	0.06	0.22
Rural	0.06	0.36
Medium		
Urban	0.05	0.18
Rural	0.05	0.29
Large		
Urban	0.05	0.16
Rural	0.05	0.27
Local Government:		
Small		
Urban	0.09	0.34
Rural	0.10	0.56
Medium		
Urban	0.07	0.27
Rural	0.08	0.44
Large		
Urban	0.06	0.22
Rural	0.06	0.36
Not-for-profit:		
Small		
Urban	0.06	0.23
Rural	0.07	0.38
Medium		
Urban	0.05	0.20
Rural	0.06	0.32
Large		
Urban	0.07	0.25
Rural	0.07	0.41
For-profit:		
Small		
Urban	0.07	0.26
Rural	0.08	0.43
Medium		
Urban	0.06	0.21
Rural	0.06	0.34
Large		
Urban	0.09	0.32
Rural	0.09	0.52
Hospitals—Psychiatric, short-term and long-term:		
Small		
Urban	0.10	0.36
Rural	0.11	0.59
Medium		
Urban	0.13	0.48
Rural	0.14	0.78
Large		
Urban	0.29	1.05
Rural	0.31	1.70
Nursing homes:		
Tax-paying		
Urban	0.11	0.39
Rural	0.11	0.64
Tax-exempt		
Urban	0.11	0.40

TABLE 33.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS ASSUMING SWITCHING FROM ONSITE INCINERATION TO COMMERCIAL DISPOSAL ALTERNATIVES ALTERNATIVE WASTE DISPOSAL COST AS A PERCENT OF REVENUE BUDGET—Continued

[Percent]

Industry	Scenario B Switching with waste segregation	Scenario C Switching without waste segregation
Rural	0.12	0.65
Commercial research labs:		
Tax-paying		
Urban	0.09	0.34
Rural	0.10	0.56
Tax-exempt		
Urban	0.09	0.34
Rural	0.10	0.56

Tables 32 and 33 show that facilities with onsite MWI that are currently uncontrolled may experience impacts ranging from 0.03 to 1.59 percent, depending on the industry, regulatory option, and scenario. A comparison of the economic impacts expected to occur under the three switching scenarios, presented in Tables 32 and 33, indicates that the option of switching will be attractive to some facilities that might have considered operating an onsite incinerator in the absence of this regulation. For many of these facilities, the economic impacts of switching to an alternative method of waste disposal are much lower than the economic impacts of choosing to install emission control equipment. The decision to switch to an alternative method of medical waste disposal should preclude any facilities from experiencing a significant economic impact. These results support EPA's assertion that implementation of the regulation will likely result in either Scenarios B or C and that the costs and economic impacts of Scenario A are unlikely to occur.

Table 34 shows the impacts that would be incurred by medical waste generators that currently use an offsite medical waste incineration service. These impacts range from 0.00 to 0.02 percent and are considered negligible impacts. These results indicate that the incremental cost for the vast majority of medical waste generators are expected to be small.

TABLE 34.—MEDICAL WASTE INCINERATION PER FACILITY IMPACTS FOR FIRMS THAT UTILIZE OFFSITE WASTE INCINERATION—NEW SOURCES INCREMENTAL ANNUAL COST AS A PERCENT OF REVENUE/ BUDGET

[Percent]

Industry	Incremental annual cost as a percent of revenue
Hospitals:	
<50 Beds	0–0.01
50–99 Beds	0–0.01
100–299 Beds	0–0.01
300 + Beds	0–0.01
Nursing homes:	
0–19 Employees	
Tax-paying	0
Tax-exempt	0
20–99 Employees	
Tax-paying	0–0.01
Tax-exempt	0–0.01
100 + Employees	
Tax-paying	0
Tax-exempt	0
Commercial research labs:	
Tax-paying	
0–19 Employees	0
20–99 Employees	0
100 + Employees	0
Tax-exempt	0
Outpatient care clinics:	
Physicians' clinics (Amb. Care)	
Tax-paying	0–0.01
Tax-exempt	0–0.01
Freestanding kidney dialysis facilities	
Tax-paying	0–0.01
Tax-exempt	0–0.01
Physicians' offices	0
Dentists' offices and clinics:	
Offices	0
Clinics	
Tax-paying	0
Tax-exempt	0
Medical & dental labs:	
Medical	0–0.01
Dental	0–0.01
Freestanding blood banks	0.01–0.02
Funeral homes	0
Fire & Rescue	0
Corrections:	
Federal Government	0
State Government	0
Local Government	0

Table 33 also presents price impact estimates for the commercial medical waste incinerator sector. The analysis shows that a new medical waste incinerator required to meet any of the regulatory options would need to increase its prices by approximately 11.82 percent in order to recoup its control costs. The large difference between the facility-specific price increase compared to the industry-wide price increase (3.8 percent) for this industry suggests that it is unlikely that a new commercial MWI would be able to increase the price of its service by 11.82 percent.

Although a ''switching'' analysis was not developed for the commercial MWI sector, recent trends in the medical waste treatment and disposal industry suggest that the concept of switching may also be applicable to the commercial MWI sector. A company in this industry that might have decided to open a new incinerator may reconsider the option of opening an alternative technology, such as autoclaving. These alternative technologies will seem more attractive from a cost perspective due to the requirements that regulation places on new MWI. Therefore, some companies in this industry will have an incentive to choose to open an alternative treatment unit, such as an autoclave unit. Some companies in the medical waste treatment and disposal industry have already begun to make these ''switching'' decisions. Since companies in this industry have demonstrated the ability to operate various types of medical waste treatment and disposal units, the option of ''switching'' should be seen as a viable alternative for commercial MWI operators.

This economic impact section examines possible economic impacts that may occur in industries that will be directly affected by this regulation. Therefore, the analysis includes an examination of industries that generate medical waste or dispose medical waste. Secondary impacts such as subsequent impacts on air pollution device vendors and MWI vendors are not estimated due to data limitations. Air pollution device vendors are expected to experience an increase in demand for their products due to the regulation. This regulation is also expected to increase demand for commercial MWI services. However, due to economies of scale, this regulation is expected to shift demand from smaller incinerators to larger incinerators. Therefore, small MWI vendors may be adversely affected by the regulation. Lack of data on the above effects prevents quantification of the economic impacts on these secondary sectors.

V. Inclinations for Final Rule

At various points throughout this notice, EPA has indicated ''inclinations'' regarding the final regulations for MWI, based on the new information and revised analyses now available. For example, as discussed in Section II of this notice, EPA is inclined to: subcategorize MWI by size rather than by type, where judged appropriate in the final regulations; adopt the NYSDOH definition of medical waste for the purpose of determining what incinerators the final regulations apply to; determine compliance with the final regulations using parameter monitoring and routine inspection/maintenance rather than CEMS; defer to the States the judgement of what constitutes an acceptable operator training program; and develop a separate regulation for medical waste ''pyrolysis'' units. In this final section, EPA inclinations regarding the regulatory options outlined earlier are discussed.

A note of caution should be observed and kept in mind by the reader, however, with regard to these EPA inclinations. These ''inclinations'' should not be viewed as final or, for that matter, even tentative EPA decisions. All options discussed in this notice and any additional options which may arise from further public comment will be considered in developing the final standards and guidelines for MWI. The primary purpose of these inclinations is to solicit public comment.

It is also important to reiterate some additional points. First, as mentioned earlier, all of the information and analyses reviewed in this notice, particularly the discussions below with their focus on air pollution control technology, are often misunderstood and lead some to assume that the final regulations will require the use of a specific air pollution control technology—this is not the case. The final regulations must be based upon the performance capabilities of air pollution control technology; as a result, EPA assesses air pollution control technologies and draws conclusions regarding their performance capabilities. These conclusions regarding performance capabilities take the form of emission limits which could be achieved through the use of the various air pollution control technologies. This approach permits EPA to identify and consider the different options for the regulations, in terms of emission limits.

The final regulations will not require use of any specific air pollution control technology. The final regulations will include emission limits (i.e., concentration levels in the gases released to the atmosphere) for specific air pollutants (e.g., hydrogen chloride, lead, etc.) that an MWI must achieve. The decision on how to meet these emission limits is left to the MWI owner or operator; an owner or operator may select any equipment or any means available to comply with these emission limits.

Second, as also mentioned earlier, Section 129 of the Clean Air Act directs EPA to develop regulations for MWI which are based on maximum achievable control technology (MACT). Section 129 defines MACT as the maximum reduction in emissions which is achievable, considering cost, environmental, and energy impacts. Section 129 also states, however, that for new MWI MACT can be no less stringent than the best similar MWI and for existing MWI MACT can be no less stringent than the best 12 percent of existing MWI. These minimum stringency requirements for the standards (new MWI) and the guidelines (existing MWI) are referred to as the MACT ''floors.'' The emission limits in the final regulations can be no less stringent than the MACT floor emission limits.

Finally, the MACT floors are only the starting point for determining MACT. Since MACT is the maximum reduction in air pollution emissions that is achievable, considering cost, environmental, and energy impacts, if more stringent emission limits than the MACT floor are achievable, EPA must identify these more stringent emission limits and consider them in selecting the MACT emission limits for the final regulations.

A. New MWI

As discussed in Section IV, the MACT floor for large new MWI appears to require the use of good combustion and a combined dry/wet scrubber with activated carbon. There is no air pollution control technology which could achieve lower emissions than this system. Consequently, EPA is inclined to establish emission limitations for large new MWI based on good combustion and a combined dry/wet scrubber system with activated carbon (i.e., the MACT floor).

For medium new MWI, the MACT floor appears to require the use of good combustion and a combined dry/wet scrubber system without activated carbon. In this case, one regulatory option more stringent than the MACT floor would reflect the addition of activated carbon to the combined dry/wet scrubber system. On a national basis, because of switching to the use of alternative means of medical waste disposal, the addition of activated carbon results in a negligible cost increase. Where a typical medium new MWI was constructed, the addition of activated carbon would reduce emissions of dioxin and would increase air pollution control costs by less than 4 percent. As a result, EPA is inclined to establish emission limitations for medium new MWI based on good combustion and a combined dry/wet scrubber system with activated carbon (i.e., more stringent than the MACT floor).

For small new MWI, four small existing MWI have been identified which currently operate with good combustion and moderate efficiency wet scrubbers; therefore, the MACT floor appears to require the use of good combustion and a moderate efficiency wet scrubber. Consideration of the impact of this MACT floor indicates that few new small MWI are likely to be constructed due to the substantial increase in the cost of a new small MWI as a result of the moderate efficiency wet scrubber and the availability of switching to an alternative means of medical waste disposal.

One regulatory option more stringent than this MACT floor would reflect the use of good combustion and a high efficiency wet scrubber. Consideration of this option indicates that the nationwide impacts would be negligible, primarily because few new small MWI would be constructed (i.e., because of switching to alternative means of medical waste disposal). Where a typical new small MWI was constructed, however, the high efficiency wet scrubber would only reduce PM emissions by a small amount and would increase air pollution control costs by about 15 percent. As a result, EPA is inclined to establish emission limitations for small new MWI based on the use of good combustion and a moderate efficiency wet scrubber (i.e., the MACT floor).

B. Existing MWI

As discussed in Section III, the MACT floor for large existing MWI appears to require the use of good combustion and a high efficiency wet scrubber. One regulatory option more stringent than this MACT floor is the use of dry scrubbers with activated carbon. However, a dry scrubber typically costs much more than a high efficiency wet scrubber, and a dry scrubber with activated carbon would result in only a very small additional reduction in dioxin, Pb, and Cd emissions. For large existing MWI already equipped with wet scrubbers, replacing a wet scrubber with a dry scrubber would be exorbitantly expensive. As a result, EPA is inclined to establish emission limitations for large existing MWI based on the use of good combustion and a high efficiency wet scrubber (i.e., the MACT floor). As discussed in Section III, these emission limitations could also be achieved using a dry scrubber with activated carbon.

For medium existing MWI, the MACT floor appears to require the use of good combustion and a moderate efficiency wet scrubber. One regulatory option more stringent than this MACT floor would reflect the use of good combustion and a high efficiency wet scrubber. On a nation-wide basis, while this more stringent option would result in a relatively small cost increase, it would also result in only a small decrease in PM emissions. For a typical medium MWI that installed or upgraded an existing wet scrubber to a high efficiency wet scrubber, air pollution control costs would increase by about 15 to 25 percent. As a result, EPA is inclined to establish emission limitations for medium existing MWI based on the use of good combustion and a moderate efficiency wet scrubber (i.e., the MACT floor). As mentioned above and in Section III, these emission limitations could also be achieved using a dry scrubber with activated carbon.

For small existing MWI, the MACT floor appears to require the use of good combustion; add-on air pollution control would not be needed to meet the MACT floor. One regulatory option more stringent than this MACT floor would reflect the use of good combustion and a low efficiency wet scrubber. Consideration of this option, as well as other options outlined below, is the subject of the remainder of this section. At this point, EPA has no inclination, but solicits comment on the options available.

If the guidelines for small existing MWI were established based on the use of good combustion and wet scrubbing, the analysis indicates that almost all healthcare facilities operating small MWI would switch to the use of alternative means of medical waste disposal. From a national perspective, this would minimize emissions of PM, dioxin, acid gases, and metals from small existing MWI at a relatively low cost because of switching. For most healthcare facilities using small existing MWI, the cost of switching to the use of alternative means of medical waste disposal would be negligible. On this basis, one might argue that EPA should establish emission guidelines for small existing MWI based on the use of good combustion and wet scrubbers.

On the other hand, if a healthcare facility chooses to install a wet scrubbing system on its small existing MWI, the cost of waste disposal at this facility would more than double and the emission reduction achieved would be relatively small. The wet scrubber-based option would effectively preclude continued use of the MWI, whereas guidelines based on the use of good combustion alone would permit many healthcare facilities with small MWI to continue to use these MWI, preserving incineration as a viable medical waste disposal option for these healthcare facilities. On this basis, one might argue that EPA should establish emission guidelines for small existing MWI based on the use of good combustion alone.

As mentioned earlier in this notice, some commenters expressed concern about the availability and/or the cost of alternative means of medical waste disposal to healthcare facilities located in remote or rural locations. In this case, the conclusion that costs would be negligible because of switching would be incorrect, and such a facility could be faced with adverse impacts. The availability and/or cost of alternative means of medical waste disposal in urban areas, however, does not appear to be an issue. Competition among commercial medical waste disposal services, formation of healthcare facilities into groups for the purpose of leading commercial disposal services to bid for waste disposal contracts, as well as other forms of cooperation among healthcare facilities in urban areas appears to ensure that alternative means of medical waste disposal are readily available at reasonable costs to healthcare facilities in urban areas.

This consideration of the potential difference in the availability and/or cost of alternative means of medical waste disposal to healthcare facilities located in rural or urban areas leads to additional regulatory options. Small existing MWI could be subcategorized into those located in urban areas and those located in rural areas.

As mentioned, the MACT floor for small existing MWI only appears to require the use of good combustion; it does not appear to require the use of good combustion and a wet scrubber. The guideline for small existing MWI located in urban areas could be based on the use of good combustion and a low efficiency wet scrubber (i.e, beyond the MACT floor). The guideline for small existing MWI located in rural areas, however, could be based on the use of good combustion alone (i.e., the MACT floor). On the other hand, the guideline for small existing MWI located in rural areas could be based on the use of good combustion and low efficiency wet scrubbers (i.e., beyond the MACT floor), but permit—on a case by case basis—a healthcare facility which met certain criteria to comply with a guideline based on the use of good combustion alone (i.e., the MACT floor).

These options of differing requirements for small existing MWI in urban and rural areas were examined in a broad sense under Regulatory Option 2, which would establish emission limitations based on good combustion alone in rural areas, but establish emission limitations based on good combustion and wet scrubbers in urban areas. The difference between these two options is that the second option would establish a set of criteria (much more comprehensive than simply ‘‘rural location’’) to permit a small existing MWI in a rural location to comply with requirements based on the use of good combustion alone.

The attractiveness of this second option is that it would appear to minimize emissions from small existing MWI (urban or rural) while providing relief—on a case by case basis—for those few small MWI located in rural areas where the impacts of compliance might be particularly severe due to the limited availability of alternative means of medical waste disposal. The EPA, therefore, solicits comment on the following options:

(1) Guidelines for small existing MWI located in both urban and rural areas based on the use of good combustion alone;

(2) Guidelines for small existing MWI located in urban areas based on the use of good combustion and wet scrubbing, and guidelines for small existing MWI located in rural areas based on the use of good combustion alone;

(3) Guidelines for small existing MWI located in urban and rural areas based on the use of good combustion and wet scrubbers, but with the guidelines permitting small existing MWI located in rural areas to meet requirements based on the use of good combustion alone, provided these MWI meet certain criteria; and

(4) Guidelines for small existing MWI in both urban and rural areas based on the use of good combustion and wet scrubbers.

As mentioned above, EPA has no inclination with regard to the guidelines for small existing MWI. Each of the options outlined above merits serious consideration. Since the option outlined above with criteria for small existing MWI located in rural areas to meet requirements—on a case by case basis—based on the use of good combustion alone would seem to achieve the environmental benefits, but avoid the cost impacts, of the most stringent option, EPA specifically solicits comment on what the criteria associated with this option might be.

For example, these criteria might include: location with respect to an Metropolitan Statistical Area [MSA] (i.e., either outside an MSA or more than a specified number of miles from an MSA); location with respect to a commercial waste disposal company or a vendor of alternative treatment technology; some other measure of the lack of alternative disposal options; some measure of economic impact of switching waste disposal methods or some other reason why switching would not be possible; etc. The criteria could also be structured to allow good combustion alone only where a healthcare facility generates less than some very small amount of medical waste on a daily or weekly basis.

List of Subjects in 40 CFR Part 60

Air pollution control, New source performance standards, Emission guidelines, Medical waste incinerators.

Dated: June 12, 1996.

Mary D. Nichols,

Assistant Administrator for Air and Radiation.

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