Economic Impact Analysis
Virginia Department of Planning and Budget

9 VAC 5-40 – State Air Pollution Control Board
Regulations for the Control and Abatement of Air Pollution
November 9, 2001

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 9-6.14:7.1.G of the Administrative Process Act and Executive Order Number 25 (98). Section 9-6.14:7.1.G requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. The analysis presented below represents DPB's best estimate of these economic impacts.

Summary of the Proposed Regulation

The proposed regulations will establish emission standards for particulate matter, carbon monoxide, dioxins/furans, hydrogen chloride, sulfur dioxide, nitrogen oxides, lead, cadmium, and mercury, which will apply to small municipal waste combustors. To ensure proper facility operation and compliance with the emission limits, requirements for emissions testing and monitoring, operator training and qualifications, record-keeping, and reporting are also proposed. These regulations are proposed to meet the requirements of sections 111(d) and 129 of the federal Clean Air Act, and 40 CFR part 60 subpart BBBB of federal regulations.

Estimated Economic Impact

Introduction

Original federal regulations were developed for all municipal waste combustors both small and large, but because of a court order the U.S. Environmental Protection Agency (EPA) developed separate regulations for small and large combustors. In 1995, EPA promulgated

regulations for large combustors that burn more than 250 tons of waste per day. The proposed regulation is a continuum of the original intent of EPA and will apply to small municipal waste combustors (SMWCs) with a combustion design capacity of 35 to 250 tons/day. These facilities combust municipal solid waste, which include solid, liquid, or gasified solid waste, and refuse-derived fuel, which is the shredded and classified form of municipal solid waste. The term "municipal" does not refer to the ownership of the facility, but rather to the type of the waste combusted. Municipal waste includes household, commercial/retail, and institutional waste. These waste materials may be discarded by residential dwellings, hotels, motels, stores, offices, restaurants, warehouses, schools, hospitals, and prisons. Majority of the waste items are paper, yard waste, plastics, leather, rubber, glass, metals, and other combustible and noncombustible materials.

The proposed regulations will apply to both existing SMWCs and the new plants that will come online in the future. Existing plants will be subject to emissions guidelines while new plants will be subject to the new source performance standards. Existing plants are those for which construction commenced on or before August 30, 1999 and new plants are those for which construction, modification, or reconstruction began after that date.

Hazardous household waste and the waste that is not recyclable or compostable must be disposed. The two primary types of disposal practices are landfilling and municipal waste combustion, or incineration. Landfills are facilities for long-term containment of solid waste. An alternative method of managing solid waste is through combustion. Solid waste combustion involves incineration of all or a portion of the solid waste stream in specially designed combustion facilities and the disposal of the residual ash in landfills. Incineration reduces the mass of waste up to 90 percent[1] and results in considerable savings in landfill capacity, but also creates various kinds of toxic emissions. In 1998, Virginia generated about 9 million tons of solid waste, recycled 35%, incinerated 18%, and landfilled 47% of this amount.[2]

Combustion or incineration may employ conventional techniques or a "waste-to-energy" approach. A by-product of combustion at many of SMWC facilities is energy production. Most

[1] Source: EPA
[2] Ibid.

of these combustors generate electricity or steam from burning garbage for commercial and residential use and affected Virginia facilities are no exceptions.

Emissions from SMWCs contain harmful organics such as dioxins/furans, metals such as particulate matter, cadmium, lead, mercury, and acid gases such as sulfur dioxide, hydrogen chloride, and nitrogen oxides. These emissions can cause or contribute to air pollution that may endanger public health and welfare. Some of the pollutants emitted are highly toxic and can cause serious health effects in humans. Emissions of oxides of nitrogen and sulfur contribute to acid rain, which is known to harm lakes, forests, and buildings, as well as public health.

The proposed regulations will apply to three existing municipal waste plants with four combustion units in Virginia. The emissions from these units must be reduced by the application of "maximum achievable control technology," which is defined as the technology that would result in emissions reductions as high as that can be achieved by the best controlled combustion unit, taking into account the costs and benefits of compliance.

The proposed requirements

The proposed regulations will establish emission standards for particulate matter, carbon monoxide, dioxins/furans, hydrogen chloride, sulfur dioxide, nitrogen oxides, lead, cadmium, and mercury, which will apply to SMWCs. Standards for visible emissions, fugitive dust/emissions, odor, and toxic pollutants have been established in other regulations and incorporated by reference. Since those standards are already established elsewhere and apply to SMWCs, this analysis does not address them. The proposed emission limits vary according to the capacity of the combustion unit. Class I units are those with an aggregate combustion capacity greater than 250 tons/day of municipal waste while Class II units are those with combustion capacity equal to or less than that. The proposed emission limits for existing SMWCs are summarized in Table 1.

A distinguishing feature of the proposed regulations is that they do not prescribe how to achieve the standards summarized in the table. The source has complete control on the method by which the standards will be met. The affected sources are likely to employ the most cost effective methods to comply with the standards and promote innovation in emissions control technology. This feature is likely to result in low compliance costs. The magnitude of savings depends on how many different technology options are available for controlling emissions.

Table 1: The Proposed Emissions Limits

Pollutant	Emission Limit[a, b]	
	Class I Units	**Class II Units**
Particulate Matter (PM)	27 mg/dscm	70 mg/dscm
Carbon Monoxide (CO)	—	50–250 ppm by dry volume[c]
Dioxins/Furans (total mass basis)	30 ng/dscm (non-electrostatic precipitator units) 60 ng/dscm (electrostatic precipitator units)	125 ng/dscm
Hydrogen Chloride (HCl)	31 ppm by dry volume or 95% reduction	250 ppm by dry volume or 50% reduction
Sulfur Dioxide (SO_2)	31 ppm by dry volume or 75% reduction	77 ppm by dry volume or 50% reduction
Nitrogen Oxides (NO_x)	170–380 ppm by dry volume [d]	—
Lead (Pb)	0.490 mg/dscm	1.6 mg/dscm
Cadmium (Cd)	0.040 mg/dscm	0.10 mg/dscm
Mercury (Hg)	0.080 mg/dscm	0.080 mg/dscm

[a] Emission limits are measured at 7 percent oxygen on a dry basis at standard conditions.
[b] The list of acronyms used in the table is the following: mg stands for milligrams, dscm stands for dry standard cubic meter, ppm stands for parts per million, ng stands for nanograms.
[c] Applicable limit depends on the combustion method employed within the regulated unit (e.g., fluidized-bed units must achieve 100 ppm). See proposed 9-VAC-40-6580 for details.
[d] Applicable limit depends on the unit design (e.g., mass burn waterwall units must achieve 200 ppm). See proposed 9-VAC-40-6620 for details.

In addition to the emission limits, general operating practices will be established in the form of an operator training and qualification program. A compliance schedule with specific increments of progress is provided. Operating limits for operating parameters such as maximum charge rates, temperature limits, and carbon feed rates and usage are prescribed. Test methods to be used in determining compliance with the emission limits, as well as compliance requirements,

including testing schedules, are specified. Air curtain incinerators that burn 100 percent yard waste will have to meet separate requirements for increments of progress, compliance monitoring and testing, record-keeping, and reporting. Procedures to be followed in the event of facility and control equipment maintenance or malfunction are provided.

Initial and annual stack testing will be used to measure the emissions levels and to demonstrate compliance with the standards. Equipment necessary to monitor compliance with the site-specific operating limits are to be installed, calibrated, maintained, and operated. The reporting of emissions will be required once a year, unless emission limits are exceeded, in which case reporting is required twice a year. Records of monitoring and test results are to be maintained.

Operator training and certification requirements are proposed to ensure good operating practices that contribute to the overall effectiveness of the plant operations, which in turn, may reduce the amount of emissions. SMWC's chief facility operator, shift supervisors, and control room operators will be required to complete a generic and a site-specific operator training course. According to the agency (Department of Environmental Quality), operators are already required to complete a generic training. However, the proposed regulations will introduce an additional requirement for plant-specific training on all employees who might affect plant operations. These employees include chief facility operators, shift supervisors, control room operators, ash handlers, maintenance personnel, and crane or load handlers. A training manual must also be developed for each SMWC and all of these employees must review it annually though a program.

In short, the owners of SMWC will have to conduct initial and annual stack testing, install and operate continuous emission monitoring systems, monitor waste load levels, train operators and obtain certification for some operators and supervisors, develop operating manuals to ensure compliance with the proposed regulations. All of these requirements will have to be satisfied according to a schedule.

A compliance schedule with specific increments of progress is proposed. The final compliance will have to be achieved by December 6, 2005 or within three years after the proposed regulations are approved by EPA and became effective, whichever is earlier. The

agency indicates that the plan approval and consequently, the effective date are likely to be around the 2005 deadline.

Compliance schedules will depend on whether a source is a Class I unit or a Class II unit. Compliance schedule for Class I units has five increments of progress, as follows.

Increment 1, Submit final control plan: Within six months of the effective date.

Increment 2, Award contracts: Within one year of the effective date.

Increment 3, Begin onsite construction: Within two years of the effective date.

Increment 4, Complete onsite construction: Within thirty months of the effective date.

Increment 5, Final compliance: Within three years of the effective date, or before December 6, 2005, whichever is earlier.

In contrast, Class II units will have only two deadlines, as follows.

Increment 1, Submit final control plan: Within six months of the effective date.

Increment 2, Final compliance: Within three years of the effective date, or before December 6, 2005, whichever is earlier.

In addition to the above deadlines, Class I units that commenced construction after June 26, 1987 will be required to comply with the proposed dioxins/furans and mercury emission limits within one year of the effective date, or one year after the issuance of a revised construction or operation permit if a permit modification is required, but no later than November 6, 2005.

Costs

The proposed regulations will impose many different types of costs on the owners of SMWCs. These costs can be grouped under capital and operating cost categories. Capital costs include outlays on control, monitoring, and any other types of equipment purchases and installation expenses required to comply with the proposed standards. Capital costs are one-time costs and are not very meaningful unless converted to annual figures based on the useful life of the capital equipment. Operating costs are ongoing costs and stem from the operation and maintenance of installed equipment, testing, monitoring, water and electricity inputs used in the

process, supervision of labor, reporting, record-keeping, operator training and certification, and any other activities necessary to comply with the proposed regulations. Total annual cost is the sum of the annualized capital costs and operating costs and is used to measure the impact on the owners of SMWCs.

Although the proposed requirements are numerous and complex, there are only three facilities in Virginia that will be affected. Each facility has been contacted and asked to provide cost estimates for the proposed standards. Only one facility with two combustion units provided readily available cost estimates from 1996, which were developed in preparation for the promulgation of the original regulations. These estimates included one time capital costs as well as the annual operation costs, which is a standard format for this type of analysis.

For the remaining two affected facilities, an approximation is made from readily available research on the subject to produce a ballpark estimate for all of the affected facilities. As a part of its responsibility, EPA has already produced an analysis on the economic impact of the small municipal waste combustor regulations.[3] The cost estimates for the two affected facilities, each with a single combustion unit, are derived from EPA's analysis. [4] This is done by first identifying the most relevant combustion unit cost information available in the EPA study and then extrapolating that information for the affected two facilities.[5] There is a chance that the estimates based on combustion units may overstate (understate) the potential costs if the sizes of affected Virginia units are larger (smaller) than the size of the average unit included in the original analysis.

Because both EPA analysis and the facility specific cost estimates did not quantify operator training and certification costs, these items are identified separately and incorporated into capital and operating cost estimates provided here.[6] To comply with the regulations, all of the operators must be tested and certified for plant-specific training through a certification panel.

[3] EPA, 1999, "Economic Impact Analysis: Small Municipal Waste Combustor – Section 111/129 Emission Guidelines and New Source Performance Standards."

[4] Some costs are not quantified in EPA's analysis. Unquantified cost items include operator training and certification costs, administrative costs on the agency to issue permits, to monitor performance, and enforce compliance, costs associated with underutilization of resources from lost output, resource allocation costs, and unemployment assistance, costs associated with additional paperwork requirements beyond testing, reporting, and record-keeping, and finally costs associated with controlling fugitive emissions.

[5] For one of the affected facilities, cost estimates to comply with the new source performance standards is applied because the facility is expected to rebuilt its facility and be subject to more stringent standards.

[6] These estimates are derived in large from the conversations with the affected facility personnel.

This initial certification costs are estimated to be about $20,000 for all of the operators at each combustion unit. In a sense, these are one-time capital costs and are distributed over 15 years. In addition to that, there will be additional ongoing certification costs due to operator turnover, which are considered as operating expenses. Based on historical turnover rates, each unit is expected to replace one of its operators every two years, which amounts to $2,500 in annual operating costs. Aside from the certification costs, each combustion unit is also expected to incur about $8,000 per year in other site-specific training costs, which include providing a training room and other accommodations for the operators. These estimated costs are extrapolated to all of the affected four units and added in the cost estimates provided in Table 2.

As an alternative to cost estimates based on the number of combustion units, cost estimates based on per ton of waste processed are also provided. To provide this information, the quantity of waste processed at each facility is summed up and multiplied by the estimated cost/ton figures in EPA's analysis.[7] Similarly, these estimates may also overstate (understate) the actual costs as the quantity of waste processed in one year may be higher (lower) than the quantity of waste processed by an average unit in the original analysis.

Compliance costs for the affected SMWC units in the table are separately estimated for one business owned facility with a single combustion unit and for the two government-owned facilities with three combustion units. The business owned facility is currently not operating its combustion unit, but has a valid permit to start operations any time. This facility is currently evaluating its options and has not decided whether to permanently shut down, or start operations. If the facility shuts down, the compliance cost estimates under business owned units column should be disregarded accordingly.

Per unit cost estimates suggest that the three affected facilities will incur approximately $16.1 million for the purchase of the required emission control equipment and for their installation on one time basis, and about $1.6 million for the other operating expenses on an annual basis.[8] When one time capital costs are converted to annual costs based on

[7] The quantities of waste processed are obtained from the agency and are verified with the affected facility personnel whenever possible. Some rounding of figures occurred in this two-step process.

Table 2: Cost Estimates for the Affected Units in Virginia[a]

Costs	Business Owned Units	Government Owned Units	Total
	Based on Cost Per Combustion Unit		
Capital Costs	$6,944,575	$9,191,449	$16,136,024
Annual Operating Costs	$730,584	$878,540	$1,609,124
Total Annual Costs	$1,389,548	$1,647,567	$3,037,115
	Based on Cost Per Ton of Waste		
Cost Per Ton	$15.84	$17.77 ($54.79) [c]	
Tons of Waste Processed	13,000 [b]	80,000 (23,000) [c]	116,000
Total Annual Costs	$216,420	$2,713,270	$2,929,690

Source: EPA, 1999, "Economic Impact Analysis: Small Municipal Waste Combustor – Section 111/129 Emission Guidelines and New Source Performance Standards," p. 16., and affected facility personnel.
[a] All cost figures that are stated in 1997 dollars in the original source are converted to 2001 dollars by an inflation factor of 1.08 based on the U.S. producer price index.
[b] This figure represents the quantity of waste the facility could potentially process if it were operating.
[c] Figures for the facility that will be subject to the new source performance standards is in parentheses.

the useful life of the necessary equipment and added to other annual operating costs, total annual costs to the owners of the facilities in Virginia is estimated to be approximately $3 million per year.

The estimated figures in the lower panel of the table are based on the cost per ton of waste processed. The estimates suggest that the business owned unit is likely to incur $216 thousand while the two government-owned facilities with three combustion units are likely to incur about $2.7 million in annual compliance costs. When compared across the two estimation methods, there are significant differences in the cost estimates for both business and government owned units. However, both estimation methods indicate that the total annual compliance costs are likely to be close to $3 million.

EPA analysis also estimates the additional compliance costs per household and in terms of tipping fees to illustrate the magnitude of the compliance costs from a different perspective. For the fee-for-service facilities, the tipping fee is the fee charged to other businesses. The

[8] The agency indicated a chance that two additional units may be subject to the proposed emissions standards. These estimates do not include additional costs for these two facilities that may be subject to the proposed regulations.

information collected from the facilities and from the agency indicates that slightly more than half of the waste combusted at these facilities is household waste and less than half is commercial type of waste.

In terms of current dollars, it is estimated that annual average compliance costs per household is about $52.70 in counties with a population of 50,000 or less and about $10.21 in counties with a population from 100,000 to 250,000. Populations of affected cities in 2000 are as follows, City of Galax; 6,837, City of Harrisonburg; 40,468, City of Hampton; 146,437.[9] These population figures matched with the estimated costs merely suggest that the additional waste disposal costs for City of Galax and City of Harrisonburg are about $52.70 per household/year and about $10.21 for City of Hampton.

If the facility does not process household waste but process mostly commercial waste then the additional costs in terms of tipping fees would better illustrate the magnitude of the additional compliance costs. It is indicated that the additional compliance costs are equivalent to about 32% increase in tipping fees over the $62.58 national average in current dollars for per ton of waste combusted.

Neither the tipping fee increases nor the cost per household estimates should be taken as an indication that the full compliance costs can be passed to customers or businesses. The ability to pass some of the compliance costs downstream to customers and upstream to suppliers depends on the waste disposal market characteristics these facilities operate in. It is usually impossible to pass all of the cost increases to consumers although in most cases the supplier can pass at least a portion of the costs.

The demand for combustion services is known to be irresponsive to the price changes,[10] which makes it easier to pass cost increases to customers. On the other hand, the affected facilities are small players and price takers in the municipal waste disposal market.[11] This makes it difficult to pass on the costs. For the Virginia's affected facilities, there is not sufficient evidence indicating presence of market power in the waste disposal industry that would allow passing costs to households or other businesses. In fact, relatively small sizes of affected facilities and the widespread availability of landfilling alternative for disposal are the two main

[9] Source: U.S. Census Bureau.
[10] Source: EPA

reasons for the lack of any overriding market power these facilities could have. Thus, it is very unlikely that the affected firms will pass a significant portion of the additional compliance costs to households or to other commercial businesses.

What is probable is passing costs to steam customers. The two of the three affected facilities are currently generating steam as a by-product of incineration and selling it to institutions or commercial businesses that use it for heating and cooling purposes. Interestingly, the third facility is primarily established for steam production by industrial boilers, but also has an incinerator unit to contribute to steam generation. The combustion unit at this facility is currently not operational.

In short, the steam generation is a significant part of the overall operations for all of the affected facilities. For example, the previous year's revenues from the steam production at the largest affected facility were about $3.5 million.[12] Unlike the waste disposal industry, the affected facilities have strong market power in the steam business. The primary source of their market power is the infrastructure of the steam distribution. Like the natural gas markets,[13] steam has to be transported through existing pipelines. This limits the number of sellers in a local area and creates a very small regional market. Furthermore, the number of steam customers is also very limited not exceeding only a few. One of the facilities is known to be located in the vicinity of its only customer and is known to have a contractual relationship to participate in operating costs rather than buying steam at the ongoing price. In a market structure with one seller and a couple of buyers, most of the decisions are made through bargaining, and both parties will likely have vested interest in sharing additional compliance costs given the potentially tremendous costs of establishing a new steam pipeline or streamlining the whole production to suit an alternative energy source. Thus, it is likely that some of the compliance costs will be passed to the affected facilities' steam customers.

It is also important to note that the estimated compliance costs in Table 2 should be taken as the maximum likely costs for these facilities as they were obtained under the assumption that the facility will not switch to a more cost effective waste disposal alternative, or to a cheaper

[11] Source: Conversations with the facility personnel.
[12] Source: Ibid.
[13] Soderholm, Patrick, 2000 "Fuel Flexibility in the West European Power Sector," Resources Policy, 26: 157-170.

production process. Recycling and landfilling may be very attractive ways of waste disposal after the proposed changes becomes effective. If recycling and landfilling become more cost effective methods, it is very likely that these facilities will change their waste disposal method to avoid higher costs. They may increase the scope of recycling programs, construct a landfill, or contract with a nearby landfill. In addition, steam production by an additional boiler may become relatively cheaper and attractive. Such rational behavior is likely to reduce the estimated compliance costs in the table. For example, if an incinerator constructs a new landfill to dispose waste, or if the business owned unit decides to shut down its combustion unit, it will not incur the estimated compliance costs, but rather incur probably smaller costs for transforming its business operations.

All of the affected facilities indicate that no significant capital or operating expenses have been incurred yet for the proposed regulations. However, because the original regulations have been promulgated in 1996 and held back because of a court order, one of the facilities have installed some add on equipment to the existing plant. Thus, most of the compliance costs will likely be incurred before the compliance deadline to meet the proposed standards.

These additional costs may cause some of the facilities to cease operations and may discourage new entrants in the municipal waste combustion industry. This may be because landfilling the waste or changing the plant operations may become more cost effective. As mentioned before, there is no formal indication that any plants shutting down operations, but there is a chance that the business owned unit may shut down its combustion unit.

The economic impact of the proposed standards will be different in magnitude for the new units. These units will not be subject to the emissions guidelines, but to the new source performance standards. All new units will be required to install spray dryer based control systems and class I units will be required to install newer technology control systems for nitrogen oxides. Although the estimated unit costs do not differ significantly for new and existing units, EPA's estimated cost per ton of waste combusted for new units coming online is significantly higher than the estimated cost per ton of waste for the existing units. For example, additional cost per ton of waste is estimated to be $55.79 in current dollars for new units coming online while it is $17.77 for the existing government owned units. However, expected emissions reductions from the new units are also higher.

Finally, the agency will likely perform additional inspection, monitoring, and record-keeping to ensure that the emissions limitations are being met, which may require increased expenditure in personnel and equipment. However, the agency does not expect additional personnel and equipment needs to be significant because these sources have been already permitted, inspected, and monitored for many years. Allocation of additional duties among the current personnel and other resources within the agency is expected to be sufficient to cover little, if any, additional staffing that may be required to ensure compliance with the proposed changes. On the other hand, the agency expects to enhance its ability to make both short and long term planning decisions by a small margin through the additional data collected and analyses performed.

Benefits

The main benefit of the proposed standards will be substantially reducing emissions of harmful air pollutants. EPA has estimated the total amount of emissions reductions expected from the proposed standards. The table on the next page extrapolates these estimates for Virginia. This is done by first calculating the expected emissions reduction per combustion unit and then multiplying the result by the number of affected units in the Commonwealth. The table reveals that the amounts of emissions reductions from SMWCs are substantial. The percent reductions for most pollutants are expected to be more than 50% and for dioxins/furans may be as high as 97%.

The benefits from the proposed standards are expected to be significant as the health risks from small exposures to some of these regulated air pollutants can be high. Some of the emissions are known or suspected of causing cancer, nervous system damage, developmental abnormalities, reproductive impairment, immune suppression, liver dysfunction, hormone imbalance, and other serious health effects.

In particular, dioxin is a significant concern because it is persistent in the environment and bioaccumulates. These characteristics cause dioxin to move through the food chain, biomagnify, and cause adverse effects to humans and wildlife. Reproductive, developmental, and immune system effects associated with exposure to dioxin are significant public health concerns. According to the agency, when compliance with the standards is achieved municipal waste combustors will represent less than one percent of the known sources of dioxin when the

Table 3: Aggregate Expected Emissions Reductions from Virginia Sources

Pollutant	Current Emissions [a] (Lbs per year)	Expected Emissions Reduction (Lbs per year)	Percent Reduction
Dioxins/Furans	.27 [b]	.26	97%
Cadmium (Cd)	41	34	84%
Mercury (Hg)	139	132	95%
Lead (Pb)	70	64	91%
Particulate Matter (PM)	106,527	77,765	73%
Sulfur Dioxide (SO_2)	275,298	134,896	49%
Hydrogen Chloride (HCl)	750,335	637,784	85%
Nitrogen Oxides (NO_x)	382,924	34,463	9%

Source: EPA, 1999, "Economic Impact Analysis: Small Municipal Waste Combustor – Section 111/129 Emission Guidelines and New Source Performance Standards," p. 23.
[a] Obtained from the agency's emissions inventory database.
[b] Estimated from EPA study based on the number of combustion units because current emissions for dioxins/furans are not measured at the affected facilities in Virginia.

proposed rule is fully implemented.

Mercury is also highly toxic, persistent in the environment and bioacumulates, particularly in fish. Human exposure to mercury occurs primarily through ingestion of fish. Exposure to mercury can cause adverse health effects in humans and wildlife, including gastro intestinal and respiratory tract disturbances, central nervous system, birth, and developmental effects. The agency indicates that municipal waste combustors will represent only about 3 percent of the U.S. inventory for mercury emissions when the proposed rule is implemented.

Lead and cadmium are highly toxic and may cause mucous membrane irritation, gastrointestinal effects, nervous system, reproductive, and developmental disorders, and skin irritation. Long-term exposure to hydrogen chloride may affect eyes, skin, and mucus membranes.

Control of harmful emissions from municipal waste combustors will reduce such serious health effects and the associated treatment costs. Furthermore, the reduction of SMWC emissions will reduce the risk of damage to vegetation and property, and improve visibility. A summary of health and other effects are provided in the following table.

Table 4: Health and Other Effects of Pollutants

Pollutant	Health and Other Effects
Dioxins/Furans	mortality, morbidity carcinogenicity
Cadmium (Cd) Mercury (Hg) Lead (Pb)	retardation and brain damage hypertension central nervous system injury renal dysfunction
Particulate Matter (PM)	mortality, morbidity eye and throat irritation, bronchitis, lung damage impaired visibility soiling and Materials damage
Sulfur Dioxide (SO_2) Hydrogen Chloride (HCl) Nitrogen Oxides (NO_x)	dental erosion acid rain mortality, morbidity respiratory tract problems, permanent harm to lung soiling and materials damage reduced agricultural yield

Source: Federal Register, December 19, 1995. Vol. 60, No. 243, p. 65411.

The economic value of these benefits cannot be credibly estimated because the uncertainty in doing so is enormous. It is not known how many people are exposed to these

harmful emissions. Also, dose-response relationships between exposure to many of these harmful pollutants and the adverse health effects are little known.

Finally, overall ozone reductions may lessen the risk of current attainment areas being designated nonattainment, and current nonattainment areas being reclassified to a more serious classification. Also, failure to implement these regulations may result in federal government intervention.

Businesses and Entities Affected

Currently, three facilities in Virginia meet the criteria for "small municipal waste combustor." When a more definitive inventory is conducted as part of the section 111(d) plan, this number may be revised.

Localities Particularly Affected

The proposed regulations will apply throughout the Commonwealth. However, the three facilities that will be affected are located in City of Galax, City of Hampton, and City of Harrisonburg.

Projected Impact on Employment

None of the three SMWCs are expected to permanently shut down their operations at this time. Although there is a chance that one facility may permanently shut down its combustion unit that is currently not operational, what the facility will eventually do is not known. Even if this unit decides to shut down, no impact on employment is expected because it is not currently operating. Also, the facility located in City of Harrisonburg is believed to be making plans to temporarily shut down the plant in next two years for construction of a new facility. The actual impact on employment depends on whether the affected facilities shut down their combustion units.

Effects on the Use and Value of Private Property

The value of the affected facilities is likely to decrease because of additional compliance costs and lower profits. The value of steam customers may also decrease in value due to sharing a portion of compliance costs. However, air pollution control devices will have to be purchased and the vendors will likely experience a small increase in demand for their products. Their profits and the value of their businesses are likely to increase. Furthermore, businesses that

conduct training of combustion unit operators are also expected to experience a small increase in the demand for their services. This may have a small positive effect on the value of their businesses. Finally, the value of private property located in the vicinity of the affected SMWC units may increase due to emissions reductions that will be achieved.