



Hospital/Medical/Infectious Waste Incinerators: Background Information for Promulgated Standards and Guidelines -

Analysis of Economic Impacts for New Sources



00518 #573
KUC# 38115010

Hospital/Medical/Infectious Waste Incinerators: Background Information for Promulgated Standards and Guidelines – Analysis of Economic Impacts for New Sources

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

U.S. EPA
OAQPS, AQSSD, ISEG

July 1997

DISCLAIMER

This report is issued by the Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency. Mention of trade names and/or commercial products is not intended to constitute endorsement or recommendation for use. Copies of this report are available free of charge to Federal employees, current contractors and grantees, and non-profit organizations -- as supplies permit -- from the Library Services Office (MD-35), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711 (919-541-2777) or, for a nominal fee, from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (703-487-4650).

I. INTRODUCTION

On February 27, 1995, the EPA published the proposed New Source Performance Standards (NSPS) for new medical waste incinerators (MWIs). The proposal was the result of several years of effort reviewing available information in light of the Clean Air Act requirements. Following proposal, a large number of comment letters were received, some including new information and some indicating that commenters were in the process of gathering information for the 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 MWIs; 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. One change made to the final rule as a result of comments regarding the definition of medical waste has been a change in the title of the rulemaking. For reasons discussed in other documents, the official title of the rulemaking is "Hospital/Medical/Infectious Waste Incinerators" or "HMIWI." However, for purposes of this document, the terms "MWI" and "HMIWI" should be viewed as interchangeable.

The purpose of this revised economic impact analysis (EIA) document is to reassess the economic impacts of new regulatory options that have been developed for new MWIs. The potential economic impacts of three control options for new MWIs were originally evaluated in *Medical Waste Incinerators - Background Information for Proposed Standards and Guidelines: Analysis of Economic Impacts for New Sources*.¹ An addendum was subsequently prepared to estimate the potential economic impacts of a fourth control option.² The economic impacts presented in this document should be viewed as a revision to the original economic impact documents.

II. EXECUTIVE SUMMARY

Industry-wide impacts presented in this analysis 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 change in affected labor markets in terms of the number of employees lost. The impacts represent the combined, or cumulative, effects of both this NSPS for new sources and the Emission Guidelines (EG) for existing sources. Control costs from the NSPS and EG are accumulated in order to account for market adjustments that would first occur after implementation of the EG. Industries that generate medical waste (hospitals, nursing homes, etc.) are expected to experience average price increases in the range of 0 to 0.16 percent, depending on the industry, regulatory option, and scenario analyzed. These industries are expected to experience output and employment impacts in the range of 0 to -0.21 percent. In addition, 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 will occur if demand for the industry's service is relatively price-inelastic, i.e., between -1 and 0. Such a price elasticity indicates that output is not very responsive to a change in price, specifically that the percentage decrease in output will be less than the percentage increase in price. Since revenue is the product

of price and output, a less than proportional change in output compared to price means that total revenue will increase.

The following example illustrates how the above price impacts could be interpreted for the hospital industry. The estimated average industry-wide price increase for hospitals under regulatory option three (the most stringent regulatory option) and scenario C, switching with no waste segregation, is 0.03 percent. This can be expressed in terms of the increased cost of hospitalization due to the regulation. Total nationwide adjusted patient days at hospitals in 1993 were an estimated 304.5 million days. ("Adjusted" patient days include both in-patient days and the in-patient day equivalent of out-patient visits.) Annualized control costs under regulatory option three and scenario C are \$108,783,078, or \$0.36 per adjusted patient day. This means that the average price increase that an individual would experience for each hospital patient-day is expected to equal 36 cents.

The estimated average price increase for the commercial medical waste incineration industry is 4.1 percent, regardless of the regulatory option (control requirements for commercial MWIs do not vary by regulatory option). This price increase is considered achievable because of the cost advantage (i.e., lower cost per ton of waste burned) – due to economies of scale – that commercial MWIs have over smaller on-site MWIs.

Impacts were also estimated at the facility level by employing the concept of the model facility, i.e., by defining key parameters to describe typical facilities in the affected industries. The vast majority of facilities impacted by the regulation are those that send their medical waste off-site to be incinerated and will have to pay more for commercial incineration. All impacts on these facilities are minuscule. At the most, the increased cost of commercial incineration could be recovered with a price increase of only 0.03 percent. For facilities that operate on-site MWIs ("MWI operators"), impacts are also generally insignificant. Either the cost of controls or the cost of switching to an alternative medical waste treatment and disposal method could be recovered with a price increase that does not significantly exceed the market price increase.

Two types of MWI operators may not be able to switch to an alternative, however: commercial MWI operators, because their line of business is commercial incineration; and on-site MWIs that burn a small amount of medical waste and are located far away from an urban area, because they may not have access to waste hauling and/or commercial incineration services. However, only a few, if any, of the projected 10 new commercial MWIs over the next five years, and, at the most, only a few of the projected 85 new small on-site MWIs over the next five years, are likely to be significantly impacted by the regulation (under all three regulatory options). A "significant impact" does not necessarily imply closure or the need to cancel plans to open up, or expand, a facility. For example, operators of small, remote on-site MWIs may still have switching opportunities. As the commercial incineration industry continues to grow (with additional impetus being provided by the EG and NSPS), it is possible that services will be extended to remote, isolated areas that are currently not served. On-site autoclaving is another possible treatment alternative. If a facility had planned to invest in a new MWI, it stands to reason that an

on-site autoclave unit of comparable cost would be affordable. Additionally, a facility that had planned – by virtue of operating an on-site MWI – to open in a remote area without access to commercial incineration services, might be able to reconsider its location decision, and locate instead in an area with such access.

This economic impact analysis examines industries that are directly impacted by the regulation, namely industries that generate or treat medical waste. Secondary impacts such as those on air pollution device vendors and MWI vendors were not evaluated due to data limitations. However, it can be said that air pollution device vendors are expected to experience an increase in demand for their products due to the regulation. The regulation is also expected to increase the demand for commercial MWI services. Due to economies of scale, however, there is likely to be a demand shift from smaller incinerators to larger incinerators. Therefore, vendors of small MWIs may be adversely affected by the regulation.

In accordance with the Regulatory Flexibility Act of 1980 and its amendment in 1996 by the Small Business Regulatory Enforcement Fairness Act (SBREFA), an analysis of impacts on small “entities” – including small businesses, small nonprofit organizations, and small governmental jurisdictions – was performed. This analysis indicates that the NSPS will not have a “significant impact on a substantial number of small entities” under any regulatory option. Impacts are not significant for the vast majority of medical waste generators that send their waste off-site to be treated and disposed. Impacts are also not significant for the great majority of MWI operators that would have the opportunity to switch to an alternative method of medical waste treatment and disposal if control costs are prohibitive. Some significant impacts were found under all three regulatory options for commercial MWI operators and for small on-site MWI operators that are remote from an urban area. These facilities may not have the opportunity to switch to an alternative treatment and disposal method – commercial MWI operators because medical waste incineration is their line of business, and small, remote MWIs because they may not have access to commercial incineration services. However, the number of such facilities that are both significantly impacted and “small” would be, at the most, only a few, and would therefore not be “substantial.”

III. BACKGROUND INFORMATION

A. Regulatory Options

At proposal, the EPA concluded that all new MWIs would need good combustion and dry scrubbers to meet the MACT floors for CO, PM, and HCl. Consequently, the EPA was left to consider only two control options for MACT.

After proposal, the EPA received numerous comments containing substantially new information. Review of this new information led to new conclusions in a number of areas: the MWI inventory; MWI subcategories; performance of emission control technologies; MACT floors; and monitoring and testing options. As a result, the EPA examined several new regulatory options in selecting

MACT for new MWIs. This section summarizes these new regulatory options and the EPA's assessment of their merits.

The MACT "floor" defines the least stringent emission standards the EPA may adopt for new MWIs. However, the Clean Air Act also requires EPA to examine alternative emission standards (i.e., regulatory options) more stringent than the MACT floor.

Based on the new information submitted to the EPA following proposal of the MACT emission standards for new MWIs, new MACT floor emission levels were developed for new small, medium, and large MWIs. Next, the EPA determined the emission control technologies new MWIs would probably need to meet regulations based on these floor emission limits. The floor for small new MWIs requires good combustion and moderate efficiency wet scrubbers. For medium new MWIs, the MACT floor requires good combustion and a combined wet/dry scrubbing system without activated carbon injection. The MACT floor for large new MWIs requires good combustion and a combined wet/dry scrubbing system with activated carbon injection.

Having identified the emission control technology most new MWIs would likely install to meet the MACT floor emission limits, the EPA also reviewed the performance capabilities of other emission control technologies that would reduce emissions by an amount greater than the MACT floor level of control. This process enables the EPA to identify more stringent regulatory options which could be selected as MACT. Table 1 summarizes the emission control technology that would probably be required for new small, medium, and large MWIs to meet the emission limits specified for each of the regulatory options. The regulatory options are a combination of the various emission standards the EPA believes merit consideration as MACT for new MWIs. This table is constructed only for the purpose of organizing and structuring an analysis of the cost, environmental, energy, and economic impacts associated with determining or selecting MACT for new MWIs. These emission standards for new MWIs will not include requirements to use a specific emission control system or technology; the standards will only include emission limits, which may be met by any means or by any control system or technology of the MWI owner's or operator's choice.

B. Analysis Scenarios

Health care facilities may choose from among a number of alternatives for treatment and disposal of their medical waste. (It should be noted that these alternatives are generally more limited for health care facilities located in rural areas than for those located in urban areas.) At the time of proposal, inventory estimates indicated that fewer than half of all hospitals operated on-site 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 on-site medical waste treatment technologies or the use of commercial off-site treatment and disposal services. Consequently, it is quite likely that even fewer hospitals now operate on-site medical waste incinerators.

Table 1
Regulatory Options For New MWIs

MWI Size	Regulatory Option		
	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 >200 lb/hr and ≤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 efficiency wet scrubber

Given the above data, it can be assumed that more than half of all hospitals today have chosen to use other means of treatment and disposal of their medical waste rather than operate an on-site incinerator. This indicates that alternatives to the use of on-site incinerators exist and that they are readily available in many cases. For other health care facilities, such as nursing homes, etc., only a small number of facilities currently operate on-site MWIs. Therefore, for these types of health care 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 95 percent or more. This further confirms the availability of alternatives to on-site incineration for the treatment and disposal of medical waste.

A likely reaction and outcome associated with the adoption of the standards for new MWIs, therefore, is an increase in the use of these alternatives by health care facilities for treatment and disposal of their medical waste. It is not the objective of the EPA to encourage the use of alternatives or to discourage the continued use of on-site medical waste incinerators; rather, it is the objective of the EPA to adopt the emission standards for new MWIs that fulfill the requirements of the Clean Air Act. In doing so, however, it is clear that one outcome associated with adoption of these emission standards is likely to be an increase in the use of alternatives and a decrease in the use of on-site medical waste incinerators in the future. Consequently, it is an outcome the EPA should acknowledge and incorporate into the analysis of the costs and economic impacts of the emission standards.

In this analysis of costs and economic impacts, selection of an alternative form of medical waste treatment and disposal by a health care facility, rather than installing a new MWI, is referred to as "switching." Switching was incorporated into the cost analysis at proposal and was the basis for the conclusion at proposal that adoption of the proposed emission standards could lead to as many as 80 percent of health care facilities that might have installed MWIs to choose an alternative means of medical waste treatment and disposal. However, the economic impacts presented with the proposed MACT for new sources were only evaluated using the costs under a "no switching" scenario. Although the EIA presented a qualitative discussion of the likely possibility of facilities that might have installed on-site MWIs deciding to switch to alternative treatment and disposal methods, the economic impacts under a switching scenario were not quantified due to time constraints.

Switching has now been incorporated into the cost and economic impact analysis. Three scenarios are evaluated: one scenario which ignores switching, and two scenarios which consider switching. Scenario A assumes that each new MWI will comply with the appropriate regulatory option by having the appropriate emission control equipment installed. This scenario most likely overstates national costs and economic impacts and therefore should not be viewed as representative of the new source emission standards. It is included only to fulfill the goal of providing a complete analysis.

Switching scenarios B and C are considered more representative of the cost and economic impacts of the MACT for new MWIs. Both scenarios 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 standards (i.e., a regulatory option) is greater than the cost of using an alternative means of treatment and disposal.*

The difference between the two scenarios is the assumption of whether or not the medical waste stream is separated. Some facilities currently separate their medical waste into an infectious stream and a non-infectious stream. Some commenters have stated it is a good assumption that hospitals which currently operate on-site medical waste incinerators practice little separation of medical waste into infectious and non-infectious streams; generally all the waste is incinerated.

Based on estimates in the literature that only 10 to 15 percent of medical waste is infectious and the remaining 85 to 90 percent is non-infectious, scenario B assumes that only 15 percent of the waste currently being burned at a health care facility operating an on-site incinerator is infectious medical waste; the remaining 85 percent is non-infectious medical waste. This non-infectious waste is municipal waste; it needs no special handling, treatment, transportation, or disposal, and can be sent to a municipal landfill or a municipal combustor for disposal. Thus, under scenario B, when choosing an alternative to operation of an on-site medical waste incinerator, in response to adoption of the emission standards, a health care facility need only choose an alternative form of medical waste treatment and disposal for 15 percent of the waste stream to be burned on-site and may send the remaining 85 percent to a municipal landfill. 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 health care facilities will be able to, or will decide to, segregate their waste stream. For example, a facility may decide that the cost and inconvenience of training its staff to segregate waste is not acceptable. Scenario C, therefore, assumes that all medical waste that would be burned at a health care facility with an on-site medical waste incinerator is infectious medical waste and must be treated and disposed of accordingly. As a result, scenario C leads to higher costs than scenario B.

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

C. Industry Sectors

Similar to the original EIA, this analysis examines the economic impacts of the MACT emission standards on industries that generate medical waste and will operate new on-site MWIs, new commercial MWIs, and industries that generate medical waste but are not expected to operate

*Under both scenarios, however, switching may not be possible for some MWIs that burn a small amount of medical waste and are located far away from an urban area. Such MWIs may, in some cases, have difficulty attracting the services of waste haulers and/or commercial MWI operators. For some small, remote MWIs, therefore, scenarios B and C may not apply. Only scenario A, no switching, may apply.

new on-site MWIs. Facilities engaging in the above activities will generally fall into one of two categories: directly affected facilities, and “off-site generators.”

Facilities in industries that generate medical waste and will operate new on-site MWIs will be directly affected by the MACT emission standards because they will need to initiate some action to comply with the regulation (i.e., install emission control equipment or switch to an alternative). Costs and economic impacts associated with these facilities and industries are referred to as direct costs and economic impacts. Industries belonging to this category include hospitals, nursing homes, and research laboratories. Also included in this category of directly affected industries are commercial MWIs. Although the commercial MWI industry does not generate medical waste, it will be required to comply with the emission standards by installing emission control equipment.

The analysis also examines the impacts of the emission standards on facilities that generate medical waste but will not operate a new on-site MWI. Such facilities are termed “off-site generators” in this analysis. These facilities will be indirectly affected by the regulation because they must send their medical waste off-site to be treated and disposed. Commercial MWIs or other waste treatment facilities that provide service to these types of facilities are expected to pass on to their customers at least a portion of their cost increases. Off-site generators are therefore expected to have to pay more for waste treatment service. Industries belonging to this off-site generator category include hospitals, nursing homes, research laboratories, funeral homes, physicians’ offices, dentists’ offices and clinics, outpatient care facilities, freestanding blood banks, fire and rescue operations, and correctional facilities.

D. Five-Year Projections

This analysis attempts to estimate the impacts of these MACT emission standards over a five-year time period between 1996 and 2000. This type of analysis is only possible if projections of key analysis parameters are made. The parameters required to establish a future fifth-year baseline include: the number of new MWI units that would have begun operation in the absence of these emission standards for new sources, the costs of control technologies to enable the new MWI units to meet these emission standards, the population of facilities expected to exist in each of the industries (e.g., hospitals, etc.) and all relevant financial and economic data used in this analysis to estimate the economic impacts of these emission standards.

Where possible, projections of some parameters are based on historical trends. For example, the number of new commercial MWIs that would have begun operation in the absence of these emission standards is estimated by examining the annual number of new commercial incinerators that have begun operation in the past few years. This survey is possible because the MWI inventory contains this information. An examination of the MWI inventory reveals that approximately two new commercial incinerators have begun operation in each of the past few years. Using this historical information, the cost and economic impact analyses project that in the absence of these emission standards, two new commercial incinerators would begin operation in each year of the five-year analysis time frame. Therefore, this analysis uses a future baseline of ten new commercial MWIs that would potentially be affected by these emission standards by the

fifth year of this analysis time frame. This methodology is applied to the projection of new MWI units in each of the industry categories. Table 2 presents the number of new MWIs that are projected to be constructed in the absence of these MACT emission standards for new MWIs.

Although these standards specify only an emission limit that must be met, rather than a specific emission control technology that must be installed, costs are estimated by identifying the emission control technology that most new MWIs would likely install given the current available technology. Therefore, no projections are made regarding future innovations or future changes in the price of these emission control technologies.

Time-series data were not readily available to estimate changes in the population of hospitals, nursing homes, etc. over the next five years. The population of facilities in each affected industry is therefore assumed to remain constant at the 1993 level, the most recent year for which facility population data were available. This implicitly assumes that new MWIs in the next five years will not be due to industry growth, but rather to the replacement of existing MWIs.

Also due to the lack of time-series data, future values are not estimated for financial and economic inputs such as revenue and employment. Rather, the available 1993 data are assumed to apply throughout the five-year period. While this does not account for possible growth within the affected industries, it is consistent with control costs, which are stated in 1993 dollars.

IV. ECONOMIC IMPACTS

A. Methodology

This section briefly describes the analytical approach used to estimate industry-wide and facility-specific economic impacts and to evaluate the economic feasibility of switching. All economic impacts presented in this document were re-estimated using the methodology described in the original EIA. Therefore, for a more detailed description of the methodology used to estimate economic impacts, refer to the *Background Information for Proposed Standards and Guidelines: Analysis of Economic Impacts for New Sources*. Although this analysis attempts to forecast future events and reactions to the emission standards, the basis for the forecast is 1993 financial and economic data. Therefore, all dollar figures (e.g., costs, prices) are stated at 1993 levels.

Economic impacts for new MWIs are calculated under a couple of assumptions. First, the costs that are used to estimate the economic impacts of these MACT emission standards include control costs from both the emission guidelines (EG) for existing MWIs and these emission standards for new MWIs (i.e., NSPS). This approach is used to account for market adjustments (e.g., price impacts) that would first occur after implementation of the EG. 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 five-year time frame.

Table 2
Number of New Medical Waste Incinerators

MWI Size	Projected Number of New MWIs Per Year	Projected Number of New MWIs from 1996 to 2000
Small	17	85
Medium	18	90
Large	12	60
Commercial	2	10
Total	49	245

The MACT “floor” defines the least stringent emission standards the EPA may adopt for new MWIs. However, the Clean Air Act also requires EPA to examine alternative emission standards (i.e., regulatory options) more stringent than the MACT floor.

Average industry-wide price increases are estimated by comparing annualized control costs to annual revenue for each affected industry. The ratio of annualized control costs to revenue represents the average industry-wide price increase necessary to recover control costs. Percent changes in industry-wide output are estimated in turn using high and low estimates of the price elasticity of demand. Resulting changes in industry revenue are estimated based on the price and output calculations. Employment or labor market impacts are estimated assuming they are proportional to the output impacts.

Facility-specific economic impacts are estimated using model facility information. Facility-specific price impacts are compared to average industry-wide price impacts to determine if the difference between the two is significant. A determination of significance – implying that the facility price increase may not be achievable – is made for all but commercial MWI operators if the facility price increase exceeds the average industry-wide, or “market,” price increase by more than one percentage point. For commercial MWI operators, the facility price increase is considered significant if it exceeds the market price increase by more than two percentage points. More pricing latitude is given to commercial MWI operators for two reasons: 1) commercial incineration is not subject to the same institutional pricing constraints as the health care sector, and 2) commercial incineration fees could actually get a boost from the regulation as a result of switching from on-site incineration and an increase in the demand for commercial incineration services. Where significance is found, the impact on net income (earnings) of absorbing control costs is estimated and evaluated.

The assumption of no switching (scenario A) represents the highest cost and economic impact scenario. (The exception is commercial MWIs, for which control costs do not vary by scenario.) Scenario B, switching with waste segregation, represents the lowest cost and economic impact scenario. As previously discussed, the EPA considers scenario A to be unlikely. Scenarios B and C should be regarded as more representative of the impacts of the emission standards.

B. Industry-wide Impacts

1. Industry-wide Annualized Control Costs³

Tables 3A, 3B, and 3C present national annualized control costs for those industries that operate MWIs (“direct control costs”). Annualized control costs are highest under scenario A (Table 3A). Total annualized costs under scenario A range from \$230.2 million for regulatory option one to \$242.8 million for regulatory option three. As previously explained, scenario A impacts are calculated under the unlikely assumption that all facilities operating, and expected to operate, an MWI will purchase emission control equipment. This scenario does not allow for the possibility of switching to alternative methods of waste treatment and disposal.

Table 3A
Industry-wide Annualized Control Costs for Industries Operating
On-site Medical Waste Incinerators: Existing and New Sources
Scenario A: No Switching

Industry	Annualized Costs		
	Regulatory Option 1 ¹	Regulatory Option 2 ²	Regulatory Option 3 ³
Hospitals			
New	\$ 23,925,809	\$ 24,295,241	\$ 24,918,291
Existing	\$138,533,521	\$138,533,521	\$146,776,634
Total	\$162,459,330	\$162,828,762	\$171,694,925
Nursing homes			
New	\$ 3,786,349	\$ 3,844,813	\$ 3,943,413
Existing	\$ 21,923,449	\$ 21,923,449	\$ 23,227,953
Total	\$ 25,709,798	\$ 25,768,262	\$ 27,171,366
Research labs			
New	\$ 3,786,349	\$ 3,844,813	\$ 3,943,413
Existing	\$ 21,923,449	\$ 21,923,449	\$ 23,227,953
Total	\$ 25,709,798	\$ 25,768,262	\$ 27,171,366
Other			
New	\$ 1,142,432	\$ 1,160,072	\$ 1,189,822
Existing	\$ 6,614,834	\$ 6,614,834	\$ 7,008,434
Total	\$ 7,757,266	\$ 7,774,906	\$ 8,198,256
Commercial incineration			
New	\$ 3,581,630	\$ 3,581,630	\$ 3,581,630
Existing	\$ 4,971,523	\$ 4,971,523	\$ 4,971,523
Total	\$ 8,553,153	\$ 8,553,153	\$ 8,553,153
Total Existing and New	\$230,189,345	\$230,693,345	\$242,789,066

1 Assumes Regulatory Option 5 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 1 of the NSPS for new sources.

2 Assumes Regulatory Option 5 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 2 of the NSPS for new sources.

3 Assumes Regulatory Option 6 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 3 of the NSPS for new sources.

Table 3B
Industry-wide Annualized Control Costs for Industries Operating
On-site Medical Waste Incinerators: Existing and New Sources
Scenario B: Switching With Waste Segregation

Industry	Annualized Costs		
	Regulatory Option 1 ¹	Regulatory Option 2 ²	Regulatory Option 3 ³
Hospitals			
New	\$ 6,267,151	\$ 6,267,151	\$ 6,267,151
Existing	\$44,157,613	\$44,157,613	\$44,973,911
Total	\$50,424,764	\$50,424,764	\$51,241,062
Nursing homes			
New	\$ 991,800	\$ 991,800	\$ 991,800
Existing	\$ 6,988,108	\$ 6,988,108	\$ 7,117,290
Total	\$ 7,979,908	\$ 7,979,908	\$ 8,109,090
Research labs			
New	\$ 991,800	\$ 991,800	\$ 991,800
Existing	\$ 6,988,108	\$ 6,988,108	\$ 7,117,290
Total	\$ 7,979,908	\$ 7,979,908	\$ 8,109,090
Other			
New	\$ 299,251	\$ 299,251	\$ 299,251
Existing	\$ 2,108,481	\$ 2,108,481	\$ 2,147,458
Total	\$ 2,407,732	\$ 2,407,732	\$ 2,446,709
Commercial incineration			
New	\$ 3,581,630	\$ 3,581,630	\$ 3,581,630
Existing	\$ 4,971,523	\$ 4,971,523	\$ 4,971,523
Total	\$ 8,553,153	\$ 8,553,153	\$ 8,553,153
Total Existing and New	\$77,345,465	\$77,345,465	\$78,459,104

1 Assumes Regulatory Option 5 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 1 of the NSPS for new sources.

2 Assumes Regulatory Option 5 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 2 of the NSPS for new sources.

3 Assumes Regulatory Option 6 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 3 of the NSPS for new sources.

Table 3C
Industry-wide Annualized Control Costs for Industries Operating
On-site Medical Waste Incinerators: Existing and New Sources
Scenario C: Switching With No Waste Segregation

Industry	Annualized Costs		
	Regulatory Option 1 ¹	Regulatory Option 2 ²	Regulatory Option 3 ³
Hospitals			
New	\$ 16,596,792	\$ 16,596,792	\$ 16,596,792
Existing	\$ 91,125,328	\$ 91,125,328	\$ 92,186,286
Total	\$107,722,120	\$107,722,120	\$108,783,078
Nursing homes			
New	\$ 2,626,504	\$ 2,626,504	\$ 2,626,504
Existing	\$ 14,420,925	\$ 14,420,925	\$ 14,588,825
Total	\$ 17,047,429	\$ 17,047,429	\$ 17,215,329
Research labs			
New	\$ 2,626,504	\$ 2,626,504	\$ 2,626,504
Existing	\$ 14,420,925	\$ 14,420,925	\$ 14,588,825
Total	\$ 17,047,429	\$ 17,047,429	\$ 17,215,329
Other			
New	\$ 792,480	\$ 792,480	\$ 792,480
Existing	\$ 4,351,142	\$ 4,351,142	\$ 4,401,801
Total	\$ 5,143,622	\$ 5,143,622	\$ 5,194,281
Commercial incineration			
New	\$ 3,581,630	\$ 3,581,630	\$ 3,581,630
Existing	\$ 4,971,523	\$ 4,971,523	\$ 4,971,523
Total	\$ 8,553,153	\$ 8,553,153	\$ 8,553,153
Total Existing and New	\$155,513,753	\$155,513,753	\$156,961,170

1 Assumes Regulatory Option 5 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 1 of the NSPS for new sources.

2 Assumes Regulatory Option 5 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 2 of the NSPS for new sources.

3 Assumes Regulatory Option 6 for existing MWIs, the most stringent Emission Guidelines that would be considered in combination with regulatory option 3 of the NSPS for new sources.

National costs are lowest under scenario B, which assumes that some facilities that would have operated an on-site MWI will switch to an alternative method of waste treatment and disposal. This scenario also assumes that those facilities deciding to switch will also segregate their waste. Total annualized costs under scenario B range from \$77.3 million for regulatory options one and two to \$78.5 million for regulatory option three. The range under scenario C, which assumes switching with no waste segregation, is \$155.5 million for regulatory options one and two to \$157.0 million for regulatory option three. In comparison to Scenario A, costs under scenarios B and C do not vary significantly among the regulatory options because the cost of some alternative methods (such as autoclaving) are unaffected by the emission limits imposed on MWIs. In addition, control requirements for commercial MWIs (another alternative to on-site incineration) do not vary by regulatory option. The small changes in national annualized costs observed among the regulatory options reflect the different number of facilities expected to switch from on-site incineration to an alternative method of waste treatment and disposal.

Table 4 presents annual costs for those industries not operating MWIs (“indirect control costs”). Annual costs for these “off-site generators,” which are assumed to have their medical waste incinerated off-site, were calculated by multiplying estimated medical waste generated annually by the incremental cost for commercial incineration. The incremental cost was calculated by dividing industry-wide annualized control costs for commercial incinerators, both existing and new, by their throughput. The incremental cost of commercial incineration is calculated to be 0.99 cents per pound under all regulatory options. Note in Tables 3A through 3C that industry-wide annualized control costs for commercial MWIs do not vary by regulatory option. This is because control requirements do not vary by regulatory option for commercial MWIs.

2. Financial and Economic Inputs

The economic impact methodology used in this report is similar to the methodology used in the original EIA. The types of data inputs needed are the same as in the original analysis. However, all financial and economic data have been updated to 1993 where possible.

Table 5 presents the relevant financial and economic data for each of the regulated industries. Specifically, the number of facilities for each industry is reported along with revenue and employment. Also, where possible, the estimated price elasticity of demand is reported. These price elasticities are the same as those estimated in the original EIA. Note that an elasticity estimate is not presented for the commercial MWI industry. This omission is due to a lack of relevant information about this industry and is further complicated by the uncertainty of the regulation’s impact on the demand for commercial waste incineration.

3. Market Price Increase

The market price increase is defined as the average industry-wide price increase necessary to recover annualized control costs. It is calculated as the ratio of industry-wide annualized control costs to revenue. Because most, if not all, of the regulated industries are characterized by local or regional markets, actual price increases will vary from one location to another according to such

Table 4
Industry-wide Annual Costs for Industries Not Operating
On-site Medical Waste Incinerators: Existing and New Sources

Industry	Medical Waste Generated Annually (tons per year)	Annual Control Cost¹
Medical / dental laboratories	17,600	\$348,067
Funeral homes	900	\$ 17,799
Physicians' offices	35,200	\$696,134
Dentists' offices & clinics	8,700	\$172,056
Outpatient care	26,300	\$520,123
Freestanding blood banks	4,900	\$ 96,905
Fire & rescue operations	1,600	\$ 31,642
Correctional facilities	3,300	\$ 65,263
Total	98,500	\$1,947,989

¹ Assumes that all medical waste is incinerated off-site at an incremental cost of 0.99 cents per pound, the average annualized cost increase for commercial MWIs (existing and new).

Table 5
Industry-wide Financial and Economic Inputs

Industry	Number of Facilities	Industry Revenue or Budget (millions of dollars)	Industry Employment	Price Elasticity of Demand	
				Maximum	Minimum
Hospitals	6,601	\$316,188	4,311,036 ¹	-0.33	0
Nursing homes	20,879	\$51,425	1,632,824	-0.67	-0.33
Laboratories: Commercial research ² Medical / dental	4,170 15,961	\$17,102 \$14,749	159,097 177,866	-1.33 -1.33	-1.00 -0.67
Funeral homes	22,000	\$11,326	136,400	-0.33	0
Physicians' offices	192,965	\$134,637	1,231,342	-0.33	0
Dentists' offices and clinics	108,919	\$37,199	556,011	-0.67	-0.33
Outpatient care ³	9,238	\$33,021	308,183	-0.33	0
Freestanding blood banks	218	\$1,564	13,298	-0.33	0
Fire & rescue operations	29,840	\$15,695	295,416	-0.33	0
Correctional facilities	4,591	\$33,640	554,959	-0.33	0
Commercial incineration facilities	79	\$189 ⁴	N/A	NE	NE
Total	415,461	\$666,735	9,376,432		

¹ Full-time-equivalent

² SIC 8731, Commercial Physical and Biological Research

³ Defined restrictively as ambulatory care centers (represented by "general medical clinics," a subset of SIC 8011) and kidney dialysis facilities

⁴ Based on 787.9 million pounds per year @ \$.24 per pound

N/A - not available

NE - not estimated

factors as: 1) the number of facilities in the market; 2) the number of facilities operating an MWI 3) the distribution of MWI sizes; and 4) market structure and pricing mechanisms. Ideally, the average price increase in each local or regional market would be measured. However, it is not possible to define and characterize literally hundreds of local and regional markets. Therefore, the industry-wide price increase, which is an average price increase across all market areas, is used to represent the average price increase in each individual local or regional market.

As an average, the market price increase does not reflect the range of price increases that all facilities in an industry would require to recover control costs. The range of price increases necessary to recover control costs should be particularly wide in industries consisting of both MWI operators and off-site generators. On average, off-site generators will require a lower price increase to recover control costs (passed along from commercial MWIs) than MWI operators. This is because: 1) the average off-site generator is less dependent on off-site incineration than the average MWI operator is dependent on on-site incineration; and 2) MWIs used for commercial incineration are larger than average, and therefore have relatively low control costs per unit of waste disposed. Among off-site generators, the price increase necessary to recover control costs will vary with the degree of dependence on off-site incineration.

Market price increases are presented in Tables 6A, 6B, and 6C. As can be seen, scenario A (Table 6A) produces the largest impacts. However, because this scenario is unlikely to occur, attention should be focused on the impacts estimated under scenarios B and C. Scenario B, which assumes switching with waste segregation, produces average industry-wide price increases of 0.02 percent under all three regulatory options for both hospitals and nursing homes. The commercial research laboratory industry is expected to experience a price increase of 0.05 percent, regardless of the regulatory option.

Under scenario C, which assumes switching without waste segregation, the average industry-wide price increase for both hospitals and nursing homes is 0.03 percent under all three regulatory options. For commercial research labs, the price impact is 0.10 percent, regardless of the regulatory option.

Under all three scenarios, the price impacts are negligible (not even registering at two decimal places) for medical and dental laboratories, funeral homes, physicians' offices, dentists' offices and clinics, outpatient care, fire and rescue operations, and correctional facilities. For freestanding blood banks, the price impact under all three scenarios is only 0.01 percent for all three regulatory options.

With the exception of the commercial MWI industry, all market price increases in Tables 6A through 6C are under one percent and are therefore considered achievable. The low values partly reflect the fact that in each industry, the majority of facilities do not currently operate an MWI and are not expected to operate a new MWI.

Table 6A
Industry-wide Percent Price Impacts*: New and Existing Sources
Scenario A: No Switching

Industry	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Hospitals	0.05	0.05	0.05
Nursing homes	0.05	0.05	0.05
Laboratories: Research Medical/dental	0.15 0	0.15 0	0.16 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	4.12	4.12	4.12

* Percent price increases necessary to recover annualized control costs.

Table 6B
Industry-wide Percent Price Impacts*: New and Existing Sources
Scenario B: Switching With Waste Segregation

Industry	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Hospitals	0.02	0.02	0.02
Nursing homes	0.02	0.02	0.02
Laboratories: Research Medical/dental	0.05 0	0.05 0	0.05 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	4.12	4.12	4.12

* Percent price increases necessary to recover annualized control costs.

Table 6C
Industry-wide Percent Price Impacts*: New and Existing Sources
Scenario C: Switching With No Waste Segregation

Industry	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Hospitals	0.03	0.03	0.03
Nursing homes	0.03	0.03	0.03
Laboratories: Research Medical/dental	0.10 0	0.10 0	0.10 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	4.12	4.12	4.12

* Percent price increases necessary to recover annualized control costs.

Tables 6A through 6C also present average industry-wide price impacts for the commercial MWI industry. The impact, 4.12 percent, is the same under each regulatory option because control requirements for commercial MWIs do not vary by regulatory option. Also, the impacts are the same under all three scenarios because switching is not an option for commercial MWIs. Although the estimated price increase for this industry exceeds one percent, it is considered achievable because of the cost advantage (i.e., lower cost per ton of waste burned) – due to economies of scale – that commercial MWIs have over smaller on-site MWIs. This cost advantage, which will be made even more pronounced by the NSPS, is a strong basis for the argument that many facilities will switch from on-site incineration to off-site disposal in response to the regulation.

4. Output, Employment, and Revenue Impacts

The market price increase will result in output, employment, and revenue impacts. This analysis presents a range of output, employment, and revenue impacts due to the use of two price elasticity of demand estimates for each industry. These impacts are not estimated for the commercial MWI industry due to a lack of relevant financial and economic information for the industry.

Since demand is not perfectly inelastic in any of the impacted industries, output will decline in response to the market price increase. The relationship between price and output (or quantity demanded) can be captured by the following constant-elasticity demand function:

$$Q_D = aP^e$$

Where: Q_D = Quantity Demanded
 a = a constant
 P = Price
 e = Price Elasticity of Demand

By also specifying time periods 0 and 1, the percent change in output ($\% \Delta Q$) can be solved in the following way:

$$\begin{aligned}
Q_0 &= aP_0^e \\
Q_1 &= aP_1^e \\
\% \Delta Q &= \frac{Q_1 - Q_0}{Q_0} \\
&= \frac{aP_1^e - aP_0^e}{aP_0^e} \\
&= \frac{P_1^e - P_0^e}{P_0^e} \\
&= \frac{[P_0(1 + \% \Delta P)]^e - P_0^e}{P_0^e} \\
&= \frac{P_0^e(1 + \% \Delta P)^e - P_0^e}{P_0^e} \\
&= (1 + \% \Delta P)^e - 1
\end{aligned}$$

Output impacts can be calculated by setting $\% \Delta P$ equal to the market price increase. These impacts are presented in Tables 7A, 7B, and 7C. Due to a relatively small market price increase and/or relatively inelastic demand, all of the output impacts are less than one percent. The greatest output decreases are experienced by commercial research labs, but even these are insignificant: up to 0.21 percent for regulatory option three under scenario A, up to 0.06 percent for regulatory option three under scenario B, and up to 0.13 percent for regulatory option three under scenario C.

The impact of the market price increase on industry-wide employment, assuming that employment is proportional to output (i.e., fixed labor to output ratio), is also presented in Tables 7A through 7C. These impacts are presented in terms of estimated employment losses. As a percent of the baseline (see Table 5), the employment losses are considered small. (In fact, by definition, the percent decrease in employment is equal to the percent decrease in output, which has already been seen to be insignificant.) At the most (regulatory option three) under scenario A, the number of employees would decline by up to 772 at hospitals, 578 at nursing homes, and 336 at research labs (all other industries have minuscule or undetectable impacts). However, because switching is likely to occur, the impacts are more likely to fall between those shown under scenarios B and C. At the most (regulatory option three) under scenario C, the number of employees would decline by up to 489 at hospitals, 366 at nursing homes, and 213 at research labs. At the most (regulatory option three) under scenario B, the number of employees would decline by up to 231 at hospitals, 172 at nursing homes, and 100 at research labs.

Table 7A
Industry-wide Output, Employment and Revenue Impacts: New and Existing Sources
Scenario A: No Switching

Industry	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Hospitals			
Output decrease (%)	0-0.02	0-0.02	0-0.02
Employment loss	0-731	0-732	0-772
Revenue increase or (decrease) (%)	0.03-0.05	0.03-0.05	0.04-0.05
Nursing homes			
Output decrease (%)	0.02-0.03	0.02-0.03	0.02-0.04
Employment loss	269-547	270-548	285-578
Revenue increase or (decrease) (%)	0.02-0.03	0.02-0.03	0.02-0.04
Laboratories:			
Commercial research			
Output decrease (%)	0.15-0.20	0.15-0.20	0.16-0.21
Employment loss	239-318	239-318	252-336
Revenue increase or (decrease) (%)	(0.05)-0	(0.05)-0	(0.05)-0
Medical/dental			
Output decrease (%)	0	0	0
Employment loss	3-6	3-6	3-6
Revenue increase or (decrease) (%)	0	0	0
Funeral homes			
Output decrease (%)	0	0	0
Employment loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Physicians' offices			
Output decrease (%)	0	0	0
Employment loss	0-2	0-2	0-2
Revenue increase or (decrease) (%)	0	0	0
Dentists' offices and clinics			
Output decrease (%)	0	0	0
Employment loss	1-2	1-2	1-2
Revenue increase or (decrease) (%)	0	0	0
Outpatient care			
Output decrease (%)	0	0	0
Employment loss	0-2	0-2	0-2
Revenue increase or (decrease) (%)	0	0	0
Freestanding blood banks			
Output decrease (%)	0	0	0
Employment loss	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 loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Correctional facilities			
Output decrease (%)	0	0	0
Employment loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0

Table 7B
Industry-wide Output, Employment and Revenue Impacts: New and Existing Sources
Scenario B: Switching With Waste Segregation

Industry	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Hospitals			
Output decrease (%)	0-0.01	0-0.01	0-0.01
Employment loss	0-227	0-227	0-231
Revenue increase or (decrease) (%)	0.01-0.02	0.01-0.02	0.01-0.02
Nursing homes			
Output decrease (%)	0.01	0.01	0.01
Employment loss	84-170	84-170	85-172
Revenue increase or (decrease) (%)	0.01	0.01	0.01
Laboratories:			
Commercial research			
Output decrease (%)	0.05-0.06	0.05-0.06	0.05-0.06
Employment loss	74-99	74-99	75-100
Revenue increase or (decrease) (%)	(0.02)-0	(0.02)-0	(0.02)-0
Medical/dental			
Output decrease (%)	0	0	0
Employment loss	3-6	3-6	3-6
Revenue increase or (decrease) (%)	0	0	0
Funeral homes			
Output decrease (%)	0	0	0
Employment loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Physicians' offices			
Output decrease (%)	0	0	0
Employment loss	0-2	0-2	0-2
Revenue increase or (decrease) (%)	0	0	0
Dentists' offices and clinics			
Output decrease (%)	0	0	0
Employment loss	1-2	1-2	1-2
Revenue increase or (decrease) (%)	0	0	0
Outpatient care			
Output decrease (%)	0	0	0
Employment loss	0-2	0-2	0-2
Revenue increase or (decrease) (%)	0	0	0
Freestanding blood banks			
Output decrease (%)	0	0	0
Employment loss	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 loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Correctional facilities			
Output decrease (%)	0	0	0
Employment loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0

Table 7C
Industry-wide Output, Employment and Revenue Impacts: New and Existing Sources
Scenario C: Switching With No Waste Segregation

Industry	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Hospitals			
Output decrease (%)	0-0.01	0-0.01	0-0.01
Employment loss	0-485	0-485	0-489
Revenue increase or (decrease) (%)	0.02-0.03	0.02-0.03	0.02-0.03
Nursing homes			
Output decrease (%)	0.01-0.02	0.01-0.02	0.01-0.02
Employment loss	179-363	179-363	180-366
Revenue increase or (decrease) (%)	0.01-0.02	0.01-0.02	0.01-0.02
Laboratories:			
Commercial research			
Output decrease (%)	0.10-0.13	0.10-0.13	0.10-0.13
Employment loss	158-211	158-211	160-213
Revenue increase or (decrease) (%)	(0.03)-0	(0.03)-0	(0.03)-0
Medical/dental			
Output decrease (%)	0	0	0
Employment loss	3-6	3-6	3-6
Revenue increase or (decrease) (%)	0	0	0
Funeral homes			
Output decrease (%)	0	0	0
Employment loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Physicians' offices			
Output decrease (%)	0	0	0
Employment loss	0-2	0-2	0-2
Revenue increase or (decrease) (%)	0	0	0
Dentists' offices and clinics			
Output decrease (%)	0	0	0
Employment loss	1-2	1-2	1-2
Revenue increase or (decrease) (%)	0	0	0
Outpatient care			
Output decrease (%)	0	0	0
Employment loss	0-2	0-2	0-2
Revenue increase or (decrease) (%)	0	0	0
Freestanding blood banks			
Output decrease (%)	0	0	0
Employment loss	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 loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0
Correctional facilities			
Output decrease (%)	0	0	0
Employment loss	0	0	0
Revenue increase or (decrease) (%)	0	0	0

The employment impacts in Tables 7A through 7C do not attempt to quantify some positive employment impacts expected to occur as a result of the regulation. For example, employment related to the production of pollution control equipment should increase. In addition, additional people will be needed to provide training to MWI operators. Also, there should be an increase in employment related to the production and operation of commercial MWIs and alternative medical waste treatment and disposal systems.

Revenue will change in response to the market price increase. It will increase if demand is relatively inelastic (i.e., $-1 < e < 0$) and decrease if demand is relatively elastic (i.e., $e < -1$). For example, if demand is relatively inelastic, the percent decrease in output in response to a price increase will be less than the percent price increase. Since revenue is the product of price and output, a less-than-proportionate decrease in output implies an increase in revenue. The following equation can be used to measure the impact on revenue of the market price increase (and resultant output decrease):

$$\Delta \text{ Revenue} = \text{Baseline Revenue} * [\% \Delta P + \% \Delta Q + (\% \Delta P * \% \Delta Q)]$$

Revenue impacts (percent increase or, in parentheses, percent decrease) are also presented in Tables 7A through 7C. Revenue decreases only for commercial research labs in the case of the maximum elasticity ($e = -1.33$; see Table 5). In all other cases, revenue increases because demand is relatively inelastic or does not change because demand is unitary-elastic ($e = -1$). Regardless, all impacts are small and are not considered significant.

C. Model Facility Analysis

Facility-specific impacts were also estimated for the affected industries. These impacts were calculated by employing the concept of the model facility. This technique allows an analysis to be prepared on a more detailed level by defining key parameters to describe “typical” facilities in the affected industries. The EIA prepared for the proposed rule used cost estimates provided on a model combustor (i.e., MWI) basis to estimate economic impacts for model facilities. The model facility concept not only had to incorporate model MWI parameters, (e.g., amount of throughput to determine size, etc.), but also key financial and economic parameters (e.g., revenue, etc.). Therefore, a scheme to assign model MWIs to model facilities had to be developed in the original EIA.

New information received after proposal made it possible for cost estimates to be developed on a model facility basis, with key model MWI parameters already incorporated into the model facility concept. Therefore, this document no longer needs to employ the “linking” scheme used to assign model MWIs to model facilities in the earlier EIA. The model facilities defined in the cost analysis are presented in Table 8. Note that hospitals are defined in terms of number of

Table 8
Model Facility Definitions

Facility	Definition	MWI Assignment
Large Hospital	400 beds	Large MWI
Medium Hospital	140 beds	Medium MWI
Small Hospital	40 beds	Small MWI
Nursing Home	150 employees	Small MWI
Commercial Research Laboratory	200 employees	Medium MWI
Commercial Incineration Facility	N/A	Commercial MWI (Large)

N/A - not available

beds while nursing homes and commercial research laboratories are defined in terms of number of employees. Note also that this type of information is not available for the commercial MWI industry.

1. Model MWI Costs

Tables 9 and 10 present capital (for scenario A) and annualized (for scenarios A, B, and C) costs for model MWIs. Scenario A has capital costs because it assumes that all facilities expected to operate an MWI will have emission control equipment installed rather than decide to use an alternative technology (i.e., switch). Scenarios B and C have no capital costs because switching to an alternative technology precludes the need to invest in emission control equipment for an on-site MWI.

For all MWIs other than commercial MWIs and small rural MWIs that are remote from an urban area, scenario A is an unlikely representation of facility-specific impacts because the assumption that some potentially new MWIs will not be replaced by alternative technologies is unrealistic. The regulation will impose additional costs on new MWIs and, therefore, will make alternative technologies more attractive – from a cost perspective – in comparison. In addition, the costs in Table A are from a baseline of no controls. The table therefore overstates control costs for the no doubt many new MWIs that, in the absence of the emission standards, would have been equipped with at least some controls. Scenario A, on the other hand, may be the only scenario that applies to commercial MWIs and small rural MWIs that are remote from an urban area if they are unable to switch to an alternative technology.

Incremental annual costs for off-site generators are presented in Table 11. The costs reflect two alternative estimates of the increase in the cost of off-site incineration. The low estimate is 0.99 cents per pound, the average annualized control cost for all commercial MWIs, existing and new. The high estimate derives from a new large model commercial MWI estimated to have annualized control costs of \$358,163 and to burn 7,711,000 pounds of medical waste annually. Dividing cost by throughput yields a cost of 4.64 cents per pound. The use of low and high cost estimates allows for the consideration of uncertainty in the actual incremental cost that off-site generators will face.

2. Financial and Economic Inputs

Model information for facilities that operate on-site MWIs (i.e., MWI operators) is presented in Table 12. The information derives from the financial and economic input data in Tables 13 and 14. Interpolation was used to assign employment and revenue to the model hospitals of bed sizes 40 (small), 140 (medium), and 400 (large), and to assign revenue to the model nursing homes with 150 employees and model research labs with 200 employees. For example, in Table 13 it is seen that the average number of beds at a Federal government hospital is 34.8 in the 25-49 beds category and 66.2 in the 50-99 beds category. The model small hospital has 40 beds, however. Interpolating between average revenue of \$16.5 million for a Federal hospital with 34.8 beds and \$29.6 million for a Federal hospital with 66.2 beds, revenue of \$18.7 million for the model small hospital, shown in Table 12, is obtained.

Table 9
Control Costs for Model MWIs: New Sources
Scenario A: No Switching

Model MWI	Regulatory Option		
	One	Two	Three
Small Urban			
Annualized cost	\$ 68,194	\$ 68,194	\$ 78,194
Capital cost	\$220,386	\$220,386	\$268,786
Small Rural			
Annualized cost	\$ 68,194	\$ 68,194	\$ 78,194
Capital cost	\$220,386	\$220,386	\$268,786
Medium			
Annualized cost	\$159,563	\$165,163	\$165,163
Capital cost	\$652,194	\$655,394	\$655,394
Large on-site			
Annualized cost	\$208,063	\$208,063	\$208,063
Capital cost	\$652,894	\$652,894	\$652,894
Large commercial			
Annualized cost	\$358,163	\$358,163	\$358,163
Capital cost	\$758,494	\$758,494	\$758,494

Table 10
Annual Costs of Switching for Model MWIs ¹

Model MWI	Scenario B - Switching With Waste Segregation	Scenario C - Switching Without Waste Segregation
Small		
Urban	\$5,260	\$19,200
Rural ²	\$7,400	\$31,200
Medium		
Urban	\$19,944	\$72,800
Rural	\$28,058	\$118,300
Large		
Urban	\$93,584	\$341,600
Rural	\$131,658	\$555,100

¹ Switching costs do not vary by regulatory option.

² May not apply to some facilities that burn a small amount of medical waste and are remote from an urban area. Such facilities may not have switching opportunities if they have difficulty attracting the services of waste haulers and/or commercial MWI operators.

Table 11
Annual Costs for Model Facilities Not Operating On-site MWIs: New Sources

Industry/Model Facility	Medical Waste Per Facility (tons)	Incremental Annual Cost Per Facility	
		Low ¹	High ¹
Hospitals			
<50 Beds	9.75	\$193	\$906
50-99 Beds	17.10	\$338	\$1,589
100-299 Beds	52.08	\$1,030	\$4,838
300+ Beds	167.28	\$3,308	\$15,539
Nursing Homes			
0-19 Employees			
Tax-paying	0.14	\$3	\$13
Tax-exempt	0.17	\$3	\$16
20-99 Employees			
Tax-paying	1.14	\$23	\$106
Tax-exempt	1.04	\$21	\$97
100+ Employees			
Tax-exempt	2.70	\$53	\$250
Tax-paying	3.44	\$68	\$320
Commercial Research Labs			
Tax-paying			
0-19 Employees	0.28	\$6	\$26
20-99 Employees	2.19	\$43	\$204
100+ Employees	24.50	\$485	\$2,276
Tax-exempt	7.28	\$144	\$676
Outpatient Care			
Physicians' clinics (amb. care)			
Tax-paying	2.26	\$45	\$210
Tax-exempt	4.19	\$83	\$389
Freestanding kidney dialysis facilities			
Tax-paying	1.62	\$32	\$150
Tax-exempt	2.31	\$46	\$215
Physicians' Offices	0.18	\$4	\$17
Dentists' Offices and Clinics			
Offices	0.08	\$2	\$7
Clinics		\$3	
Tax-paying	0.14	\$4	\$13
Tax-exempt	0.19		\$18
Medical & Dental Labs			
Medical	1.63	\$32	\$151
Dental	0.51	\$10	\$48
Freestanding Blood Banks	22.48	\$445	\$2,088
Funeral Homes	0.04	\$1	\$4
Fire & Rescue	0.05	\$1	\$5
Corrections			
Federal Government	1.64	\$32	\$152
State Government	1.70	\$34	\$158
Local Government	0.34	\$7	\$31

¹Based on \$0.010 per pound, the average annualized control cost for all commercial MWIs (existing and new).

²Based on \$0.046 per pound, the annualized control cost for a new large model commercial MWI.

Table 12
MWI Operators: Model Facilities
(Year = 1993)

Industry/Model Facility	Employment ¹	Annual Revenue/Budget ²
Short-term hospitals, excluding psychiatric:		
Federal government		
Small	393	\$18.7
Medium	674	\$43.2
Large	1,738	\$117.0
State government		
Small	133	\$8.7
Medium	617	\$41.3
Large	2,753	\$207.3
Local government		
Small	112	\$5.6
Medium	432	\$27.1
Large	1,987	\$155.0
Not-for-profit		
Small	139	\$8.3
Medium	522	\$36.8
Large	1,725	\$134.6
For-profit		
Small	112	\$7.3
Medium	399	\$34.7
Large	1,156	\$106.7
Psychiatric hospitals, short-term and long-term		
Small	87	\$5.3
Medium	259	\$15.1
Large	719	\$32.6
Nursing homes		
Tax-paying	150	\$4.9
Tax-exempt	150	\$4.8
Commercial research laboratories		
Tax-paying	200	\$21.2
Tax-exempt	200	\$21.2
Commercial incineration facilities	N/A	\$1.9

1 For hospitals, full-time-equivalent

2 Millions of dollars

N/A - not available

Table 13
Hospitals: Financial/Economic Inputs
(Year = 1993)

	Industry Totals			Average Per Facility		
	Number of Facilities	Number of Beds	Employment ¹	Number of Beds	Employment	Annual Revenue (millions \$)
Short-term hospitals, excluding psychiatric:						
Federal government						
6-24 Beds	31	528	9,023	17 0	291 1	8 6
25-49 Beds	61	2,122	22,230	34 8	364 4	16 5
50-99 Beds	22	1,456	11,796	66 2	536 2	29 6
100-199 Beds	56	8,122	38,291	145 0	683 8	44 2
200-299 Beds	32	7,975	36,581	249 2	1,143 2	74 8
300-399 Beds	26	9,188	39,010	353 4	1,500 4	104.1
400-499 Beds	16	7,156	31,672	447 3	1,979 5	130 1
500+ Beds	46	35,321	100,372	767 8	2,182 0	157 6
State government						
6-24 Beds	3	49	133	16 3	44 3	3 5
25-49 Beds	20	686	2,326	34 3	116 3	7 5
50-99 Beds	10	693	2,218	69 3	221 8	15 1
100-199 Beds	17	2,332	10,327	137 2	607 5	40 3
200-299 Beds	8	1,982	7,961	247 8	995 1	79 6
300-399 Beds	11	3,925	23,720	356 8	2,156 4	171 5
400-499 Beds	10	4,413	33,243	441 3	3,324 3	241 5
500+ Beds	17	10,868	61,888	639 3	3,640 5	306 7
Local government						
6-24 Beds	129	2,451	6,418	19 0	49 8	2 4
25-49 Beds	408	15,012	42,095	36 8	103 2	5 0
50-99 Beds	370	25,689	72,360	69 4	195 6	10 8
100-199 Beds	242	33,472	102,518	138 3	423 6	26 3
200-299 Beds	73	18,331	73,667	251 1	1,009 1	77 5
300-399 Beds	36	12,279	59,058	341 1	1,640 5	124 5
400-499 Beds	14	6,400	32,525	457 1	2,323 2	184 5
500+ Beds	42	31,516	149,207	750 4	3,552 5	278 1
Not-for-profit						
6-24 Beds	92	1,748	6,475	19 0	70 4	3 8
25-49 Beds	398	15,148	52,895	38 1	132 9	7 9
50-99 Beds	608	44,407	142,944	73 0	235 1	15 0
100-199 Beds	795	114,670	429,112	144 2	539 8	38 2
200-299 Beds	555	136,231	551,960	245 5	994 5	73 2
300-399 Beds	328	113,066	481,106	344 7	1,466 8	113 2
400-499 Beds	169	75,385	327,941	446 1	1,940 5	152 4
500+ Beds	218	150,905	720,101	692 2	3,303 2	277 0
For-profit						
6-24 Beds	10	186	553	18 6	55 3	4 3
25-49 Beds	76	3,097	8,633	40 8	113 6	7 4
50-99 Beds	201	14,756	42,217	73 4	210 0	16 3
100-199 Beds	288	39,443	111,940	137 0	388 7	33 7
200-299 Beds	95	22,535	68,204	237 2	717 9	66 8
300-399 Beds	27	9,203	26,404	340 9	977 9	96 1
400-499 Beds	12	5,191	15,051	432 6	1,254 3	112 6
500+ Beds	8	4,553	16,281	569 1	2,035 1	195 7
Psychiatric hospitals, short-term and long-term						
6-24 Beds	18	430	1,345	23 9	74 7	4 3
25-49 Beds	84	3,166	7,073	37 7	84 2	5 1
50-99 Beds	303	22,131	39,192	73 0	129 3	8 5
100-199 Beds	156	20,477	37,091	131 3	237 8	14 3
200-299 Beds	58	14,714	30,928	253 7	533 2	25 8
300-399 Beds	39	13,821	26,319	354 4	674 8	30 6
400-499 Beds	30	13,697	23,191	456 6	773 0	35 0
500+ Beds	72	56,949	99,680	791 0	1,384 4	64 0

¹Full-time equivalent

Table 14
Other MWI Operators: Financial/Economic Inputs
(Year = 1993)

Other MWI Operators	Average Employment Per Facility	Average Revenue Per Facility
Nursing homes		
Tax-paying		
100+ employees	148.2	\$4,846,944
Tax-exempt		
50-99 employees	74.3	\$2,063,489
100+ employees	189.3	\$6,210,832
Commercial research laboratories		
Tax-paying		
50-99 employees	68.3	\$7,299,521
100+ employees	469.7	\$49,670,443
Tax-exempt	139.5	14,761,754
Commercial incineration	N/A	\$1,850,640 ¹

¹Based on 7,711,000 pounds per year @ 24 cents per pound

N/A - not available

3. Model Facility Impacts

The facility-specific price increase is defined as the price increase necessary for an individual facility to fully recover control costs. It is calculated as the ratio of model facility annualized control costs to annual revenue. This provides an indication of the impact of the regulation on “typical” facilities in each industry. This calculation is then compared to the market price increase (i.e., the average industry-wide price increase). To the extent that an industry is competitive, individual firms are constrained to institute price increases that do not significantly exceed the market price increase. For all but commercial MWIs, the analysis assumes that the facility-specific price increase may not be achievable if it exceeds the market price increase by more than one percentage point. For commercial MWIs, it is assumed that the facility-specific price increase may not be achievable if it exceeds the market price increase by more than two percentage points. More pricing latitude is given to commercial MWI operators for two reasons: 1) commercial incineration is not subject to the same institutional pricing constraints as the health care sector, and 2) commercial incineration fees could actually get a boost from the regulation as a result of switching from on-site incineration and an increase in the demand for commercial incineration services.

The price increases necessary for model facilities to recover annualized control costs under scenario A, no switching, are shown in Table 15A. For all but commercial incineration facilities, these price increases are considered achievable if they do not exceed the market price increase (see Table 6A) by more than one percentage point. Where the difference is more than one percentage point (e.g., small local government hospitals), Table 15B shows that the price increase necessary to recover annual switching costs, whether under Scenario B or Scenario C, is achievable, in no case exceeding the market price increase (see Tables 6B and 6C) by more than one percentage point. It can therefore be concluded that where switching to an alternative method of medical waste disposal (e.g., off-site incineration) is an option, the regulation does not have any significant price impacts. (The lower price impacts in Table 15B compared to Table 15A also suggest – as is already incorporated into scenarios B and C – that many facilities may find switching cost-attractive regardless of whether the price impacts of installing controls are significant.)

Not all facilities may have switching as an option, however. Recall that switching may not be possible for some MWIs that burn a small amount of medical waste and are located far away from an urban area. A comparison of Table 15A with Table 6A reveals that the facility-specific price increase for small rural MWIs exceeds the market price increase by more than one percentage point in the following instances: local government hospitals under regulatory options one through three, for-profit hospitals under regulatory option three, psychiatric hospitals under regulatory options one through three, and both tax-paying and tax-exempt nursing homes under regulatory options one through three. In the original EIA, the ratio of annualized control costs to before-tax net income – indicating the percent reduction in before-tax net income if control costs are fully absorbed – was calculated. Repeating this calculation for the above cases of small rural MWIs

Table 15A
Price Impacts for Model Facilities Operating On-site MWIs: New Sources
Scenario A: No Switching

Model Facility	Annualized Control Costs as a Percent of Revenue/Budget		
	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Short-term hospitals, excluding psychiatric:			
Federal government			
Small			
Urban	0.37	0.37	0.42
Rural	0.37	0.37	0.42
Medium	0.37	0.38	0.38
Large	0.18	0.18	0.18
State government			
Small			
Urban	0.78	0.78	0.90
Rural	0.78	0.78	0.90
Medium	0.39	0.40	0.40
Large	0.10	0.10	0.10
Local government			
Small			
Urban	1.22	1.22	1.40
Rural	1.22	1.22	1.40
Medium	0.59	0.16	0.61
Large	0.13	0.13	0.13
Not-for-profit			
Small			
Urban	0.83	0.83	0.95
Rural	0.83	0.83	0.95
Medium	0.43	0.45	0.45
Large	0.15	0.15	0.15
For-profit			
Small			
Urban	0.93	0.93	1.07
Rural	0.93	0.93	1.07
Medium	0.46	0.48	0.48
Large	0.19	0.19	0.19
Psychiatric hospitals, short-term and long-term			
Small			
Urban	1.28	1.28	1.47
Rural	1.28	1.28	1.47
Medium	1.06	1.10	1.10
Large	0.64	0.64	0.64
Nursing homes			
Tax-paying			
Urban	1.39	1.39	1.59
Rural	1.39	1.39	1.59
Tax-exempt			
Urban	1.42	1.42	1.63
Rural	1.42	1.42	1.63
Commercial research labs			
Tax-paying	0.75	0.78	0.78
Tax-exempt	0.75	0.78	0.78
Commercial incineration facilities*	19.35	19.35	19.35

* Assumes a new commercial incinerator facility is completely uncontrolled in the baseline.

Table 15B
Price Impacts of Switching for Model Facilities Operating On-site MWIs: New Sources
Scenarios B and C

Model Facility	Annual Switching Costs as a Percent of Revenue/Budget	
	Scenario B - Switching With Waste Segregation	Scenario C - Switching Without Waste Segregation
Short-term hospitals, excluding psychiatric:		
Federal government		
Small - Urban	0 03	0 10
Rural ¹	0 04	0 17
Medium - Urban	0 05	0 17
Rural	0 06	0 27
Large - Urban	0 08	0 29
Rural	0 11	0 47
State government		
Small - Urban	0 06	0 22
Rural ¹	0 08	0 36
Medium - Urban	0 05	0 18
Rural	0 07	0 29
Large - Urban	0 05	0 16
Rural	0 06	0 27
Local government		
Small - Urban	0 09	0 34
Rural ¹	0 13	0 56
Medium - Urban	0 07	0 27
Rural	0 10	0 44
Large - Urban	0 06	0 22
Rural	0 08	0 36
Not-for-profit		
Small - Urban	0 06	0 23
Rural ¹	0 09	0 38
Medium - Urban	0 05	0 20
Rural	0 08	0 32
Large - Urban	0 07	0 25
Rural	0 10	0 41
For-profit		
Small - Urban	0 07	0 26
Rural ¹	0 10	0 43
Medium - Urban	0 06	0 21
Rural	0 08	0 34
Large - Urban	0 09	0 32
Rural	0 12	0 52
Psychiatric hospitals, short-term and long-term		
Small - Urban	0 10	0 36
Rural ¹	0 14	0 59
Medium - Urban	0 13	0 48
Rural	0 19	0 78
Large - Urban	0 29	1 05
Rural	0 40	1 70
Nursing homes		
Tax-paying - Urban	0 11	0 39
Rural ¹	0 15	0 64
Tax-exempt - Urban	0 11	0 40
Rural ¹	0 15	0 65
Commercial research labs		
Tax-paying - Urban	0 09	0 34
Rural	0 13	0 56
Tax-exempt - Urban	0 09	0 34
Rural	0 13	0 56

¹Does not apply to facilities that are remote (i.e., more than 50 miles from an SMSA) and burn less than 2,000 pounds of medical waste per week.

(using earnings data updated to 1993), impacts ranging from 16.03 percent for for-profit hospitals under regulatory option three to 46.61 percent for tax-exempt nursing homes under regulatory option three were found. All of these impacts can be considered significant.

Such facilities may therefore be prevented from installing a new MWI. If switching is also not possible, a prospective new facility could be prevented from going into business, or an existing facility that needs to replace an existing MWI with a new MWI could have to shut down. However, this is likely to apply, at the most, to only a few of the projected 85 new small MWIs from 1996 to 2000. Only a few of these 85 new MWIs are likely to be located far away from an urban area. Moreover, such MWIs may still have switching opportunities. As the commercial incineration industry continues to grow (with additional impetus being provided by the EG and NSPS), it is possible that services will be extended to remote, isolated areas that are currently not served. On-site autoclaving is another possible treatment alternative. If a facility had planned to invest in a new MWI, it stands to reason that an on-site autoclave unit of comparable cost would be affordable. Additionally, a facility that had planned – by virtue of operating an on-site MWI – to open in a remote area without access to commercial incineration services, might be able to reconsider its location decision, and locate instead in an area with such access.

Switching may also not be an option for commercial MWIs. (While commercial autoclaving can treat medical waste, it may not be a viable switching option for all commercial MWI operators.) Table 15A shows that the facility-specific price impact for commercial MWIs is 19.35 percent under all three regulatory options. This is the price increase that a new large model commercial MWI that would otherwise (i.e., in the absence of the NSPS) have been “uncontrolled” will require to recoup control costs. Because it deviates significantly from the market price increase (4.12%), it may not be achievable. The impact, in turn, on net income of absorbing a significant portion of control costs is liable to be prohibitive. However, these impacts apply only to new commercial MWIs that would otherwise have been completely uncontrolled. This may not be a realistic assumption. To wit, only several of the 79 commercial MWIs in the existing MWI inventory are completely uncontrolled. To the extent that new commercial MWIs would otherwise have had at least some controls, the impacts would not be as great.

Consequently, just as only several of the 59 facilities operating the 79 commercial MWIs in the existing MWI inventory were found to be significantly impacted by the Emission Guidelines (EG), at the most only a few – if any – of the facilities that will operate, or would have operated, the projected 10 new commercial MWIs over the next five years are likely to be significantly impacted by the NSPS. (A “significant impact” could be construed as either shutting down instead of replacing an existing commercial MWI, or canceling plans to go into business or expand by building and putting into service a new commercial MWI.) Instead, most, if not all, of these facilities are likely to either go ahead with their plans to build new MWIs or, if possible, find an alternative such as commercial autoclaving.

Price impacts for model facilities that do not operate an MWI (off-site generators) are shown in Table 16. These facilities represent the vast majority of medical waste generators. All impacts are very small and are not considered significant.

This economic impact analysis has examined industries that will be directly affected by the regulation, namely industries that generate or treat medical waste. Secondary impacts such as those on air pollution device vendors and MWI vendors were 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. The regulation is also expected to increase the demand for commercial MWI services. Due to economies of scale, however, there is likely to be a demand shift from smaller incinerators to larger incinerators. Therefore, vendors of small MWIs may be adversely affected by the regulation. Lack of data on the above effects prevents quantification of economic impacts on these secondary sectors.

V. Small Entity Impacts

In accordance with the Regulatory Flexibility Act of 1980 and its amendment in 1996 by the Small Business Regulatory Enforcement Fairness Act (SBREFA), it is necessary to determine if the NSPS will have a “significant impact on a substantial number of small entities.”⁴ As demonstrated below, the NSPS are determined not to have a significant economic impact on a substantial number of small entities under any regulatory option.

Three types of small “entities” are impacted by the regulation: small businesses, small nonprofit organizations, and small governmental jurisdictions. Examples of impacted businesses include for-profit hospitals and tax-paying nursing homes. Examples of impacted nonprofit organizations include not-for-profit hospitals and, in many cases, tax-exempt nursing homes. Examples of impacted governmental jurisdictions include those (e.g., municipalities, counties, states) that operate hospitals and probably some tax-exempt nursing homes.

The NSPS will impact many facilities that generate medical waste – not only facilities that were planning to purchase and install a new MWI over the next five years, but also facilities that would have sent their medical waste off-site to be incinerated by a new MWI over the next five years. MWI operators are directly impacted by having to meet the control requirements of the regulation while “off-site generators” face the likelihood of higher fees for commercial incineration. Off-site generators represent the vast majority of facilities impacted by the regulation. While perhaps half of all hospitals operate on-site MWIs, the great majority of nursing homes and research labs do not. Moreover, the following industries were defined to exist exclusively of facilities that do not operate on-site MWIs: medical and dental labs, outpatient care, physicians’ offices, dentists’ offices and clinics, blood banks, funeral homes, fire and rescue operations, and correctional facilities. Table 16 shows that economic impacts of the EG and NSPS (cumulatively) on facilities that have to pay more for commercial incineration are insignificant. The increase in fees could be recovered with a price increase of, at the most, only 0.03 percent (freestanding blood banks).

Table 16
Price Impacts for Model Facilities Not Operating On-site MWIs: New Sources

Industry/Model Facility	Incremental Annual Cost as a Percent of Revenue/Budget	
	Low ¹	High ²
Hospitals		
<50 Beds	0	0 02
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	0
Tax-exempt	0	0 1
20-99 Employees		
Tax-paying	0	0 01
Tax-exempt	0	0 01
100+ Employees		
Tax-exempt	0	0 1
Tax-paying	0	0 1
Commercial Research Labs		
Tax-paying		
0-19 Employees	0	0
20-99 Employees	0	0
100+ Employees	0	0 1
Tax-exempt	0	0 1
Outpatient Care		
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	0
Dentists' Offices and Clinics		
Offices	0	0
Clinics		
Tax-paying	0	0
Tax-exempt	0	0
Medical & Dental Labs		
Medical	0	0 01
Dental	0	0 02
Freestanding Blood Banks	0 01	0 03
Funeral Homes	0	0
Fire & Rescue	0	0
Corrections		
Federal Government	0	0
State Government	0	0
Local Government	0	0

¹Based on \$0.010 per pound, the average annualized control cost for all commercial MWIs (existing and new).

²Based on \$0.046 per pound, the annualized control cost for a new large model commercial MWI.

It remains, therefore, to look at MWI operators. Four industries have been defined as including MWI operators: hospitals, nursing homes, research labs, and commercial incineration. The U.S. Small Business Administration (SBA) definition of a small business for hospitals, nursing homes, and commercial MWI operators is \$5 million or less in annual revenue averaged over the past three years. For research labs, the SBA definition is 500 employees or fewer.⁵ A nonprofit organization is considered “small” if it is “independently owned and operated and not dominant in its field.” A governmental jurisdiction is considered “small” if its population is 50,000 or less.⁶

It has been seen in this revised EIA that – due to the widespread opportunity to switch to an alternative method of medical waste treatment and disposal – the economic impacts of the NSPS on MWI operators of all sizes are generally not significant. In general, the cost of controls or the cost of switching can be recovered with a price increase that does not significantly exceed the market price increase. This holds for small businesses, small nonprofit organizations, and, by implication, small governmental jurisdictions (if a government facility is not significantly impacted, it can be assumed that the jurisdiction is not significantly impacted).

There are two exceptions. Significant economic impacts were found under all three regulatory options for 1) uncontrolled commercial MWIs, and 2) some small, rural, remote MWIs that may not have switching opportunities.

However, not all of these significantly impacted MWIs are necessarily operated by a small entity. For example, the small intermittent MWI for which significant impacts were found was assigned to hospitals with 40 beds and nursing homes with 150 employees. Table 12 shows that hospitals with 40 beds have average revenue ranging from \$5.3 million (psychiatric hospitals) to \$18.7 million (Federal hospitals). This exceeds the threshold for a small hospital, \$5.0 million, suggesting that most hospitals that will operate a new small MWI are not “small.” Average revenue for nursing homes in Table 12 is \$4.8–4.9 million, just below the \$5.0 million small-business cutoff. Many nursing homes that will operate a new small MWI – perhaps close to half – are therefore not “small.” Furthermore, the majority of MWIs are not operated by a public, or government, facility, suggesting that fewer than half of the small, rural, remote new MWIs would be under the jurisdiction of a small government.

In any case, the number of significant impacts is not considered “substantial.” Only a few – if any – of the facilities that will operate, or would have operated, the projected 10 new commercial MWIs over the next five years are likely to be significantly impacted. Similarly, only a few, at the most, of the 85 new small MWIs projected for the next five years are likely to be precluded from switching opportunities and would therefore be significantly impacted. These numbers are not only independently small, but also small in relation to the total number of facilities that will be impacted by the NSPS. (This total number is difficult to estimate without knowing approximately how many facilities would, in the absence of the NSPS, have had their medical waste incinerated off-site at a new commercial MWI.)

Finally, it should be noted that in one important sense, the NSPS have differential impacts that actually favor small entities. MWIs tend to be located at large facilities as opposed to small facilities. (It takes certain economies of scale to be able to justify operating an on-site MWI.) Tables 15A and 15B show that the price increase necessary for MWI operators to recover control costs or switching costs ranges up to 1.70 percent (large rural psychiatric hospitals; scenario C, switching without waste segregation). In contrast, Table 16 shows that impacts of the EG and NSPS (cumulatively) on the generally smaller facilities that send their medical waste off-site to be incinerated are minimal. The estimated increase in the cost of off-site incineration, 1.0-4.6 cents per pound, could be recovered with a price increase of, at the most, only 0.03 percent (freestanding blood banks).

References

1. U.S. Environmental Protection Agency. Medical Waste Incinerators - Background Information for Proposed Standards and Guidelines: Analysis of Economic Impacts for New Sources. EPA-453/R-94-048a. July 1994.
2. U.S. Environmental Protection Agency. Addendum to Analysis of Economic Impacts for New Sources. EPA-453/R-94-048a. July 1994.
3. "Cost Information for New MWI's." Memorandum submitted by Brian Strong, Midwest Research Institute, to Linda Chappell, U.S. Environmental Protection Agency. February 21, 1997.
4. EPA SBREFA Task Force. "EPA Interim Guidance for Implementing the Small Business Regulatory Enforcement Fairness Act and Related Provisions of the Regulatory Flexibility Act." February 1997.
5. Small Business Administration. "Small Business Size Standards." 13 Code of Federal Register, Part 121. January 31, 1996 (Volume 61, Number 21).
6. Office of Regulatory Management and Evaluation. "EPA Guidelines for Implementing the Regulatory Flexibility Act." April 1992.

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

1. REPORT NO. EPA-453/R-97-008b	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Hospital/Medical/Infectious Waste Incinerators: Background Information for Promulgated Standards and Guidelines - Analysis of Economic Impacts for New Sources		5. REPORT DATE July 1997
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Air Quality Strategies and Standards Division (Mail Drop 15) Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, NC 27711		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. _____
12. SPONSORING AGENCY NAME AND ADDRESS Director Office of Air Quality Planning and Standards Office of Air and Radiation U.S. Environmental Protection Agency Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final
		14. SPONSORING AGENCY CODE EPA/200/04
15. SUPPLEMENTARY NOTES Published in conjunction with promulgated air emission standards and guidelines for hospital/medical/infectious waste incinerators		
16. ABSTRACT The economic impact analysis uses annualized control costs in conjunction with economic and financial parameters to estimate potential economic impacts that may be experienced by existing facilities in industries that generate hospital waste or medical/infectious waste. Economic impacts such as price, output, and employment changes are examined for industries such as hospitals, nursing homes, and veterinary facilities.		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Pollution Control Standards of Performance Emission Guidelines Medical Waste Incinerators Hospital/Medical/Infectious Waste Incinerators	Air Pollution Control Solid Waste Medical Waste Incineration Hospital Waste Infectious Waste	
18. DISTRIBUTION STATEMENT Release Unlimited	19. SECURITY CLASS (Report) Unclassified	21. NO. OF PAGES <u>44</u>
	20. SECURITY CLASS (Page) Unclassified	22. PRICE

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