United States Environmental Protection Agency

Economic Impact Analysis of the Plastic Parts and Products NESHAP

Final Report

EPA-452/R-03-019
August 2003

Economic Impact Analysis of the Plastic Parts and Products NESHAP

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Contract No. 68-D-99-024

*RTI International is a trade name of Research Triangle Institute.

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REGULATORY BACKGROUND AND IMPACTS (COSTS AND EMISSION REDUCTIONS)

1.1 Background

1.1.1 Authority for Development of National Emission Standards for Hazardous Air Pollutants (NESHAP)

Section 112 of the Clean Air Act (CAA) requires us to list categories and subcategories of major sources and area sources of hazardous air pollutant (HAP) and to establish NESHAP for the listed source categories and subcategories. The Plastic Parts and Products (Surface Coating) category of major sources was listed on July 16, 1992 (57 FR 31576) under the Surface Coating Processes industry group. Major sources of HAP are those that emit or have the potential to emit equal to, or greater than, 9.1 megagrams per year (Mg/yr) (10 tons per year [tpy]) of any one HAP or 22.7 Mg/yr (25 tpy) of any combination of HAP.

1.1.2 Criteria for Development of NESHAP

Section 112 of the CAA requires that we establish NESHAP for the control of HAP from both new and existing major sources. The CAA requires the NESHAP to reflect the maximum degree of reduction in emissions of HAP that is achievable. This level of control is commonly referred to as the MACT (Maximum Achievable Control Technology).

The MACT floor is the minimum control level allowed for NESHAP and is defined under section 112(d)(3) of the CAA. In essence, the MACT floor ensures that the standard is set at a level that assures that all major sources achieve the level of control at least as stringent as that already achieved by the better-controlled and lower-emitting sources in each source category or subcategory. For new sources, the MACT floor cannot be less stringent than the emission control that is achieved in practice by the best-controlled similar source. The MACT standards for existing sources can be less stringent than standards for new sources, but they cannot be less stringent than the average emission limitation achieved by the best-performing 12 percent of existing sources in the category or subcategory (or the best-performing five sources for categories or subcategories with fewer than 30 sources).

In developing MACT, we also consider control options that are more stringent than the floor. We may establish standards more stringent than the floor based on the consideration of the cost of achieving the emission reductions, any non-air quality health and environmental impacts, and energy requirements.

1.2 Summary of the Proposed Rule

1.2.1 Affected Source Categories

The proposed rule will apply to you if you own or operate a plastic parts and products surface coating facility that is a major source, or is located at a major source, or is part of a major source of HAP emissions. We have defined a plastic parts and products surface coating facility as any facility engaged in the surface coating of any plastic part or product.

You will not be subject to the proposed rule if your plastic parts and products surface coating facility is located at an area source. An area source of HAP is any facility that has the potential to emit HAP but is not a major source. You may establish area source status by limiting the source's potential to emit HAP through appropriate mechanisms available through your permitting authority.

The source category does not include research or laboratory facilities or janitorial, building, and facility maintenance operations, or hobby shops that are operated for personal rather than commercial purposes. The source category also does not include coating of magnet wire, coating of plastics to produce fiberglass boats (except post-mold coating of personal watercraft or their parts), or the extrusion of plastic onto a part or product to form a coating. Post-mold coating of personal watercraft and their parts is included in the source category.

This source category also does not include surface coating of plastic parts and products that would be subject to certain other subparts of 40 CFR part 63. In particular, it does not include the following coating operations:

(1) Coating operations that are subject to the aerospace manufacturing and rework facilities NESHAP (40 CFR part 63, subpart GG).

(2) Operations coating plastic and wood that are subject to the wood furniture NESHAP (40 CFR part 63, subpart JJ).

(3) Operations coating plastic and metal parts of large appliances that are subject to the large appliance surface coating NESHAP (40 CFR part 63, subpart NNNN, 67 FR 48254, July 23, 2002).

(4) Operations coating plastic and metal parts of metal furniture that would be subject to a proposed metal furniture surface coating NESHAP (67 FR 20206, April 24, 2002).

(5) Operations coating plastic and wood parts of wood building products that would be subject to a proposed wood building products surface coating NESHAP (67 FR 42400, June 21, 2002).

(6) In-mold and gel coating operations in manufacturing of reinforced plastic composites that are subject to the proposed reinforced plastics composites production NESHAP (66 FR 40324, August 2, 2001).

(7) Surface coating of parts that are pre-assembled from plastic and metal components, where greater than 50 percent of the coatings (by volume, determined on a rolling 12-month basis) are applied to the metal surfaces, that would be subject to a proposed NESHAP for miscellaneous metal parts surface coating. If you can demonstrate that more than 50 percent of coatings are applied to metal surfaces, then compliance with a proposed NESHAP for miscellaneous metal parts surface coating would constitute compliance with proposed subpart PPPP. You must maintain records (such as coating usage or part surface area) to document that more than 50 percent of coatings are applied to metal surfaces.

We have established four subcategories in the plastic parts and products surface coating source category: (1) general use coating, (2) thermoplastic olefin (TPO) coating, (3) headlamp coating, and (4) assembled on-road vehicle coating. The general use coating subcategory includes all plastic parts and products coating operations except TPO, headlamp, and assembled on-road vehicle coating. This includes operations that coat a wide variety of substrates, surfaces, and types of plastic parts, as well as more specialized coating scenarios. Each subcategory consists of all coating operations, including associated surface preparation, equipment cleaning, mixing, storage, and waste handling.

1.2.2 Characterization of Emissions

The proposed NESHAP would regulate emissions of organic HAP. Available emission data collected during the development of the proposed NESHAP show that the primary organic HAP emitted from plastic parts and products surface coating operations include methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK), toluene, and xylenes. These compounds account for over 85 percent of this source category's nationwide organic HAP emissions. Other organic HAP emissions identified include ethylene glycol butadiene (EGBE) and glycol ethers. The majority of organic HAP emissions from a facility engaged in plastic parts and products surface coating operations can be attributed to the application, drying, and curing of coatings. The remaining emissions are primarily from cleaning operations. In most cases, organic HAP emissions from mixing, storage, and waste handling are relatively small.

The organic HAP emissions associated with coatings (the term "coatings" includes protective and decorative coatings as well as adhesives) occur due to volatilization of solvents and carriers. Coatings are most often applied either by using a spray gun in a spray booth or by dipping the substrate in a tank containing the coating. In a spray booth, volatile components evaporate from the coating as it is applied to the part and from the overspray. The coated part then passes through a flash-off area where additional volatiles evaporate from the coating. Finally, the coated part passes through a drying/curing oven, or is allowed to air dry, where the remaining volatiles are evaporated.

Organic HAP emissions also occur from the activities undertaken during cleaning operations where solvent is used to remove coating residue or other unwanted materials. Cleaning in this industry includes cleaning of spray guns and transfer lines (e.g., tubing or piping), tanks, and the interior of spray booths. Cleaning also includes applying solvents to manufactured parts prior to coating application and to equipment (e.g., cleaning rollers, pumps, conveyors, etc.).

Mixing and storage are other sources of emissions. Organic HAP emissions can occur from displacement of organic vapor-laden air in containers used to store organic HAP solvents or to mix coatings containing organic HAP solvents. The displacement of vapor-laden air can occur during the filling of containers and can be caused by changes in temperature or barometric pressure, or by agitation during mixing. Volatilization of organic HAP can also occur during waste handling.

Although most of the coatings used in this source category do not contain inorganic HAP, a few special purpose coatings used by a few facilities in this source category contain inorganic HAP such as chromium and lead. Although these emissions have not been quantified, we believe that the inorganic HAP emission levels are very low. Furthermore, emissions of these materials to the atmosphere are minimal because very few of the facilities in this source category use spray application techniques to apply coatings that contain inorganic HAP compounds. At this time, it does not appear that emissions of inorganic HAP from this source category warrant Federal regulation.

1.3 Definition of Affected Source

We define an affected source as a stationary source, a group of stationary sources, or part of a stationary source to which a specific emission standard applies. The proposed standards define the affected source as the collection of all operations associated with the surface coating of plastic parts and products within each of the four subcategories (TPO, headlamps, assembled on-road vehicle and general use). These operations include preparation of a coating for application (e.g., mixing with thinners or other additives); surface preparation of the plastic parts and products; coating application and flash-off; drying and/or curing of applied coatings; cleaning of equipment used in surface coating; storage of coatings, thinners, and cleaning materials; and handling and conveyance of waste materials from the surface coating operations. The coating operation does not include the application of coatings using hand-held aerosol containers.

A few facilities have coating operations in more than one subcategory. For example, a few facilities have TPO coating operations that are in the TPO coating subcategory and also have other plastic parts and products coating operations that are in the general use coating subcategory. In such a case, the facility would have two separate affected sources: (1) the collection of all operations associated with the surface coating of TPO, and (2) the collection of all operations associated with general use coating. Each of these affected sources would be required to meet the emission limits that apply to its subcategory.

Another example of a facility with coating operations in more than one subcategory would be a facility that assembles and paints motor homes. The use of adhesives, caulks, sealants, and associated materials in assembling the motor home would be in the general use coating subcategory and would constitute one affected source. The use of coatings and associated materials in painting the assembled motor home would be in the assembled on-road vehicle subcategory and would constitute a second affected source.

1.4 Emission Limits and Operating Limits

1.4.1 Emission Limits

The rule will limit organic HAP emissions from each existing affected source using the emission limits in Table 1-1. The proposed emission limits for each new or reconstructed affected source are given in Table 1-2.

Table 1-1. Emission Limits for Existing Affected Sources

For any affected source applying coating to ...	The organic HAP emission limit you must meet, in kg organic HAP emitted/kg coating solids used (lb organic HAP emitted/lb coating solids used), is:
TPO substrates	0.23
Headlamps	0.45
Assembled on-road vehicles	1.34
Other (general use) plastic parts and products	0.16

Table 1-2. Emission Limits for New or Reconstructed Affected Sources

For any affected source applying coating to ...	The organic HAP emission limit you must meet, in kg organic HAP emitted/kg coating solids used (lb organic HAP emitted/lb coating solids used), is:
TPO substrates	0.17
Headlamps	0.26
Assorted on-road vehicles	1.34
Other (general use) plastic parts and products	0.16

You can choose from several compliance options in the proposed rule to achieve the emission limits. You could comply by applying materials (coatings, thinners and other additives, and cleaning materials) that meet the emission limits, either individually or collectively, during each compliance period. You could also use a capture system and add-on control device to meet the emission limits. You could also comply by using a combination of both approaches.

Existing affected sources would have to be in compliance with the final rule no later than 3 years after the effective date of the final rule. The effective date is the date on which the final rule is published in the Federal Register. This the maximum allowed by the CAA. Most plastic parts and products sources would need this 3 year maximum period of time to develop and test reformulated coatings, particularly those that may opt to comply using a different lower-emitting coating technology. In addition, time would be needed to establish records management systems required for enforcement purposes.

For new sources, the CAA requires compliance with standards immediately upon startup or the effective date of the final rule, whichever is later.

1.4.2 Compliance Options for Meeting Emission Limits

There are three proposed options for complying with the proposed emission limits, and the testing and initial compliance requirements vary accordingly. You may choose to use one compliance option for the entire affected source, or you may use different compliance options for different coating operations within the affected source. You may also use different compliance options for the same coating operation at different times.

1.4.2.1 Option 1: Compliant Materials

This option is a pollution prevention option that allows you to easily demonstrate compliance by using low-HAP or non-HAP coatings and other materials. If you use coatings that, based on their organic HAP content, individually meet the kg (pound (lb)) organic HAP emitted per kg (lb) coating solids used levels in the applicable emission limits and you use non-HAP thinners and other additives and cleaning materials, this compliance option is available to you. For this option, we have minimized recordkeeping and reporting requirements. You can demonstrate compliance by using readily available purchase records, the amount of each material (if needed) and material safety data sheets (MSDS) or other manufacturer's reformulation data to determine the organic HAP content. You would not need to perform any detailed emission rate calculations. For more information on the compliance limits and the methods to demonstrate compliance with these limits, refer to the preamble or the proposed rule.

1.4.2.2 Option 2: Compliance Based on the Emission Rate without Add-on Controls

This option is, like Option 1, a pollution prevention option. Option 2 allows you to demonstrate compliance based on the organic HAP contained in the mix of coatings, thinners and other additives, and cleaning materials you use. This option allows you the flexibility to use some individual coatings that do not, by themselves, meet the kg (lb) organic HAP emitted per kg (lb) coating solids used levels in the applicable emission limits if you use other low-HAP or non-HAP coatings such that overall emissions from the affected source over a 12-month period meet the emission limits. You must use this option if you use

HAP-containing thinners, other additives, and cleaning materials and do not have add-on controls. You would keep track of the mass of organic HAP in each coating, thinner or other additive, and cleaning material, and the amount of each material you use in your affected source each month of the compliance period. You would use this information to determine the total mass of organic HAP in all coatings, thinners and other additives, and cleaning materials divided by the total mass of coating solids used during the compliance period. You would demonstrate that your emission rate(in kg (lb) organic HAP emitted per kg (lb) coating solids used) meets the applicable emission limit. You can use readily available purchase records, including manufacturer's formulation data, to determine the amount of each coating or other material you used and the organic HAP in each material. The proposed rule contains equations that show you how to perform the calculations to demonstrate compliance. For more information on the compliance limits and the methods to demonstrate compliance with these limits, refer to the preamble or the proposed rule.

1.4.2.3 Option 3: Emission Rate with Add-on Controls Option

This option allows sources to use a capture system and an add-on pollution control device, such as a combustion device or a recovery device, to meet the emission limits. While we believe that, based on typical emission characteristics, most sources will not use control devices, we are providing this option for sources that can use control devices. Fewer than 10 percent of the existing sources for which we have data use control devices and may continue using the control devices for compliance with the proposed standards. Under this option, testing is required to demonstrate the capture system and control device efficiency. Alternatively, you may conduct a liquid-liquid material balance to demonstrate the amount of organic HAP collected by your recovery device. The proposed rule provides equations showing you how to use records of materials usage, organic HAP contents of each material, capture and control efficiencies, and coating solids content to calculate your emission rate during the compliance period.

If you demonstrate compliance based on this option, you would demonstrate that your emission rate considering controls (in kg (lb) organic HAP emitted per kg (lb) of coating solids used) is less than the applicable emission limit. For more information on the compliance limits and the test methods to demonstrate compliance with these limits, refer to the preamble or the proposed rule.

1.4.3 Operating Limits

As mentioned above, you would establish operating limits as part of the initial performance test of a capture system and control device other than a solvent recovery system for which you conduct liquid-liquid material balances. The operating limits are the minimum or maximum (as applicable) values achieved for capture systems and control devices during the most recent performance test, conducted under representative conditions, that demonstrated compliance with the emission limits.

The proposed rule specifies the parameters to monitor for the types of emission control systems commonly used in the industry. You would be required to install, calibrate, maintain, and continuously operate all monitoring equipment according to manufacturer's specifications and ensure that the continuous parameter monitoring systems (CPMS) meet the requirements in §63.4568 of the proposed rule. If you use control devices other than those identified in the proposed rule, you would submit the operating parameters to be monitored to the Administrator for approval. The authority to approve the parameters to be monitored is retained by EPA and is not delegated to States. For more information on the operating limits and the procedures to demonstrate compliance with these limits, refer to the preamble or the proposed rule.

If you use a capture system and control device for compliance, you would be required to develop and implement on an ongoing basis a work practice plan for minimizing organic HAP emissions from storage, mixing, material handling, and waste handling operations. This plan would include a description of all steps taken to minimize emissions from these sources (e.g., using closed storage containers, practices to minimize emissions during filling and transfer of contents from containers, using spill minimization techniques, placing solvent-laden cloths in closed containers immediately after use, etc.). You would have to make the plan available for inspection if the Administrator requests to see it.

If you use a capture system and control device for compliance, you would be required to develop and operate according to a designed plan during periods of startup, shutdown, or malfunction of the capture system and control device.

1.5 Continuous Compliance Provisions

1.5.1 Emission Limits

If you use the compliant materials option (Option 1), you would demonstrate continuous compliance if each coating meets the applicable emission limit and you use no organic HAP-containing thinners, other additives, or cleaning materials. If you use the emission rate without add-on controls option (Option 2), you would demonstrate continuous compliance if, for each 12-month compliance period, the ratio of kg (lb) organic HAP emitted to kg (lb) coating solids used is less than or equal to the applicable emission limit. You would follow the same procedures for calculating the organic HAP emitted to coating solids ratio that you used for the initial compliance period.

For each coating operation on which you use a capture system and control device (Option 3) other than a solvent recovery system for which you conduct a liquid-liquid material balance, you would use the continuous parameter monitoring results for the month as part of the determination of the mass of organic HAP emissions. If the monitoring results indicate no deviations from the operating limits and there were no bypasses of the control device, you would assume the capture system and control device are achieving the same percent emission reduction efficiency as they did during the most recent performance test in which compliance was demonstrated. You would then apply this percent reduction to the total mass of organic HAP in materials used in the controlled coating operations to determine the emissions from those operations during the month. If there were any deviations from the operating limits during the month or any bypasses of the control device, you would account for them in the calculation of the monthly emissions by assuming the capture system and control device were achieving zero emission reduction during the periods of deviation. Then you would determine the organic HAP emission rate by dividing the total mass of organic HAP emissions for the 12-month compliance period by the total mass of coating solids used during the 12-month compliance period. Every month, you would calculate the emission rate for the previous 12-month period.

1.5.2 Operating Limits

If you use a capture system and control device, the proposed rule would require you to achieve on a continuous basis the operating limits you establish during the performance test. If the continuous monitoring shows that the capture system and control device are operating outside the range of values established during the performance test, you have deviated from the established operating limits.

If you operate a capture system and control device with bypass lines that could allow emissions to bypass the control device, you would have to demonstrate that captured organic HAP emissions within the affected source are being routed to the control device by monitoring for potential bypass of the control device.

If you use an emission capture system and control device for compliance, you would be required to implement, on an ongoing basis, the work practice plan you developed during the initial compliance period. If you did not develop a plan for reducing organic HAP emissions or you do not implement the plan, this would be a deviation from the work practice standard.

If you use a capture system and control device for compliance, you would be required to operate according to your designed plan during periods of startup, shutdown, or malfunction of the capture system and control device.

For more information on continuous operating limits and the compliance procedures necessary to meet them, please refer to the preamble or the proposed rule.

1.6 Notification Requirements

Notification requirements for this rule are taken from the General Provisions notification requirements in subpart A of 40 CFR 63 for NESHAPs. They include: initial notifications, notification of performance test if you are complying using a capture system and control device, notification of compliance status, and additional notifications required for affected sources with continuous monitoring systems. The General Provisions also require certain records and periodic reports. For more information on the recordkeeping requirements, notifications, periodic reporting, and for startups, shutdowns, and malfunctions, please refer to the preamble or the ICR supporting statement in the public docket.

1.7 Rationale for Selecting the Proposed Standards

1.7.1 Selection of Source Category and Subcategories

The surface coating of plastic parts and products is a source category that is on the list of source categories to be regulated because it contains major sources which emit or have the potential to emit at least 9.07 Mg (10 tons) of any one HAP or at least 22.7 Mg (25 tons) of any combination of HAP annually. The proposed rule would control organic HAP emissions from both new and existing major sources. Area sources are not being regulated under this proposed rule.

The plastic parts and products surface coating category consists of facilities that apply protective or decorative coatings and adhesive coatings to plastic parts and products through a post-mold coating process. The surface coating of plastic parts and products includes any facility engaged in the surface coating of plastic parts or products, including panels, housings, bases, covers, and other components formed of synthetic polymers. We use the plastic parts and products lists contained in the Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) code descriptions to describe the vast array of plastic parts and products.

Due to the broad scope of the plastic parts and products surface coating source category, the source category definition likewise needs to be broad in order to include the varieties of operations and activities that might occur at these facilities. However, a broad description has the potential to unintentionally include surface coating operations that we would not consider to be part of the source category. We intend the source category to include facilities for which the surface coating of plastic parts and products is either their principal activity or an integral part of a production process that is the principal activity. Most coating operations are located at plant sites that are dedicated to these activities. However, some may be located at sites for which some other activity is principal, such as automobile assembly plants that coat plastic automobile parts or accessories off the assembly line. Co-located surface coating operations comparable to the types and sizes of the dedicated plastic parts surface coating facilities, in terms of the coating operation and applicable emission control techniques, are included in the source category.

We reviewed the available data and information to identify a descriptor common to sources we intended to include in the category that would further help to describe the category. Based on our review, we believe the quantity of coating used is the most equitable descriptor for purposes of defining the scope of the category. This source category only includes facilities that use at least 100 gallons of coatings. Other descriptors that could have been used but were rejected because they would either be too difficult to implement or they are not as equitable as coating usage include production rate, quantity of emissions, and solvent usage.

The source category does not include research or laboratory facilities or janitorial, building, and facility maintenance operations, or hobby shops that are operated for personal rather than commercial purposes. The source category also does not include coating of magnet wire, coating of plastics to produce fiberglass boats (except the post-mold coating of personal watercraft or their parts), or the extrusion of plastic onto a plastic part or product to form a coating. These activities and operations are not comparable to the types and sizes of the dedicated facilities in terms of coating operations and applicable control techniques and are regulated or are being considered for regulation as part of other source categories. Thus, they are not considered to be within the scope of the source category. The post-mold coating of personal watercraft and their parts is considered within the scope of the source category.

The source category also does not include certain other coatings of plastic parts and products that are already being, or would be, regulated by another NESHAP as part of a different source category.

The statute gives us discretion to determine if and how to subcategorize. Once the floor has been determined for new or reconstructed and existing affected sources for a source category or subcategory, we must set MACT standards that are no less stringent than the MACT floor. Such standards must then be met by all sources within the source category or subcategory. A subcategory is a group of similar sources within a given source category. As part of the regulatory development process, we evaluate the similarities and differences between industry segments or groups of facilities comprising a source category. In establishing subcategories, we consider factors such as process operations (type of process, raw materials, chemistry/formulation data, associated equipment, and final products); emission characteristics (amount and type of HAP); control device applicability; and opportunities for pollution prevention. We may also consider existing regulations or guidance from States and other regulatory agencies in determining subcategories.

After reviewing survey responses from the industry, facility site visit reports, and information received from stakeholders meetings, we found that the plastic parts and products surface coating industry could be grouped into four subcategories: (1) general use coating, (2) TPO coating, (3) headlamp coating, and (4) assembled on-road vehicle coating. The general use coating subcategory includes all plastic parts and products coating operations except TPO, headlamp, and assembled on-road vehicle coating. This includes operations that coat a wide variety of substrates, surfaces, and types of plastic parts, as well as more specialized coating scenarios. Each of the subcategories includes coating operations, including associated surface preparation, equipment cleaning, mixing and storage, and waste handling.

The TPO coating is considered a separate subcategory from other plastic parts and products coating operations because the surface coating of TPO substrates requires the use of an adhesion promoter in order to apply subsequent coatings to the substrate. Headlamp coating is considered as a separate subcategory because these coating operations require specialized reflective argent coatings and hard clear coatings to meet U.S. Department of Transportation Motor Vehicle Safety Standards for reflectivity, brightness, color, and other performance criteria. Assembled on-road vehicle coating is considered a separate subcategory because these coating operations are performed on fully-assembled vehicles that may contain heat sensitive parts. In addition, fully assembled on-road vehicles are physically larger than the other parts and products coated in this source category. The large size and presence of heat sensitive parts make certain lower-HAP technologies, such as heat-cured waterborne coatings, not feasible for use on fully assembled on-road vehicles and make it technically difficult for these sources to achieve the same emission level as sources that do not coat assembled on-road vehicles. An assembled on-road vehicle coating operation is considered part of this subcategory if greater than 50 percent of the surface being coated on a vehicle is plastic.

1.8 Selection of Affected Source within Selected Source Category and Subcategories

When emission standards are based on a collection of emissions sources or total facility emissions, we select an affected source based on that same collection of emission sources or the total facility as well. This approach for defining the affected source broadly is particularly appropriate for industries where a single emission standard encompassing multiple emission points within the plant provides the opportunity and incentive for owners and operators to utilize control strategies that are more cost effective than if separate standards were established for each emission point within a facility.

The affected source for these proposed standards is broadly defined to include all operations associated with the coating of plastic parts and products and the cleaning of products, substrates or coating operation equipment in a subcategory (i.e., TPO coating, headlamp coating, assembled on-road vehicle coating, or general use coating). These operations include storage and mixing of coatings and other materials; surface preparation of the plastic parts and products prior to coating application; coating application and flash-off, drying and curing of applied coatings; cleaning operations; and waste handling operations.

Because we are assuming that all the organic HAP in the materials entering the affected source are volatilized (emitted), emissions from operations occurring within the affected source (e.g., mixing operations and storage) are accounted for in the estimate of total materials usage at the affected source. A broad definition of the affected source was selected to provide maximum flexibility in complying with the proposed emission limits for organic HAP. In planning its compliance, each facility can select among available coatings, thinners and other additives, and cleaning materials, as well as the use of emissions capture and add-on control systems, to comply with the emission limits for each subcategory in the most cost-effective manner. Additional information on the plastic parts and products surface coating operations selected for regulation, and other operations, are included in the docket for the proposed standards.

The MACT floor analysis was performed using a sourcewide emission rate approach for each of the four subcategories mentioned above. Because organic HAP emissions are directly related to the materials used by these sources, and since it is very difficult to estimate the emissions that occur in any one area within the affected source, an emission rate approach for affected sources in each subcategory is the most feasible way to determine emission limits. The emission rate approach covers the emissions from all areas within the affected source for each subcategory.

To determine the existing and new source MACT floor for each subcategory, we determined the organic HAP emission rate for each facility in units of kg (lb) organic HAP emitted per kg (lb) of coating solids used for each subcategory. We then ranked the sources in each subcategory from lowest to highest emission rate to identify the best-performing sources. We then used information obtained from industry survey responses and subsequent changes and clarifications received from facilities to estimate the sourcewide organic HAP emission rate from each survey respondent. If add-on controls were reported, their capture and control efficiencies were taken into account. Both major and “synthetic minor” sources were included in the population for determining MACT floor emission limits.

Table 1-1 above provides the MACT floor emission limits for existing sources by subcategory. These limits were reviewed to assess the achievability of the emissions levels by affected sources, and it was determined that all sources could achieve the existing source MACT floor emission rate for their subcategory. For more information, please refer to the public docket.

Table 1-2 above provides the MACT floor emission limits for new sources by subcategory. As one can see by comparison of Tables 1 and 2, the new source MACT floor emission limits are the same as the existing source limits for the general use coating and the assembled on-road vehicle coating subcategories. The new source MACT levels are more stringent for the other two subcategories.

For the general use coating subcategory, the existing and new source MACT floors are the same because none of the sources with emissions rates lower than the existing source MACT floor emission rates represent a similar source that could establish a new source level for the range of new sources in the subcategory. For the assembled on-road vehicle coating subcategory, the existing and new source MACT floors are the same because the diversity of sources is such that those sources emission rates lower than the existing source MACT level are not representative of the possible range of new sources in the subcategory. This determination is based on review of coating operations observed by EPA during site visits and among facilities in the MACT database.

For the TPO subcategory, the new source MACT floor is more stringent than the existing source MACT level because the best-performing single source uses a coating process that can be feasibly employed on TPO substrates at other facilities. For the headlamp coating subcategory, the new source MACT floor is more stringent than the existing source MACT level because the best-performing single source uses coating processes that the Agency believes are feasible for new coating processes. These processes coat automotive headlamps utilizing low-HAP, ultraviolet (UV)-cure clearcoat technology and vacuum metallizing technology on the reflective lamp bodies.

1.9 Beyond the Floor Alternatives

The Agency is required to establish MACT floors for NESHAPs established under Title III of the Clean Air Act Amendments of 1990. The Agency can, however, set these standards beyond the MACT floor. We do this by identifying and considering any reasonable regulatory alternatives that are beyond the floor, taking into account emission reductions, cost, non-air quality health and environmental impacts, and energy requirements. These alternatives may be different for new and existing sources, and separate standards may be established for new and existing sources.

No options beyond the MACT floor could be identified for the general use coating subcategory and the assembled on-road vehicle subcategory that were technically feasible for all new or existing facilities.

For the TPO coating subcategory, we are not requiring beyond the floor emission reductions. The use of a waterborne coating technology was identified as a beyond the floor option, but was not recommended as such since the Agency determined that the additional cost of going beyond the floor is not warranted at this time without a further evaluation of health and environmental risks. This is due to the high cost of retrofitting an existing TPO source with the waterborne coating technology and the small additional emission reduction beyond the MACT floor level.

For the headlamp coating subcategory, we are not requiring beyond the floor emission reductions. The use of low-HAP UV-cure clearcoat and vacuum metallizing were considered but not recommended as beyond the floor options because requiring existing sources to switch to these technologies could require costly retrofits to an existing headlamp coating operation. The Agency then determined that the additional cost of going beyond the floor is not warranted at this time without a further evaluation of health and environmental risks.

Add-on controls were also reviewed to identify beyond the floor options, but no controls of this type were found to be technically feasible generally for any of the four subcategories. Therefore, add-on controls were not considered as a beyond-the-floor option.

Therefore, we base the proposed standards for existing sources on the existing source MACT floors for the subcategories, and the same is true for new sources.

For more information, please refer to the MACT floor memorandum in the public docket (Burlew, 2002).

1.10 Format of the Proposed Standards

The format of the proposed standards is an emission rate expressed as the mass of organic HAP emitted per mass of coating solids used. This format would allow coating operators flexibility in choosing any combination of means (e.g., coating reformulation, use of lower-HAP or non-HAP materials) that is workable to comply with the emission limits.

We selected mass of coating solids used as a component of the proposed format to normalize the rate of organic HAP emissions across all sizes and types of facilities. We also selected kg (lb) organic HAP emitting per kg (lb) coating solids used because this is consistent with the data available though Material Safety Data Sheets and other manufacturer's formulation data. Considering the primary means of compliance will likely be low- and no-HAP coatings and other materials, this format best ensures comparable control levels being achieved by all affected sources. Also, this format allows sources flexibility to use a combination of emission capture and control systems, as well as low-HAP content coatings and materials.

In lieu of emissions standards, section 112(h) of the CAA allows work practice standards or other requirements to be established when a pollutant cannot be emitted through a conveyance or capture system, or when measurement is not practicable because of technological and economic limitations. Many plastic parts and products facilities use some type of work practice measure to reduce HAP emissions from mixing, cleaning, storage, and waste handling areas as part of their standard operations. However, we do not have data to quantify accurately the emission reductions achievable by such measures.

1.11 Testing and Initial Compliance Requirements

The proposed standards allow you to choose among several options to demonstrate compliance with the organic HAP limits: compliant materials (i.e., coatings and other materials with low or no organic HAPs); emission rate without add-on controls, or emission rate with add-on controls.

For the compliant materials option, the source must document the organic HAP content of all coatings on an as-received basis and show that each is less than the applicable emissions limit. Manufacturer's formulation data can be used to demonstrate the HAP content of each material and solids content of each coating. For more information on this option and test methods used to identify organic HAP and solids content, refer to the preamble or the monitoring rationale memo in the public docket (Burlew, 2002).

For the emission rate with add-on controls option, you would be required to conduct an initial performance test of the system to determine its overall control efficiency using EPA Method 25 or 25A depending on the type of control device and outlet concentration. Capture efficiency would also have to be determined using various EPA Methods (204 and 204A – 204F). For a solvent recovery system for which you conduct a liquid-liquid material balance, you would determine the quantity of volatile matter applied and the quantity recovered during the initial compliance period to determine its overall control efficiency. For both cases, the overall control efficiency would be combined with the monthly mass of organic HAP in the coatings and other materials used to calculate the monthly organic HAP emissions in kg (lb) HAP emitted. The monthly amount of coating solids in kg (lb) would also be determined. For more information on this option and test methods, refer to the preamble or memos in the public docket (Burlew, 2002).

1.12 Costs and Emission Reductions of the Proposed Standards

1.12.1 Cost Estimates

The total capital cost for existing sources is estimated to be $804,000. These costs include monitoring costs. These capital costs are primarily based on all existing source facilities to purchase stainless steel application equipment in order to meet the emission limits. The nationwide annualized costs include the costs for facilities to purchase reformulating coatings along with the administrative, insurance, capital recovery, and taxes and overhead associated with the capital investment. The annualized costs, including monitoring, recordkeeping, and reporting, for existing sources is estimated to be about $10.7 million (1997$). This The total capital cost for new sources is estimated to be $28,000.

These costs include monitoring costs. The nationwide annual costs, including monitoring, recordkeeping, and reporting, for existing sources is estimated to be about $194,000 (1997$). New sources are assumed to incur a capital cost associated with using application equipment made of stainless steel to resist corrosion that might occur if using low-HAP, waterborne coatings. New sources will also incur an annual cost increase associated with purchasing reformulated lower-HAP coatings. The costs for new sources are also based on an estimate of six new sources being constructed within 5 years after issuance of the final standards. This estimate comes from a growth projection for new sources in this industry of 4 percent over a 5 year period. This estimate was based on reviewing Census data for the major SIC/NAICS codes represented in the plastic parts existing source database.

This 4 percent growth projection was applied to the number of existing sources mapped to each model plant to determine how many new facilities are expected for each model over the 5 year period. After rounding to discount any fractional results, this calculation estimates six new facilities over the 5 year period. For more information on the methodology used to estimate the number of affected new sources, please refer to the growth methodology memo in the public docket.

These costs, as well as the emissions reductions, are calculated assuming the majority of source would comply by using lower-HAP or non-HAP containing coatings and cleaning materials because such materials are generally available, and add-on controls would not, as mentioned above, be technically feasible for typical facilities. We also assumed that facilities currently equipped with add-on controls would continue to operate these systems and would perform the required performance tests and parameter monitoring.

1.12.2 Emissions and Emission Reductions Estimates

The 1997 nationwide baseline organic HAP emissions for the 202 existing major source plastic parts and products surface coatings facilities of which EPA is aware are estimated to be 9,820 tons per year. Implementation of the emissions standards as proposed would reduce these emissions by 7,560 tons per year, or about 80 percent. As mentioned earlier in Section 1.2.2, the major HAP emitted from the plastic parts and products surface coating industry include MEK, MIBK, toluene, and xylenes. These compounds account for over 85 percent of the nationwide HAP emissions from this source category. Other HAP identified in emissions include ethylene glycol monobutyl ether (EGBE) and glycol ethers.

For new sources, nationwide baseline organic HAP emissions are estimated at 520 tons per year. Implementation of the emissions standards as proposed would reduce these emissions by 440 tons per year, or about 85 percent.

1.13 Health Effects from Exposure to HAP Emissions

The major HAP emitted from the plastic parts and products surface coating industry include MEK, MIBK, toluene, and xylenes. Other HAP identified in emissions include ethylene glycol monobutyl ether and glycol ethers. The HAP that would be controlled with this proposed rule are associated with a variety of adverse health effects. These adverse health effects include chronic health disorders (e.g., birth defects and effects on the central nervous system, liver, and heart), and acute health disorders (e.g., irritation of the lung, skin, and mucous membranes, and effects on the central nervous system).

We do not have the type of current detailed data on each of the facilities covered by the proposed emission standards for this source category, and the people living around the facilities, that would be necessary to conduct an analysis to determine the actual population exposures to the HAP emitted from these facilities and potential for resultant health effects. Therefore, we do not know the extent to which the adverse health effects described above occur in the populations surrounding these facilities. However, to the extent the adverse effects do occur, the rule would reduce emissions, subsequent exposures, and associated health effects.

SECTION 2

INDUSTRY PROFILE

2.1 Introduction

The U.S. Environmental Protection Agency's (EPA's) National Emission Standards for Hazardous Air Pollutants (NESHAP) will regulate organic hazardous air pollutant (HAP) emissions released during surface coating operations of plastic parts and products. The plastic parts and products surface coating category consists of facilities that apply protective, decorative, or functional coatings and adhesives to plastic substrates through a post-mold coating process only. These goods fall into two major product groups: automotive/transportation and business machines/electronics. In addition to these groups, surface-coated plastic parts are incorporated in a wide range of miscellaneous products, ranging from toys to signs, that are also covered by the NESHAP. Table 2-1 provides a listing of the products produced by affected entities, and the respective six-digit North American Industry Classification System (NAICS) codes of the industries to which those entities belong. This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be covered by this NESHAP.

Plastic parts surface coating may be performed by

- captive operators in the same organization as the product manufacturer,
- commercial suppliers that fabricate and coat plastic parts and sell them to the product manufacturer,
- commercial suppliers that surface-coat plastic parts on a toll basis for the product manufacturer, or
- commercial suppliers that coat plastic parts and products as part of refurbishment (EPA, 1994).

The economic effects of the rule are conditional on the technology for producing the plastic parts and their costs of production; the value of the parts to users; and the organization of the industries engaged in plastic parts production, coating, and use. This

Table 2-1. Industries Manufacturing Surface-Coated Plastic Parts

Includes Manufacturing of:	NAICS Code
Automobile and Truck Parts	
Automobile manufacturing	336111
Light truck and utility vehicle manufacturing	336112
Heavy duty truck manufaturing	336120
Motor vehicle body manufacturing	336211
Motor home manufacturing	336213
Travel trailer and camper manufacturing	336214
Vehicular lighting equipment manufacturing	336321
Other motor vehicle electrical and electronic equipment manufaturing	336322
Motor vehicle steering and suspension component (except spring) manufacturing	336330
Motor vehicle brake system manufacturing	336340
All other motor vehicle parts manufacturing	336399
Motorcycles, bicycles, and parts manufacturing	336991
Military armored vehicle, tank, and tank component manufacturing	336992
All other transportation equipment manufacturing	336999
Business Machine and Computer Equipment Parts	
Office machinery manufacturing	333313
Electronic computer manufacturing	334111
Computer terminal manufacturing	334113
Other computer peripheral equipment manufacturing	334119
Watch, clock, and part manufacturing	334518
Lead pencil and art good manufacturing	339942
Miscellaneous Products	
Plastics pipe and pipe fitting manufacturing	326122
Polystyrene foam product maufacturing	326140
Urethane and other foam product (except polystyrene) manufacturing	326150
All other plastics product manufacturing	326199
Residential electric lighting fixture manufacturing	335121
Laboratory apparatus and furniture manufacturing	339111

(continued)

Table 2-1. Industries Manufacturing Surface-Coated Plastic Parts (continued)

Includes Manufacturing of:	NAICS Code
Miscellaneous Products (continued)	
Costume jewelry and novelty manufacturing	339914
Sporting and athletic goods manufacturing	339920
Doll and stuffed toy manufacturing	339931
Game, toy, children’s vehicle manufacturing	339932
Sign manufacturing	339950
Musical instrument manufacturing	339992

Note: The above list is not meant to be an exhaustive list of affected industries, but rather a list to illustrate the types of industries likely to be affected by this rule.

Source: U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: The Bridge Between NAICS and SIC. <http://www.census.gov/epcd/ec97brdg/>. Last updated on June 27, 2000.

profile provides background information on these topics organized within a conventional economic framework.

- Section 2.2 includes a description of surface coating processes for plastic parts, with discussions of the processes and inputs, types of coated plastic parts, the costs of coating, and the characteristics of coating facilities.
- Section 2.3 describes the characteristics, uses, and consumers of surface-coated plastic parts and substitution possibilities in consumption.
- Section 2.4 discusses the industry’s organization and provides information on market structure, and companies that own potentially affected plants. Special attention is given to data on small businesses for future use in evaluating the impact on these entities as required by the Small Business Regulatory Enforcement and Fairness Act (SBREFA) and the Regulatory Flexibility Act (RFA).
- Section 2.5 presents data on trends in the markets for goods for which surface-coated plastic parts are an input. The section includes data on production, consumption, net exports, and prices in industries affected by this NESHAP.

2.2 Production, Costs, and Producers

The production of surface-coated plastic parts releases organic HAP emissions. This section describes the types of coated plastic parts and products, the inputs needed for production of those parts, the production process, and the points at which the process generates these emissions. It describes some of the costs associated with producing surface-coated plastic parts. Finally, it characterizes the producers of plastic parts that will be affected by the NESHAP.

2.2.1 Surface Coating of Plastic Parts

The production process characterizes the relationship between the inputs to a productive activity and its output(s). Figure 2-1 illustrates the productive activity of surface coating plastic parts. The appropriate quantities of labor services, materials, energy, and capital services are combined according to the relevant rules of production to produce a given quantity of surface-coated parts, where pollutants (organic HAPs) are a by-product of that activity. The quantity of pollutants that result from the surface coating process is a direct result of the combination of inputs used in that process. The pollutants may or may not be emitted into the atmosphere depending on the efficiency of pollution abatement activities. This section describes the surface coating process in terms of the products that result from the surface coating process, the characteristics of production inputs, and the characteristics of the coating process itself.

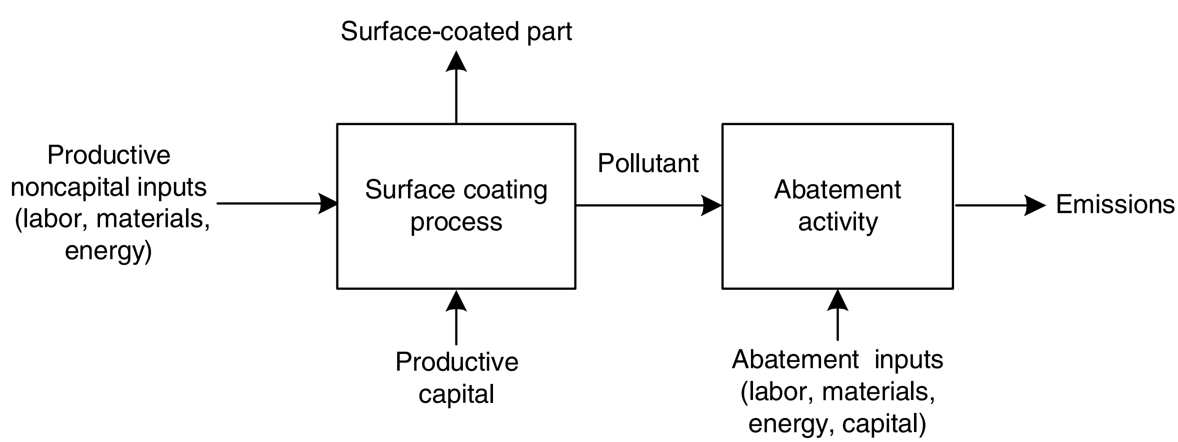

Figure 2-1. The Firm's Production Diagram

2.2.1.1 Surface-Coated Plastic Parts

Surface-coated plastic parts include automobile and light duty truck parts (including other small passenger motor vehicles like motorcycles and golf carts), business machine and computer equipment parts, and some miscellaneous plastic parts ranging from laboratory apparatus to toys.

Automobile and Light Duty Truck Parts. Surface-coated plastic parts are standard components of all passenger vehicles such as cars, light duty trucks, and motorcycles. In 1994, about 8 percent of the average weight of a new passenger car was made of plastic parts (EPA, 1995). The wide variety of automobile and light duty trucks made of plastic or plastic composites includes coated plastic interior parts, exterior body parts, and lighting equipment as well as more functional parts such as gas tanks. In addition, some motorcycle, golf cart, and motor home parts are coated plastic.

Interior Parts. Instrument board assemblies, handles, seat belt parts, air bag covers, dashboards, and door linings are often coated plastic parts.

Exterior Body Parts/Lighting Equipment. Coated plastic parts used on the exterior of automobile bodies include

- body panels, bumpers, grills, fenders, hoods, and wheel covers;
- headlamp and taillight bezels and lamp covers, mirror housings, and windshield frames;
- truck cabs, beds, bodies, and tops; and
- plastic handles, seats and saddles for motorcycles.

Functional Parts. Functional coated plastic vehicle parts include gas tanks, steering assemblies, and suspension parts.

Business Machine and Computer Equipment Parts. Computers, calculating and accounting machines, and other office machines are often encased in plastic housings. Handles, buttons, and other external machine parts are also made of plastic.

Miscellaneous Parts. There is a wide variety of miscellaneous coated plastic parts and products:

- coated plastic wires and plastic housings for electrical outlets;
- laboratory apparatus and furniture;

- musical keyboard housings, piano and keyboard keys and buttons, and entire musical instruments like recorders;
- dolls and stuffed toys, game parts, toys, and children's vehicles;
- sporting and athletic goods, such as helmets, backboards, balls, bicycles, and kayaks;
- aquarium accessories, boxes, brush handles, drums, siding, hardware, lamp bases, tool handles, life jackets, and shutters;
- costume jewelry; and
- signs and advertising display cases.

2.2.1.2 Inputs

The surface coating process requires material inputs as well as labor, capital services, and energy. The primary material inputs into the coating process are plastic parts and coatings. Necessary capital equipment most often includes spray guns, spray booths, conveyor lines, filtration systems, and curing ovens.

Material Inputs.

Plastic Parts. As an input into the coating process, the important characteristics of plastic parts are the type of resin they are made from and their shape and size. The shape and size of the part affect the coating process in that large parts require larger facilities, spray booths, and curing ovens, and parts with complex shaping may require special handling for complete and even coating coverage. The resins used to form plastic parts have certain properties that are critical in determining how to prepare the surface for coating, how well the various coatings will adhere to the surface, and what type of curing methods are appropriate.

Plastic parts that are to be coated are first manufactured out of one of two types of resins: thermoplastic or thermoset. Properties important to surface coaters include solvent resistance and the temperature at which the material can be baked. Tables 2-2 and 2-3 list common thermoplastic resins, thermoset resins, and the abbreviations generally used to describe the different resins.

Table 2-2. Types of Common Thermoplastic and Thermoplastic Elastomer Resins

Resin or Composite	Abbreviation
Acetal	
Acrylic	
Cellulosics	
Ketone-based resins	
Nylon	
Polyarylate	
Polybutylene terephthalate	PBT
Polycarbonate	
Polycarbonate and polybutylene terephthalate (PBT) blend	XENOY
Polyimide	
Polyolefins (blends of polypropylene, polyethylene and its copolymers)	TPO
Polyethylene terephthalate	PET
Polypropylene	PP
Polyphenylene oxide (modified)	PPO
Polyurethane	TPU
Polyvinyl chloride	PVC
Styrenic resins	
Acrylic-styrene-acrylonitrite	ASA
Acrylonitrile butadiene styrene	ABS
Polystyrene	
Styrenic resins (continued)	
Styrene-maleic anhydride	S-Ma
Styrene block copolymer	SBC
Styrene butadiene-styrene	SBS
Styrene-isoprene- styrene	SIS
Styrene-ethylene- butylene-styrene	SEBS
Thermoplastic polyester	TPE[a]

[a] TPE is also used as the abbreviation for the group of resins known as thermoplastic elastomers—a group of specialty rubbers with the processing characteristics of thermoplastics and the elasticity of rubber.

Sources: U.S. Environmental Protection Agency. 1994. *Alternative Control Techniques Document: Surface Coating of Automotive/Transportation and Business Machine Plastic Parts*. EPA 435/R-94-017. Research Triangle Park, NC: U.S. Environmental Protection Agency.

Howlett, Elizabeth. 1998. "Thermoplastic Elastomers in the Auto Industry: Increasing Use and the Potential Implications." *Industry, Trade, and Technology Review* January:28–41.

Table 2-3. Types of Thermoset Resins

Resin or Composite	Abbreviation
Epoxy	
Melamines	
Phenolic	
Polyurathanes	PU
Thermoset polyester	

Coatings. Coatings provide a protective, decorative, or functional film to plastic parts and products. Coatings typically include resins or binders, pigments, carriers, and additives. The resins or binders, pigments, and additives are dissolved in the carrier (i.e., water or solvent) and form the film following evaporation of the carrier.

Resins or binders form the coating film, which adheres flexibly to the surface of the plastic part. Resins or binders are most often polymers—the same types of organic molecules that make up the resins used to form plastic parts.

Pigments are insoluble solids that provide opacity to obscure the surface of a plastic part and add color.

Carriers are organic solvents, liquid carbon dioxide, or water, which facilitate the transference of the other, often solid, coating components to the plastic part.

Additives improve properties such as coalescence, flow, and other properties (University of Missouri-Rolla, 1999). Additives may

- affect the rheological properties of coatings (i.e., their ability to flow),
- speed the curing process,
- ensure pigment dispersion,
- reduce the surface tension of the coating to ensure complete coverage of the part,
- serve as defoamers so that the dried coating surface is free of bubbles, and
- serve as fungicides or bactericides ("Surface Coating," *Encyclopedia Britannica*).

Capital Inputs. The coating process involves capital inputs including coating equipment such as spray booths, filtration systems, spray guns, conveyor lines, and curing ovens and investment in pollution-abatement equipment.

Coating Equipment. Parts to be coated may enter a partially or totally enclosed spray booth either manually or by way of a conveyor. Application of the coating may be accomplished through manual or robotic methods. Figure 2-2 shows powder coating being applied manually in a partially enclosed spray booth. Figure 2-3 shows a spray booth to which parts are delivered by way of a conveyor.

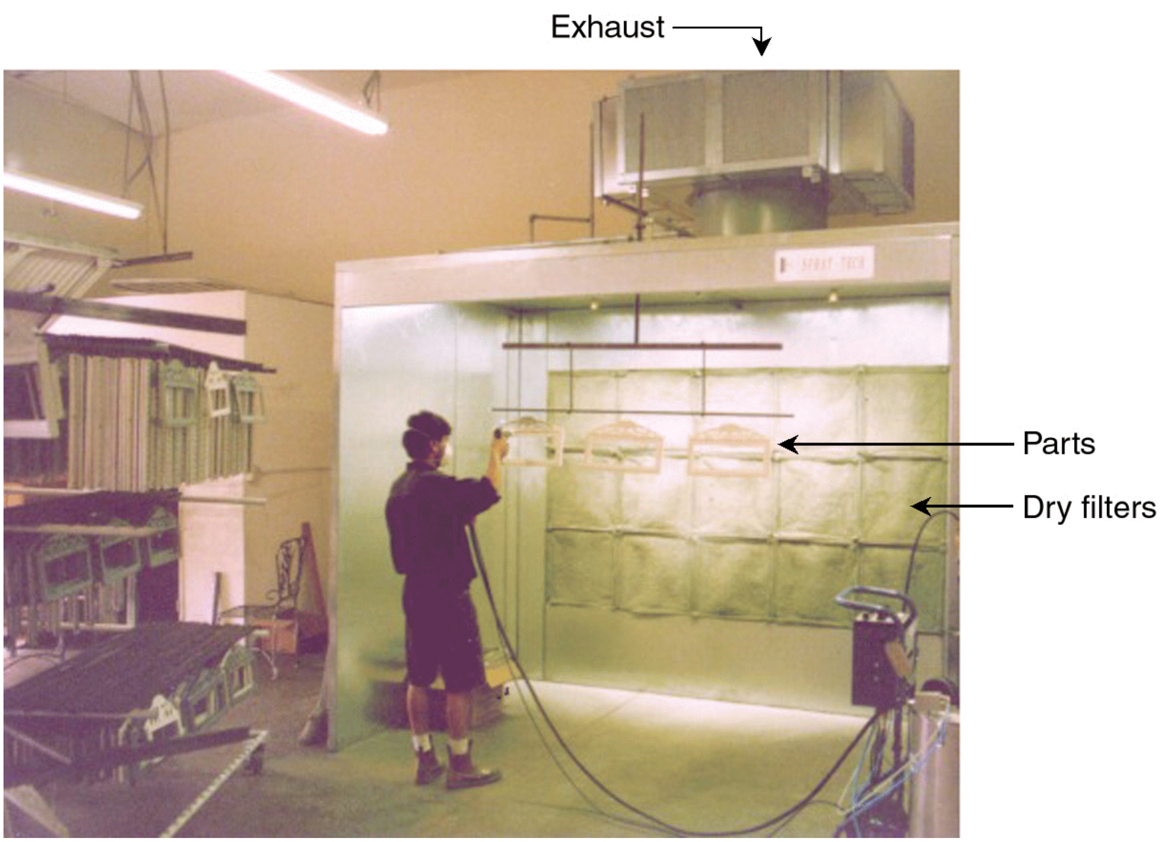

Figure 2-2. Powder Coating Booth

Source: <www.spraytech.com/powder.html>.

Figure 2-3. A Conveyorized Paint Finishing Booth

Source: OBI Spray Booths and Systems Catalog #201-2. Inside Cover.

Pollution-Abatement Equipment. To manage organic HAP emissions resulting from the coating process, additional equipment may be used at some plastic parts surface coating sources. Spray booth filtration systems may be connected to scrubbing towers or carbon absorption filters to extract the emissions from the filtered air. The extracted solvents then are incinerated to keep them from escaping into the atmosphere. The capital equipment associated with managing the solvents released in the coating process requires other inputs such as fuel, energy, and chemicals.

2.2.1.3 The Surface Coating Process

The surface coating of plastic parts includes the following steps:

- preparation of the coating (i.e., mixing with thinners or other additives),
- surface preparation,
- coating application and flash-off,
- drying and/or curing, and
- cleaning of equipment used in surface coating.

Surface Preparation. Once a part is formed, it may require surface preparation to correct flaws, clean residue from the surface, and/or to prepare the surface to receive the coating. Correcting surface flaws is necessary to provide an even surface for the coating, to achieve an aesthetically pleasing final product, and, in some cases, to improve the eventual performance of functioning parts. Correcting surface flaws may involve sanding, puttying, and gassing out plastic parts. Cleaning may include wipe-down (dry or solvent), multistage washing cycles, or deionized water rinses. Finally, masking may be used to prevent unwanted surface coating on specific areas of the part or product.

Coating Application. Coating application methods for plastic parts include brush, dip, flow, spray, vacuum metallizing, and others. Immediately following application plastic parts are usually introduced to a flash-off zone. The flash-off zone is an area where the coating completes its flowing or leveling prior to curing. Figure 2-4 shows an example coating line for a three-coat system.

Drying and/or curing. The drying and/or curing processes for plastic parts includes ambient, elevated temperature, forced-air, radiation-cure, and ultraviolet light. The proper curing conditions for each coating, including temperature, residence time in an oven or under a lamp, and humidity depend on the type of coating used and the characteristics of the substrate coated. After curing at elevated temperatures, coated parts enter a cool-down zone where they remain until cool enough for further handling (EPA, 1998).

Equipment Cleaning. Cleaning is performed on the equipment for a variety of reasons to include flushing of the paint lines and application equipment for color changes, housekeeping, etc. The specific solvent used to clean the equipment will vary depending on the type of material (i.e., waterborne, solventborne, etc.) being applied with the equipment. Commonly used cleaning materials include water, butyl acetate, acetone, xylene, and water-based peel-off cleaner.

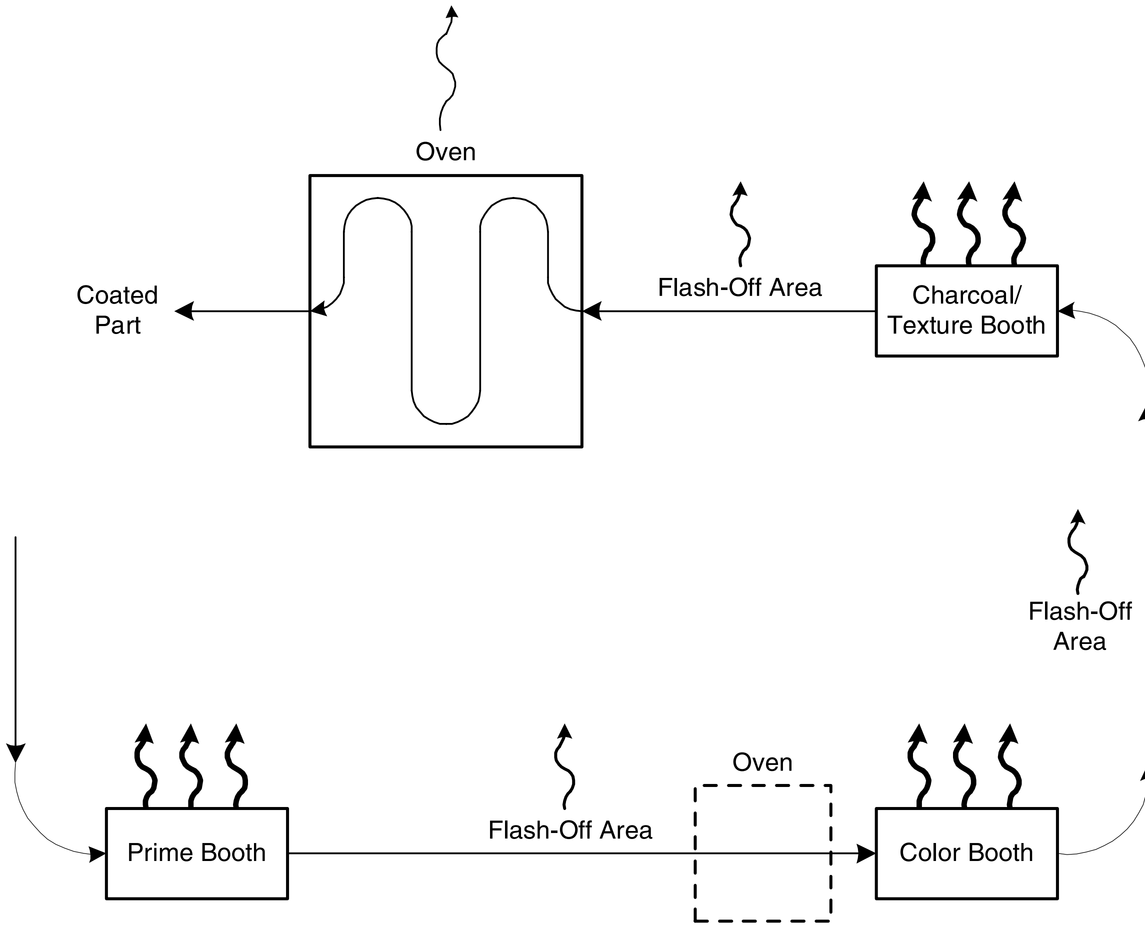

Figure 2-4. Example Coating Line for Three-Coat System

Source: U.S. Environmental Protection Agency. 1994. *Alternative Control Techniques Document: Surface Coating of Automotive/Transportation and Business Machine Plastic Parts*. EPA 435/R-94-017. Research Triangle Park, NC: U.S. Environmental Protection Agency.

2.2.1.4 Emissions

Solvents used in the surface coating of plastic parts and products contain organic HAP that may evaporate into the atmosphere. Generally, 100 percent of the organic HAP in the materials used for surface coating of plastic parts and products are emitted. However, in some adhesives a portion of the organic HAP may become part of the film through a chemical reaction and are not emitted. Finally, some of the affected entities may capture and incinerate the organic HAP emissions.

2.2.2 *Costs of Surface Coating*

The (opportunity) costs of production depend on whether the productive activity is characterized by the existence of a fixed factor such as plant and equipment whose quantity cannot be varied over the time frame of analysis or whether the activity is in the planning stage. In the former short-run case, there is no cost to using the fixed input and for any output rate, the (minimum) total costs of production are simply

$$C_x = P_n Q_{nx}^{*} + P_m Q_{mx}^{*} + P_g Q_{gx}^{*}, \tag{2.1}$$

assuming that the fixed factor is capital. However, although the cost of the fixed factor is not included in the costs of production, the cost is conditional on the quantity of the fixed input available since it influences the productivity of the other inputs. The * denotes that these are the minimum cost quantities of the inputs for a given output rate. The abatement costs for existing controls are similarly calculated.

In the planning long-run case, all costs are variable and the cost of the fixed factor (e.g., capital services) must be included: PkQkx*. In the intermediate-run case when there is the opportunity to use the fixed input in another application, this foregone opportunity is also part of the cost of production.

The cost function describes the relationship between the minimum costs of production and alternative output rates. Figure 2-5 shows a typical textbook characterization of a short-run unit cost function.

For existing suppliers of surface coating services, the primary fixed input is the capital equipment used. This includes washing systems, spray booths and/or plating vats, conveyor lines and hoists, spray guns and pumping systems, filtration systems, reclaim systems, curing ovens and incinerators, and other pollution abatement equipment.

Variable inputs include labor used for both production and pollution abatement, coatings and other chemical solutions, uncoated plastic parts and products, fuels, and purchased electricity. Total costs of the variable inputs used by industries that produce, coat, and use plastic parts and products are provided in Table 2-4. Plastic parts and products prices are not included because they are usually produced in-house or delivered to the coater for coating on a toll basis, so the price for the parts is not readily available. Note that the table provides industry data on costs rather than costs only for firms that coat plastic parts and products. The costs reported are much larger than the actual costs of surface coating.

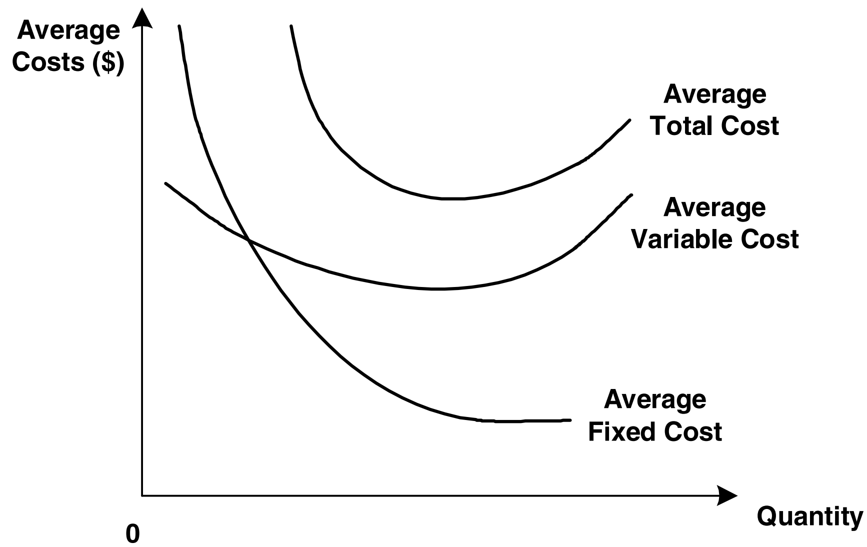

Figure 2-5. Short-Run Unit Cost Function

For any existing supplier of plastic parts surface coating services, the costs of production depend on the supplier's purchase of variable inputs and the opportunity cost of owning capital equipment. EPA regulations result in changing a facility's minimum cost quantities of some inputs, often both variable inputs and capital equipment.

2.2.3 Suppliers of Plastics Parts Coating Services

EPA has identified 202 existing facilities that coat plastic parts and products, which would be directly affected by the rule. Of these 202 facilities, EPA had sufficient data to allow costs to be estimated for 185 facilities. These 185 facilities are the facilities covered by this study. Table 2-5 shows the location of the facilities by state.

These suppliers of plastic parts coating services are as varied as the parts themselves. They range from small single-facility firms with annual revenues in the hundreds of thousands of dollars to facilities owned by large automobile manufacturers with total revenues in the hundreds of billions of dollars.

Table 2-4. Production Costs of Industries Producing Coated Plastic Parts: 1997

Industry	NAICS Code	Labor: Total Employment	Labor: Total Payroll ($\$10^3$)	Cost of Materials ($\$10^3$)	Total Capital Expenditures ($\$10^3$)
Automobile and Truck Parts					
Automobile manufacturing	336111	114,060	6,411,952	66,546,225	3,355,800
Light truck and utility vehicle manufacturing	336112	94,033	5,361,980	70,927,268	1,769,649
Heavy duty truck manufacturing	336120	28,214	1,190,164	10,306,435	120,735
Motor vehicle body manufacturing[a]	336211	1,722	54,000	200,324	8,086
Motor home manufacturing	336213	17,936	503,294	2,679,768	49,753
Travel trailer and camper manufacturing	336214	32,036	770,504	2,724,961	62,502
Gasoline engine and engine parts manufacturing	336312	81,160	3,550,770	17,847,864	1,750,675
Vehicular lighting equipment manufacturing	336321	16,506	628,534	1,686,309	169,235
Other motor vehicle electrical and electronic equipment manufacturing[b]	336322	30,489	1,048,438	4,096,932	239,147
Motor vehicle steering and suspension component (except spring) manufacturing	336330	48,625	2,323,579	5,473,746	552,144
Motor vehicle brake system manufacturing	336340	43,147	1,486,119	6,407,923	473,867
Motor vehicle transmission and power train parts manufacturing	336350	111,955	5,516,801	19,567,915	1,902,483
All other motor vehicle parts manufacturing[c]	336399	173,229	5,442,190	18,656,740	1,600,988
Motorcycles, bicycles, and parts manufacturing	336991	17,074	567,520	1,797,470	103,730
Military armored vehicle, tank, and tank component manufacturing[d]	336992	5,982	238,241	495,679	17,819
All other transportation equipment manufacturing	336999	19,290	504,886	2,875,923	98,858

(continued)

Table 2-4. Production Costs of Industries Producing Coated Plastic Parts: 1997 (continued)

Industry	NAICS Code	Labor: Total Employment	Labor: Total Payroll ($\$10^3$)	Cost of Materials ($\$10^3$)	Total Capital Expenditures ($\$10^3$)
Business Machine and Computer Equipment Parts					
Office machinery manufacturing	333313	10,492	327,913	1,180,516	97,724
Electronic computer manufacturing	334111	105,383	4,251,722	40,239,744	1,053,379
Computer terminal manufacturing	334113	5,764	253,087	941,879	34,716
Other computer peripheral equipment manufacturing	334119	93,130	4,563,858	16,981,173	980,417
Watch, clock, and part manufacturing[e]	334518	6,332	178,481	380,468	26,214
Lead pencil and art good manufacturing[f]	339942	1,210	29,408	82,640	8,821
Miscellaneous Products					
Plastics pipe and pipe fitting manufacturing[g]	326122	4,058	100,969	261,268	39,467
Polystyrene foam product manufacturing	326140	26,983	756,131	2,447,473	318,445
Urethane and other foam product (except polystyrene) manufacturing	326150	37,129	1,002,055	3,851,626	216,477
All other plastics product manufacturing[h]	326199	523,192	13,989,931	30,344,499	3,449,409
Residential electric lighting fixture manufacturing[i]	335121	74	1,973	2,405	173
Current carrying wiring device manufacturing	335931	44,907	1,293,583	2,326,114	219,293
Laboratory apparatus and furniture manufacturing	339111	16,833	616,819	909,818	58,880
Costume jewelry and novelty manufacturing [j]	339914	13,975	314,581	448,479	19,325
Sporting and athletic goods manufacturing	339920	68,920	1,799,871	4,679,110	345,602

(continued)

Table 2-4. Production Costs of Industries Producing Coated Plastic Parts: 1997 (continued)

Industry	NAICS Code	Labor: Total Employment	Labor: Total Payroll ($\$10^3$)	Cost of Materials ($\$10^3$)	Total Capital Expenditures ($\$10^3$)
Miscellaneous Products (continued)					
Doll and stuffed toy manufacturing	339931	3,392	63,722	104,698	3,939
Game, toy, children's vehicle manufacturing	339932	29,375	767,211	1,870,746	136,243
Sign manufacturing	339950	82,246	2,367,259	3,314,770	234,572
Musical instrument manufacturing	339992	13,286	359,101	493,019	36,262

[a] Excludes 707 firms classified under truck and bus bodies (NAICS 336211).

[b] Excludes 252 firms classified under electronic components, n.e.c. (NAICS 34418, 34419), and 570 firms classified under engine electrical equipment (NAICS 336322).

[c] Excludes 6 firms classified under internal combustion engines, n.e.c. (NAICS 333618) and 1 firm under all other manufacturing industries (NAICS 339999).

[d] Includes 38 firms classified under the tanks and tank components (NAICS 336992).

[e] Includes 2 firms classified under wire springs (NAICS 332612), and 128 firms under watches, clocks, and watch cases (NAICS 334518).

[f] Excludes 17 firms classified under public building and related furniture (NAICS 337127), and 143 firms under lead pencils and art goods (NAICS 339942).

[g] Excludes 349 firms classified under plastics pipe (NAICS 326122).

[h] Excludes 140 firms classified under all other manufacturing industries, n.e.c. (NAICS 339999).

[i] Excludes 497 firms classified under residential lighting fixtures (NAICS 335121), and 53 firms under all other manufacturing industries, n.e.c. (339999).

[j] Excludes 17 firms classified under metal coating and allied services (NAICS 332812) and 80 firms under fabricated metal products, n.e.c. (NAICS 332999).

Source: U.S. Department of Commerce, Bureau of the Census. 1999aa-1999nn. *Manufacturing—Industry Series, 1997 Economic Census*. Washington, DC.

Table 2-5. Surface Coaters of Plastic Parts and Products, by State

State	Number of Facilities
Arkansas	2
California	3
Connecticut	2
Florida	1
Georgia	1
Iowa	2
Illinois	5
Indiana	11
Kansas	3
Kentucky	2
Louisiana	1
Massachusetts	2
Michigan	54
Minnesota	3
Missouri	5
North Carolina	3
North Dakota	1
New Hampshire	1
New Mexico	1
New York	1
Ohio	31
Oklahoma	1
Pennsylvania	4
South Carolina	3
South Dakota	1
Tennessee	6
Texas	1
Virginia	3
Wisconsin	9
NA	22
Total	185

Source: U.S. Environmental Protection Agency (EPA). 2001. ICR Survey Responses. Washington, DC: U.S. Environmental Protection Agency.

The organization of a production process varies according to the benefits of team production[1] and the costs of monitoring shirking amongst team members. Firms that produce products comprising surface-coated plastic parts use team production to perform the actual coating process. However, only some of the firms find it efficient to combine surface coating services with the actual manufacture of plastic parts or with the assembly process of coated parts and other inputs used as components in another downstream good. Three types of production organization are used in surface coating:

- captive facilities in the same organization as the product manufacturer,
- commercial suppliers that fabricate and coat plastic parts and sell them to the product manufacturer,
- commercial suppliers that surface-coat plastic parts on a toll basis for the product manufacturer, or
- commercial suppliers that coat plastic parts and products as part of refurbishment (EPA, 1994).

2.3 Consumption, Value, and Consumers

Surface coating is a value-adding process demanded for its ability to increase a plastic part's or product's aesthetic value, conductivity, and durability. Surface-coated plastic parts and products are most often intermediate goods incorporated into final products ranging from automobiles to toys, although they may be final products themselves. The demand for surface-coated plastic parts and products is based on their value to consumers as part of a final good. The demand for surface coating services is directly related to the demand for those parts and products.

This section characterizes the demand side of the market for surface-coated plastic parts. It describes the characteristics of the various types of coated plastic parts and the value to consumers of each of four different types of final consumer goods: automobiles and light duty truck parts, heavy duty truck parts, business machine and computer equipment parts, and miscellaneous parts and products. The behavioral response of consumers to a change in

[1]Team production occurs when several types of resources are used together to produce a product which is not a sum of separable outputs of each cooperating resource and where resources do not all belong to one person. Team production is beneficial when a "team" can produce goods and services which an individual could never produce alone or when the marginal product of a team is greater than the sum of individual marginal products of team members.

the price of plastic parts, quantified in economics as the elasticity of demand, is also discussed.

2.3.1 Characteristics of Plastic Parts and Products

The demand for a commodity is not simply for the good itself but instead for a set of characteristics and properties that is satisfied by a particular commodity. Commodities can thus be described as bundles of attributes that provide services (Lancaster, 1966). The production processes of surface-coated plastic parts allow room to vary the characteristics of the final product. Frequently, gains in one particular characteristic demand sacrifices of another or increased materials and/or processing costs. Also, users of different types of plastic parts do not all require the same set of attributes. For example, electronic and office equipment manufacturers coat plastics with metallic substances to make them conductive and protect them from electromagnetic/radio frequency interference signals. However, children playing with plastic toys and dolls are interested in the appearance of the toy; the parents may value its safety and durability. Some of the various characteristics of surface-coated plastic parts are

- flammability,
- recyclability,
- expected lifetime (i.e., durability, susceptibility to UV rays),
- environmental attributes (i.e., safety of disposal and end of life),
- weight,
- safety (i.e., protection provided in an automobile accident),
- aesthetics,
- thermal properties (i.e., heat tolerance),
- flexibility/rigidity, and
- conductivity.

While many of the above characteristics of plastic parts and products will be determined primarily by the composition of the uncoated part itself, coatings influence almost all of the above characteristics to some degree, though mostly indirectly. Primary characteristics that can be directly affected by the coating part are

- durability (scratch and chemical resistance);
- aesthetics (the color and texture of the part);
- conductivity (of electromagnetic/radio frequency interference signals); and
- the presence of some functional capabilities, such as reflective properties.

2.3.2 Uses of Plastic Parts and Products

As described in Section 2.2, surface-coated plastic parts are vital components of a wide range of products, including transportation equipment, business machines and computers, and a multitude of miscellaneous products. The uses of parts and characteristics of interest to their consumers vary across those product groups. Because coated plastic parts are an intermediate good used in the production of a final good such as a complete automobile or a complete copier machine, the use of plastic parts is often dictated by a manufacturer's interpretations of consumer preferences rather than directly by the consumer himself.

2.3.2.1 Automotive and Truck Parts

Plastics are used increasingly to produce transportation equipment parts. By 1993, manufacturers were using over 250 pounds of plastic in the average vehicle (SPI, 1999). Car interiors alone represent a value of about $1,200 per vehicle, of which $500 is due to the value of plastic components (*Modern Plastics Encyclopedia*, 1999a). Automobile and other transportation equipment purchasers are concerned with the performance, safety, appearance, and longevity of transportation products. Accordingly, auto makers are especially concerned with the durability, corrosion resistance, and resiliency of plastic parts, which affect the expected lifetime of the product. They often choose the coating of a part based on the eventual location of the part on the vehicle. For example, the lower a part is on a car, the more resistant it must be to damage from particles that might fly up from the road. The UV resistance of interiors is becoming increasingly important to automakers as they find consumers demanding longer warranties on the color retention and other properties of auto interiors at the same time that interior exposure to UV is increasing along with an increase in window areas (*Modern Plastics Encyclopedia*, 1999a). Auto makers also consider the aesthetic properties of the part—its color and texture—since the appearance of a vehicle affects its value to consumers. Plastics may be easily molded into new and exciting aerodynamic shapes. The light weight of plastic parts contributes to fuel efficiency and is a factor often considered in making decisions to substitute plastic parts for those made of glass or metal. Plastics have another important advantage over metal parts—the ease of processing them into unique shapes.

2.3.2.2 Computers and Business Equipment

Like the consumers of automotive and truck parts, consumers of computers and business equipment value performance, safety, appearance, and longevity. Coatings affect the safety, appearance, and longevity of products. Although the range of aesthetic characteristics seems narrower for products in this segment than those in the automotive segment, consumers of computers and business equipment do place a value on appearance. Manufacturers are aware of the aesthetic value consumers place on computer and business machine housings and often make their production choices accordingly. For example, Sun Microsystems invested many resources in finding an exciting design for the housing of their Starfire server. Sun's Kathleen McLaurin observed: "It was especially important that the product appeal visually to the design-sensitive commercial users we were targeting" (Fox, 1998). The same sentiment guided Macintosh in its design of the i-Mac. No matter how the performance of the computer is evaluated, no one denies its eye-catching appearance. Even less innovative manufacturers find it necessary to at least color-match plastic parts to coated metal parts and use molded-in texture to find a market for their product. In addition, coatings serve the purpose of hiding any flaws in a part's substrate (EPA, 1994).

Business equipment users are also interested in the safety of the equipment. Manufacturers can increase the safety of machines by using selected resins that do not easily ignite and/or that are capable of self-extinguishing. In some cases, fire-retardant chemicals may be added to the resins to increase safety, although some European regulations preclude the use of many of these chemicals, thus limiting the choices of exporting manufacturers (*Modern Plastics Encyclopedia,* 1999b). EMI/RFI (Electromagnetic Interference/Radio Frequency Interference) shielding is necessary to prevent a machine or computer from interfering with other electronic equipment and to prevent airwaves from outside the equipment from interfering with its performance. Shielding is best accomplished with grounded, high-conductivity coatings containing nickel or copper.

2.3.2.3 Miscellaneous Products

Like consumers of the other two categories of products described above, consumers of miscellaneous products are concerned with the appearance, safety, and longevity of plastic parts, all of which can be improved with the application of coatings. Consumers of construction materials desire plastic parts that can withstand the elements and that be coated to match numerous architectural coatings. Consumers of plastic laboratory apparatus and furniture desire durable products that will not degenerate when cleaned with cleaning solvents. Consumers of sports equipment want durable plastic products that can withstand impacts and have aesthetic appeal. Consumers of toys desire products that are attractive, safe (i.e., nontoxic), and durable.

2.3.3 Substitutes

In most of the products described above, coated plastic parts have often replaced glass or metal parts, because they are lightweight, cheaper to produce than similar metal or glass parts, and sometimes safer to use than metal or glass substitutes. Currently, depending on the part in question, glass or metal are the only viable substitutes for coated plastic automobile parts. Table 2-6 lists auto parts that may be made out of coated plastic parts and indicates whether the part could also be made of glass and/or metal. Because plastic parts are much cheaper and lighter than glass or metal, it is unlikely that vehicle manufacturers will switch from plastic parts back to metal parts. As in the automotive industry, computer and business machine parts and toys could be constructed of metal rather than plastic. However, requirements for safety, the need to produce parts with unique shapes, and the relatively higher cost of using metals limit the possibilities for substitution.

2.3.4 Elasticity

The elasticity of demand for coated plastic parts and products is a measure of the responsiveness of the quantity of coated products demanded to a change in the price of those products. The responsiveness of quantity demanded to price increases with the availability of substitutes, the time frame of adjustment, the price proximity of substitutes, and the price of a good in relation to a consumer’s budget. The more inelastic the demand, the more easily firms will be able to pass the costs of regulation on to consumers. The demand for coated plastic parts may be relatively inelastic because plastic parts are generally much cheaper than metal and glass substitutes.

2.4 Firm Characteristics

The economic impacts regulating surface coating facilities are related to the ownership structure of those facilities. The market power, size, and integration of firms affect their ability to pass the costs of regulation on to consumers and/or absorb those costs without significant harm to their financial position. The 185 surface coating facilities included in this analysis are owned by 130 firms. Firms owning facilities that coat motor vehicle or business machine parts appear to have somewhat more market power than those

Table 2-6. Auto Parts Made of Plastic

Type of Part	Possible Materials for Use in Constructing Part
Interior Parts:	
Instrument panel	Plastic, steel
Console	Plastic
Heater/AC controls	Plastic, steel, aluminum
Speaker grille	Plastic, metal
Dome light	Plastic, glass
Ash tray	Plastic, metal
Van/utility vehicle rear	Plastic, metal
Airbag cover	Plastic
Exterior Parts:	
Grille	Plastic, metal
Wheel cover	Plastic, metal
Lighting	Plastic, glass
Headlamp or taillamp reflector	Plastic, glass
Headlamp lense	Plastic, glass
Facia cladding	Plastic
Window encapsulation cladding	Plastic
Body sides, fenders	Plastic, steel, aluminum
Bumper	Plastic, steel, aluminum
Functional Parts:	
Engine fan	Plastic, steel
Fuel tank	Plastic, steel
Housings	Plastic, metals

Sources: U.S. Environmental Protection Agency, Office of Compliance, Office of Enforcement and Compliance Assurance. 1995. *EPA Office of Compliance Sector Notebook Project—Profile of the Motor Vehicle Industry*. EPA/310-R-95-009. Washington, DC: U.S. Environmental Protection Agency.

Fettis, Gordon. 1995. *Automotive Paints and Coatings*. Weinheim, Germany: Verlagsgesellschaft mbH.

that coat miscellaneous parts. The relatively larger degree of concentration might not be so obvious if it were possible to further specify the product markets for miscellaneous parts and products. However, it is intuitively obvious that specific requirements that original equipment manufacturers (OEMs) impose on their suppliers of plastic vehicle and business machine parts would make it more likely that coating facilities would have close relationships with their customers and hence more market power than the facilities that coat miscellaneous plastic parts and products.

This section describes the ownership structure of surface coating facilities, including the overall concentration levels in industries affected by the Plastic Parts and Products NESHAP, the number and size of firms owning affected surface coating facilities, the vertical and horizontal integration of those firms, and the current number of small businesses affected by the NESHAP. The terms facility and establishment are used synonymously in this analysis and refer to the physical location where products are coated. Likewise, the terms company and firm are used synonymously and refer to the legal business entities that own facilities.

2.4.1 Market Power of Firms

The ownership concentration of surface coating facilities is important because it affects the firms' ability to influence the price of surface coating services or the price of inputs they purchase. If an industry is perfectly competitive, then individual producers are not able to influence the price of the output they sell or the inputs they purchase. This condition is most likely to hold if the industry has a large number of firms, the products sold are undifferentiated, and entry and exit of firms are unrestricted. Product differentiation can occur both from differences in product attributes and quality and from brand name recognition of products. Entry and exit of firms are unrestricted for most industries except, for example, in cases when government regulates who is able to produce, when one firm holds a patent on a product, when one firm owns the entire stock of a critical input, or when a single firm is able to supply the entire market.

When compared across industries, firms in industries with fewer firms, more product differentiation, and restricted entry are more likely to be able to influence the price they receive for a product by reducing output below perfectly competitive levels. This ability to influence price is referred to as exerting market power. At the extreme, a single monopolistic firm may supply the entire market and hence set the price of the output. On the input market side, firms may be able to influence the price they pay for an input if there are few firms, both within and outside the industry, that use that input. At the extreme, a single monopsonist firm may purchase the entire supply of the input and hence set the price of the input.

Surface coating is a competitive industry in that surface coating is not a differentiated product but rather a process that is extremely similar across a wide range of products. In addition, surface coating facilities are owned by a large number of firms, and the cost of surface coating equipment is low enough that entry into the market is not extremely difficult.

Although surface coaters make up small portions of the industries in which they are classified, the differing levels of concentration in those industries may indicate the relative degrees of market power among surface coaters in different industries. Table 2-7 presents several different measures of concentrations in industries that coat plastic parts and products, including four-firm concentration ratios and Herfindahl index numbers for each industry. A four-firm concentration ratio greater than 50 percent is often considered high. The Department of Justice's Horizontal Merger Guidelines claim that a Herfindahl index number less than 1,000 indicates an unconcentrated industry while a Herfindahl index number between 1,000 and 1,800 indicates a moderately concentrated industry and an index number above 1,800 indicates a highly concentrated industry. As Table 2-7 shows, industries that produce motor vehicles and business machines do appear to be more concentrated than those producing miscellaneous plastic parts.

2.4.2 Firm Size by Employment and Revenue

It is likely that large firms will be better able to absorb the financial impacts of the regulation. Hence, firm size is a factor in the distribution of the regulation's economic impacts. The 130 firms owning the 185 surface coating facilities have yearly revenues as low as $1.3 million and as high as $180 billion. Employment at the firms ranges from 15 employees to 386,000. Tables 2-8 and 2-9 illustrate the distribution of employment and revenues across firms owning surface coating facilities. Table 2-8 shows that 38 percent of firms employ fewer than 500 people, and 38 percent of firms are relatively large and employ over 1,000 people. Table 2-9 shows that many firms are large based on employment criteria, but the majority (70 percent) have annual revenues less than $500 million.

2.4.3 Vertical and Horizontal Integration

Vertical integration is a potentially important dimension in analyzing firm-level impacts because the regulation could affect a vertically integrated firm on more than one level. For example, the regulation may affect companies for whom surface coating of plastic

Table 2-7. Measurements of Concentration of Industries Manufacturing Coated Plastic Parts: 1997

Industry	NAICS Code	Number of Companies	Value of Shipments ($\$10^6$)	Percentage of the Value of Shipments Accounted for by x Largest Companies				
				x=4	x=8	x=20	x=50	Herfindahl-Hirschmann Index
Automobile and Truck Parts								
Automobile manufacturing	336111	173	95,366	79.5	96.3	99.5	99.9	2,349.7
Light truck and utility vehicle manufacturing	336112	84	110,178	99.3	99.9	99.9	99.9	NA
Heavy duty truck manufaturing	336120	75	14,509	74.4	90.3	98.5	99.8	1,597.1
Motor vehicle body manufacturing[a]	336211	747	9,009	34.4	43.9	59.4	74.9	694.7
Motor home manufacturing	336213	75	3,894	52.2	75.4	94.5	99.7	980.2
Travel trailer and camper manufacturing	336214	761	4,601	26.0	35.3	49.8	67.1	262.2
Gasoline engine and engine parts manufacturing	336312	810	25,787	67.5	75.5	84.8	92.8	1,425.1
Vehicular lighting equipment manufacturing	336321	99	3,336	58.3	76.5	92.7	99.1	1,164.4
Other motor vehicle electrical and electronic equipment manufacturing[b]	336322	890	18,297	53.4	64.2	75.9	87.1	1,615.3
Motor vehicle steering and suspension component (except spring) manufacturing	336330	183	10,633	60.1	72.3	85.6	97.1	1,415.6
Motor vehicle brake system manufacturing	336340	203	10,981	59.2	77.2	89.2	96.5	1,101.0
Motor vehicle transmission and power train parts manufacturing	336350	427	30,106	60.0	79.1	90.9	96.2	1,056.6
All other motor vehicle parts manufacturing[c]	336399	1,271	35,511	27.2	38.3	54.8	70.6	266.4
Motorcycles, bicycles, and parts manufacturing	336991	373	3,383	67.5	76.7	85.9	92.3	2,036.5
Military armored vehicle, tank, and tank component manufacturing[d]	336992	37	1,064	85.0	92.4	99.0	100.0	NA
All other transportation equipment manufacturing	336999	349	4,437	50.7	75.3	83.0	90.6	885.2

(continued)

Table 2-7. Measurements of Concentration of Industries Manufacturing Coated Plastic Parts: 1997 (continued)

Industry	NAICS Code	Number of Companies	Value of Shipments ($\$10^6$)	Percentage of the Value of Shipments Accounted for by x Largest Companies				
				x=4	x=8	x=20	x=50	Herfindahl-Hirschmann Index
Business Machine and Computer Equipment Parts								
Office machinery manufacturing	333313	158	3,163	53.0	68.2	81.2	93.5	1,208.3
Electronic computer manufacturing	334111	531	66,302	45.4	68.5	91.4	97.2	727.9
Computer terminal manufacturing	334113	141	1,487	39.4	64.5	87.2	96.5	645.4
Other computer peripheral equipment manufacturing	334119	1,015	26,911	45.3	60.2	73.0	85.4	659.7
Watch, clock, and part manufacturing[e]	334518	145	922	48.1	62.7	86.9	96.9	750.2
Lead pencil and art good manufacturing[f]	339942	171	1,279	52.4	65.6	83.7	94.6	1,047.9
Miscellaneous Products								
Plastics pipe and pipe fitting manufacturing[g]	326122	317	4,792	23.9	37.4	59.8	78.8	260.2
Polystyrene foam product manufacturing	326140	379	4,899	41.4	50.0	65.5	82.7	665.4
Urethane and other foam product (except polystyrene) manufacturing	326150	447	6,665	32.3	43.5	62.9	78.8	403.1
All other plastics product manufacturing[h]	326199	7,522	65,632	5.0	8.1	13.7	23.3	14.9
Residential electric lighting fixture manufacturing[i]	335121	543	2,255	24.5	36.5	55.8	73.6	266.3
Current carrying wiring device manufacturing	335931	446	5,878	21.2	35.0	59.1	80.3	232.0
Laboratory apparatus and furniture manufacturing	339111	371	2,221	19.0	33.3	55.1	74.4	202.5
Costume jewelry and novelty manufacturing[j]	339914	917	1,288	25.2	41.2	55.3	69.0	256.3
Sporting and athletic goods manufacturing	339920	2,477	10,634	21.4	29.2	43.6	59.7	161.1

(continued)

Table 2-7. Measurements of Concentration of Industries Manufacturing Coated Plastic Parts: 1997 (continued)

Industry	NAICS Code	Number of Companies	Value of Shipments ($$10^6$)	Percentage of the Value of Shipments Accounted for by x Largest Companies: x=4	x=8	x=20	x=50	Herfindahl-Hirschmann Index
Miscellaneous Products (continued)								
Doll and stuffed toy manufacturing	339931	239	301	31.1	51.1	72.2	89.6	403.9
Game, toy, children's vehicle manufacturing	339932	756	4,463	42.7	53.1	66.0	80.1	564.0
Sign manufacturing	339950	5,580	7,998	7.9	12.2	19.5	30.9	34.5
Musical instrument manufacturing	339992	552	1,325	32.6	45.5	68.1	83.3	420.8

[a] Includes 707 firms classified under the truck and bus bodies (SIC 3713).
[b] Includes 252 firms classified under the electronic components, n.e.c. (SIC 3679), and 570 firms classified under the engine electrical equipment (SIC 3694).
[c] Includes 6 firms classified under the internal combustion engines, n.e.c. (SIC 3519) and 1 firm under the all other manufacturing industries (SIC 9994).
[d] Includes 38 firms classified under the tanks and tank components (SIC 3795).
[e] Includes 2 firms classified under the wire springs (SIC 3495), and 128 firms under the watches, clocks, and watchcases (SIC 3873).
[f] Includes 17 firms classified under the public building and related furniture (SIC 2531), and 143 firms under the lead pencils and art goods (SIC 3952).
[g] Includes 349 firms classified under the plastics pipe (SIC 3084).
[h] Includes 140 firms classified under the manufacturing industries, n.e.c. (SIC 3999).
[i] Includes 497 firms classified under the residential lighting fixtures (SIC 3645), and 53 firms under the manufacturing industries, n.e.c. (SIC 3999).
[j] Includes 17 firms classified under the metal coating and allied services (SIC 3479) and 80 firms under the fabricated metal products, n.e.c. (SIC 3499).

Source: U.S. Department of Commerce, Bureau of the Census. 1999. *Manufacturing—Industry Series, 1997 Economic Census*. Washington, DC.
U.S. Department of Commerce, Bureau of the Census. 2001a. *Economic Census—Concentration Ratios*. <http://www.census.gov/prod/ec97/m31s-cr.pdf>

Table 2-8. Distribution of Potentially Affected Firms by Employment: 2000

Employment Range	Number of Firms	Share of Total
0–500	50	38%
500–1,000	22	17%
>1,000	49	38%
NA	9	7%
Total	130	100%

Source: Dialog Corporation. 2001. U.S. Company Profiles. <www.profound.com>. As obtained August 29, 2001.
Dun and Bradstreet. 2001. D & B Million Dollar Directory: America's Leading Public and Private Companies. Bethlehem, PA: Dun & Bradstreet.
Hoover's Online. 2001. Company Capsules. <http://www.hoovers.com>. As obtained June 25, 2001.
Infausta Incorporated. 2001. References [computer file]. Omaha, NE: Infausta, Inc.
U.S. Bureau of the Census. 2001b. Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations. First Quarter, 2001, Series QF/01-Q1. Washington, DC: U.S. Government Printing Office.

Table 2-9. Distribution of Potentially Affected Firms by 2000 Sales

Company Sales	Number of Firms	Share of Total
Less than $5 million	8	6%
$5 million to $50 million	38	29%
$50 million to $500 million	45	35%
$500 million to $1,000 million	8	6%
$1 billion or greater	22	17%
NA	9	7%
Total	130	100%

Source: Dialog Corporation. 2001. U.S. Company Profiles. <www.profound.com>. As obtained August 29, 2001.
Dun and Bradstreet. 2001. *D&B Million Dollar Directory: America's Leading Public and Private Companies*. Bethlehem, PA: Dun & Bradstreet.
Hoover's Online. 2001. Company Capsules. <http://www.hoovers.com>. As obtained June 25, 2001.
Infausta Incorporated. 2001. References [computer file]. Omaha, NE: Infausta, Inc.
U.S. Bureau of the Census. 2001b. *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations*. First Quarter, 2001, Series QF/01-Q1. Washington, DC: U.S. Government Printing Office.

parts is only one of several processes in which the firm is involved. A company that coats plastic parts, for example, may also be involved in manufacturing automobiles, aircraft, sporting goods, and appliances. This firm would be considered vertically integrated because it is involved in more than one level of production including surface coating. A regulation that increases the cost of coating plastic parts and products will also affect the cost of producing the final products that use coated plastic parts and products in the production process. Firms that manufacture and coat plastic parts and then use those parts as components in other goods, such as automobiles, are vertically integrated. Firms comprising facilities that coat and manufacture plastic parts are somewhat vertically integrated. Firms with a single coating facility are not vertically integrated.

Horizontal integration is also a potentially important dimension in firm-level impact analysis because a diversified firm may own facilities in unaffected industries, giving them resources to spend on complying with this regulation—if they so choose. The 130 potentially affected firms described in Section 2.4.2 demonstrate little diversification. Most of the larger firms are oriented in a single industry, usually motor vehicle manufacturing. Many independent single-facility firms may produce a wide variety of products. However, because the Plastic Parts and Products NESHAP is regulating a production process used for all those products, those firms will find almost all products are affected by the regulation.

2.4.4 Small Businesses

Although the rule affects firms of all sizes, small businesses may have special problems with compliance. The Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), requires that special consideration be given to these entities. The Agency classified 67 potentially affected companies as small using the approach outlined below:

- Standard Industrial Classification (SIC) code data were available for 105 companies (81 percent). These codes were mapped to NAICS industries to determine the appropriate size standard. In cases where mapping resulted in two or more NAICS codes, we used the highest size standard.
- Of the remaining 25 companies, 16 companies either had employment greater than 1,500 employees (therefore large under any manufacturing size standard) or had employment less than 500 employees (small under any manufacturing size standard).

- We assumed firms without employment data (nine firms) are small in this analysis. This assumption may potentially overstate the number of small firms in the analysis.

2.5 Markets and Trends

Because plastic parts are used in such widely varied products as automobiles, computers, and toys, surface-coated plastic parts and products are found in many markets. The demand for surface coating services is driven by all of these markets. This section describes some of the major trends in these markets, including domestic production and consumption, changes in net exports, and price trends.

2.5.1 Production

Parts coated for use in computer equipment are likely to have experienced the largest increase in production in the past years, since the computer and peripheral equipment industry has been expanding rapidly, as shown in Table 2-10. Table 2-10 also illustrates that the automobile and light duty truck industries have been growing and that the miscellaneous product industries have been decreasing production fairly steadily.

2.5.2 Consumption

Tables 2-11 through 2-13 indicate how much the above increases and decreases in production can be accounted for by changes in domestic and foreign consumption. Most notably, net exports of goods decreased for all industries described. At least some of this decrease is due primarily to the rapid growth of the U.S. economy (and domestic demand for goods) relative to other economies rather than to an increase in the total share of foreign producers in the market. Apparent domestic consumption increased for every industry shown except for costume jewelry.

2.5.3 Pricing Trends

Prices for products manufactured by the transportation industries and miscellaneous manufacturing industries have risen while prices for office, computing, and accounting machines have dropped 37.6 percent from 1990 to 1999, as shown in Table 2-14. This fact, along with the tremendous increase in the value of domestic product shipments in the computer industry, suggests that the volume of plastic parts used as inputs into business machines and computers has increased dramatically over the past 5 years, even more so than indicated solely by the data on value of shipments. Table 2-14 shows price changes for all three industry groups that produce a large number of surface-coated plastic parts.

Table 2-10. Value of Domestic Product[a] Shipments in Some Industries Using Surface Coated Plastic Parts (10^6 $1997)

	1995	1996	1997[b]	1998[b]	1999[c]	Change from 1995 to 1999 (%)
Automobile and Light Duty Truck Parts						
Automotive Parts and Accessories (NAICS 336370, 336311, 336321, 335911, 336322, 336312, 336330, 336340, 336350, 336399)	$145,926.6	$148,090.6	$167,600.0	$258,228.0	$196,015.3	34%
Motor Vehicles and Bodies (NAICS 336111, 336112, 336120, 336211, 336992)	$208,599.5	$205,776.5	$215,359.0	$306,998.6	$224,644.9	8%
Motorcycles and Parts (NAICS 334111)	$1,442.0	$1,623.2	$1,658.7	$1,770.5	$1,924.3	33%
Business Machine and Computer Equipment Parts						
Computers and Peripherals (NAICS 334111, 334112, 334113, 334119)	$60,533.8	$68,334.7	$84,300.0	$106,301.6	$123,742.3	104%
Miscellaneous Products						
Dolls, Toys, and Games (NAICS 339931, 336991, 339932)	$4,605.7	$4,193.0	$4,261.0	$4,195.2	$4,175.9	–9%
Sporting and Athletic Goods (NAICS 339920)	$9,018.7	$9,289.4	$9,510.0	$9,299.5	$9,256.7	3%
Bicycles and Bicycle Parts (NAICS 334111)	$1,024.6	$969.5	$975.0	$859.2	$694.9	–32%
Costume Jewelry and Novelties (NAICS 339914)	$278,893.6	$2,052.6	$71,611.5	$11,842.9	$10,167.3	–35%

[a] Product shipments include all specific products classified within the industries listed regardless of whether the establishments producing those products fall within the industry classification.
[b] Estimate
[c] Forecast

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.
Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu37__#, pcu357_#, pcu39__#, pcu3751#1, and pcu3751#2. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-11a. Production and Apparent Consumption of Automotive Parts and Accessories (NAICS 336370, 336311, 336321, 335911, 336322, 336312, 336330, 336340, 336350, 336399 [SICs 3465, 3592, 3647, 3691, 3694, 3714]) (10^6 $1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$145,926.6	$144,381.7	$1,544.9
1996	$148,090.6	$147,572.0	$518.6
1997	$148,201.0	$147,682.0	$519.0
1998	$258,228.0	$256,981.7	$1,246.4
1999	$196,015.3	$197,012.3	–$997.0
Change from 1995 to 1999 (%)	34%	36%	–165%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu37__#. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-11b. Production and Apparent Consumption of Motor Vehicles and Bodies (NAICS 336111, 336112, 336120, 336211, 336992 [SICs 3711, 3713]) (10^6 $1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$208,599.5	$272,191.6	–$63,592.0
1996	$205,776.5	$269,973.7	–$64,197.1
1997	$215,359.0	$283,891.0	–$68,532.0
1998	$306,998.6	$416,267.3	–$109,268.7
1999	$224,644.9	$310,041.2	–$85,396.3
Change from 1995 to 1999 (%)	8%	14%	–34%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision— Current Series, Series pcu37. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-11c. Production and Apparent Consumption of Motorcycles and Parts (NAICS 334111 [SIC 37512]) (10^6 $1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$1,442.0	$2,033.5	–$591.5
1996	$1,623.2	$2,134.3	–$511.0
1997	$1,658.7	$2,102.7	–$444.1
1998	$1,770.5	$2,428.3	–$657.9
1999	$1,924.3	$2,869.4	–$945.1
Change from 1995 to 1999 (%)	33%	41%	–60%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu37__#, and pcu3751#2. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-12. Production and Apparent Consumption of Computers and Peripheral Equipment (NAICS 334111, 334112, 334113, 334119 [SICs 3571, 3572, 3575, 3577]) (10^6 $1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$60,533.8	$71,611.5	–$11,077.7
1996	$68,334.7	$84,088.1	–$15,753.4
1997	$84,300.0	$106,100.0	–$21,800.0
1998	$106,301.6	$132,433.7	–$26,132.1
1999	$123,742.3	$156,812.2	–$33,069.9
Change from 1995 to 1999 (%)	104%	119%	–199%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu357_#. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-13a. Production and Apparent Consumption of Dolls, Toys, and Games (NAICS 339931, 336991, 339932 [SICs 3942, 3944]) (10^6 $1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$4,605.7	$11,907.1	–$7,301.5
1996	$4,193.0	$12,899.0	–$8,706.0
1997	$4,261.0	$15,351.0	–$11,090.0
1998	$4,195.2	$16,170.3	–$11,975.0
1999	$4,139.3	$16,548.2	–$12,408.9
Change from 1995 to 1999 (%)	–10%	39%	–70%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu39__#. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-13b. Production and Apparent Consumption of Sporting and Athletic Goods (NAICS 339920 [SIC 3949]) (10^6 $1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$9,018.7	$10,269.8	–$1,251.1
1996	$9,289.4	$10,459.3	–$1,169.9
1997	$9,510.0	$10,675.0	–$1,165.0
1998	$9,299.5	$10,854.1	–$1,554.6
1999	$9,415.1	$10,981.3	–$1,566.2
Change from 1995 to 1999 (%)	4%	7%	–25%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu39__#. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-13c. Production and Apparent Consumption of Bicycles and Bicycle Parts (NAICS 334111 [SIC 37511]) (10^6 \$1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$1,024.6	$1,719.8	–$695.1
1996	$969.5	$1,563.2	–$593.7
1997	$975.0	$1,644.0	–$669.0
1998	$859.2	$1,681.5	–$822.2
1999	$694.9	$1,722.4	–$1,027.5
Change from 1995 to 1999 (%)	–32%	0%	–48%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu3751#1. Available at www.bls.gov. Obtained on July 12, 2000.

Table 2-13d. Production and Apparent Consumption of Costume Jewelry and Novelties (NAICS 339914 [SIC 3961]) (10^6 \$1997)

Year	Domestic Production	Apparent Domestic Consumption	Net Exports
1995	$1,813.6	$2,195.8	–$382.2
1996	$1,681.6	$2,041.0	–$359.3
1997	$1,229.0	$1,552.0	–$323.0
1998	$1,195.5	$1,569.5	–$374.0
1999	$1,170.2	$1,571.2	–$401.0
Change from 1995 to 1999 (%)	–35%	–28%	–5%

Sources: U.S. Department of Commerce, International Trade Administration. 2000. *U.S. Industry & Trade Outlook 2000*. New York: The McGraw-Hill Companies.

Prices adjusted using data from the U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu39__#. <http://www.bls.gov>. As obtained on July 12, 2000.

Table 2-14. Price Indices in Industries that Produce Surface-Coated Plastic Parts

Year	Transportation Equipment (NAICS [SIC 37])	Office, Computing, and Accounting Machines (NAICS 333, 334, 339 [SIC 357])	Miscellaneous Manufacturing Industries (NAICS 339 [SIC 39])
1990	115.6	NA	114.9
1991	119.8	NA	117.5
1992	123.0	NA	119.6
1993	126.3	NA	121.5
1994	130.1	NA	123.3
1995	132.2	70.5	125.9
1996	134.2	63.4	127.8
1997	134.1	55.9	129.0
1998	133.6	48.8	129.7
1999	134.5	44.0	130.3
Change in price from 1990 to 1999 (%)	16.3%	–37.6%[a]	13.4%

NA = not available

[a] This is the percentage change from 1995 to 1999.

Source: U.S. Bureau of Labor Statistics, Producer Price Index Revision—Current Series, Series pcu37__#, pcu357_#, and pcu39__#. <http://www.bls.gov>. As obtained on July 12, 2000.

SECTION 3

ECONOMIC IMPACT ANALYSIS

Under the authority of Title III of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) is currently developing a regulation to reduce organic hazardous air pollutants (HAPs) from the application of coatings to various plastic parts and products in over 20 different industries. Although the rule affects firms of all sizes, small businesses may have special problems with compliance. The Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), requires that special consideration be given to these entities. Therefore, this section focuses on the compliance burden for small businesses to determine whether this rule is likely to impose a significant impact on a substantial number of the affected small entities (SISNOSE) within this source category.

3.1 Results in Brief

The National Emission Standards for Hazardous Air Pollutants (NESHAP) is projected to increase the costs of surface coating of plastic parts by approximately $10.8 million (1998 dollars). Of these costs, $8.6 million are projected to be incurred by 63 large firms, while $2.3 million in costs are projected to be incurred by 67 small firms. EPA's economic impact analysis focused on assessing impacts to small businesses. EPA estimates that companies in 32 NAICS codes will be affected by the rule. The number of small businesses in each NAICS code was determined based on the size standards defined by the Small Business Administration (SBA) for that NAICS code. The mean costs incurred by small businesses ($34,300) are much smaller than the mean costs estimated for large businesses ($136,000).

EPA assessed the economic impacts of the regulation by comparing the engineering cost estimates to baseline company sales. For small companies, the cost-to-sales ratio (CSR) averages 0.26 percent. The maximum CSR for a small company is 1.83 percent. For large companies, the average CSR is 0.03 percent, and the maximum CSR is 0.43 percent. No company, large or small, is projected to incur costs exceeding 2 percent of baseline sales.

EPA concludes that the rule will not result in significant impacts to a substantial number of small entities. Although EPA does not project disproportionate or significant impacts for small businesses, the Agency has tried to reduce impacts on small entities by affording them extensive flexibility in demonstrating compliance through pollution prevention rather than use of add-on control technology, and has sought input from small entities throughout its outreach to affected industries.

3.2 Baseline Data Set

The engineering analysis determined costs for 185 facilities potentially affected by the plastic parts NESHAP. Using facility names and addresses (where available), EPA identified 130 ultimate parent companies in publically available company databases[1] and collected sales, profit, and employment information. The following sections describe the results of the data collection.

3.2.1 Sales Data Summary

Companies owning facilities potentially affected by the plastic parts NESHAP reported a broad range of annual sales (see Figure 3-1). In 2000, sales revenue ranged from $1.3 million to over $185 billion with a median value of $88 million. Sixteen companies (13 percent) reported less than $10 million in annual sales.

3.2.2 Profit Data Summary

Companies affected by the plastic parts NESHAP appear to be less profitable on average than the manufacturing sector.[2] Broad industry profitability measures reported in the *Quarterly Financial Reports* (*QFR*) (Bureau of the Census, 2001) show the manufacturing sector's profit rate[3] was 8.4 percent for the four quarters of 2000 compared to 6.9 percent for industries potentially affected by the rule. However, the use of aggregate two-digit SIC data may actually understate this difference. Profitability data available for 32 companies show an average (median) profit rate of 3.0 (2.56) percent, with 54 percent of the sample reporting rates below 3 percent for 2000 (see Figure 3-2). The sample consists of 30 large firms and two small firms, suggesting inferences about profitability drawn from this sample are

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[1]These include Dialog Corporation (2001), Dun & Bradstreet (2001), Hoover's (2001), and InfoUSA (2001). In addition, these data were supplemented by ICR survey responses.

[2]The manufacturing sector includes North American Industry Classification System (NAICS) codes 311 to 339.

[3]The profit rate is computed as income before income taxes divided by net sales.

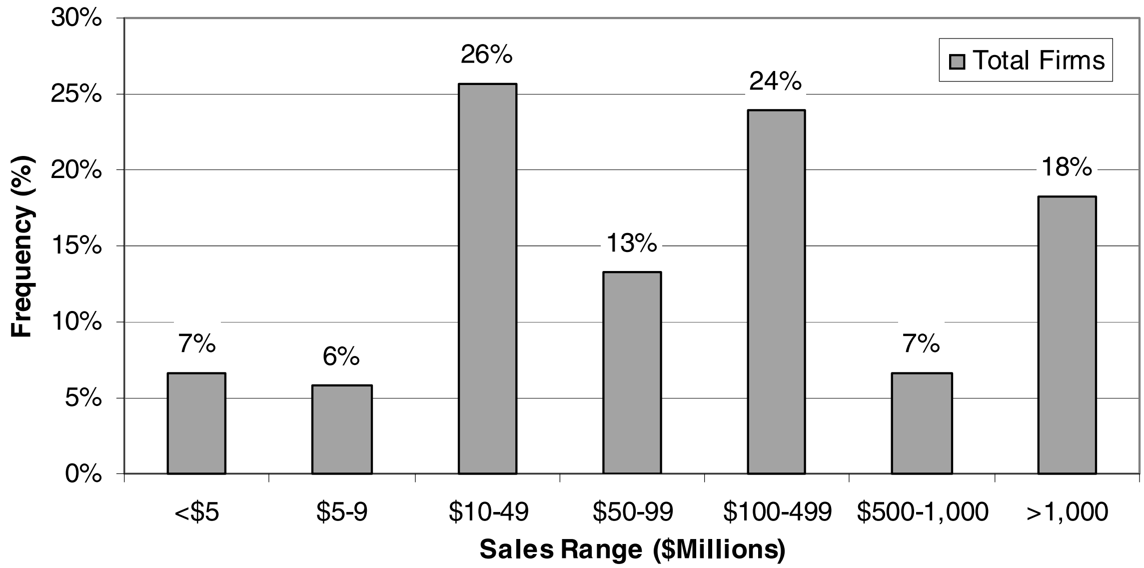

Figure 3-1. Distribution of Firm Sales (n=121)

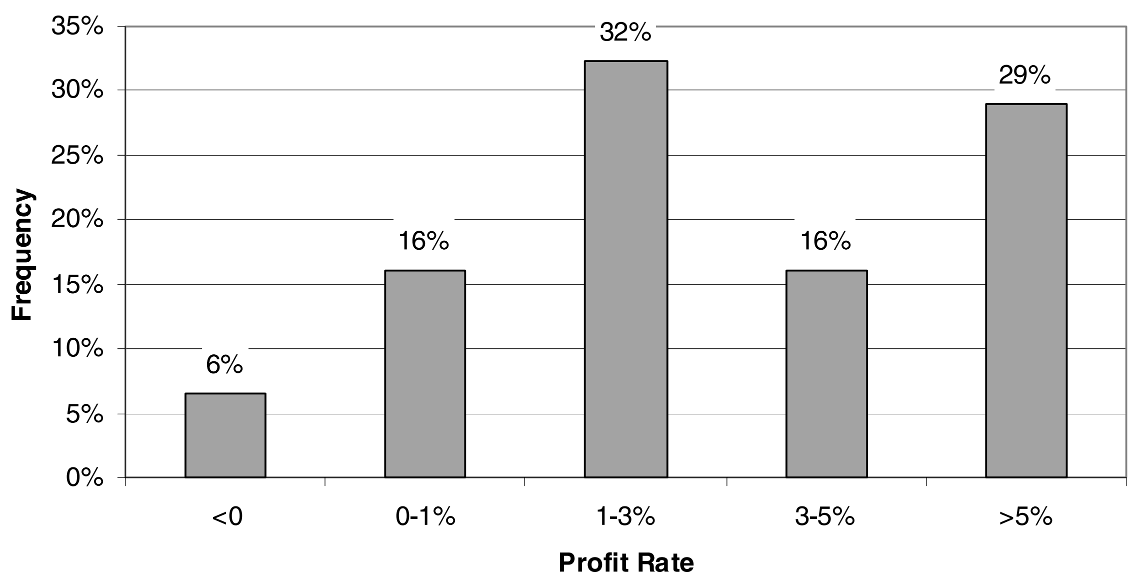

Figure 3-2. Distribution of Profit Rates (n=31)

applicable to large firms. The only two profit data observations for small firms show profit rates of 0.8 percent and –3.7 percent.

Given the limited profitability data for small firms, we examined *QFR* data and compared the industry profitability rates to those of firms with less than <$25 million in assets (proxy for small firms). The rates are very similar, and in some cases, smaller firms were actually more profitable in 2000. However, we concede that *QFR* data are reported at the two-digit SIC level and it is unclear whether we would find the same relationships between small and large companies in the source category.

3.2.3 Employment Data and Identification of Small Firms

Using the SBA's size standards for NAICS codes standards, we identified 67 companies (52 percent) as small for this analysis.[4] Company employment ranged from 15 to 386,000 employees with a median value of 679 employees (see Figure 3-3). These data also suggest the affected sources may include small specialty coating companies as well as large vertically integrated firms such as automobile manufacturers.

3.3 Methods

EPA assessed the economic and financial impacts of the rule using the ratio of compliance costs to the value of sales (cost-to-sales ratio or CSR) using revenues, control costs, and accounting measures of profit. The analysis assesses the burden of the rule by assuming the affected firms absorb the control costs, rather than passing them on to consumers in the form of higher prices. One drawback for this approach is that it does not consider interaction between producers and consumers in a market context. Therefore, it likely overstates the impacts on firms affected by the rule and understates the impacts on consumers. We used the following equation to compute the CSR:

$$\text{CSR } (\%) = \frac{\sum_{i=1}^{n} \text{TACC}}{\text{TR}_j} \tag{3.1}$$

[4] Standard Industrial Classification (SIC) code data were available for 105 companies (81 percent). These codes were mapped to NAICS industries to determine the appropriate size standard. In cases where mapping resulted in two or more NAICS codes, we used the highest size standard. Of the remaining 25 companies, 16 companies either employed more than 1,500 employees (therefore large under any manufacturing size standard) or employed fewer than 500 employees (small under any manufacturing size standard). We assumed firms without employment data (nine firms) are small in this analysis. This assumption may potentially overstate the number of small firms in the analysis.

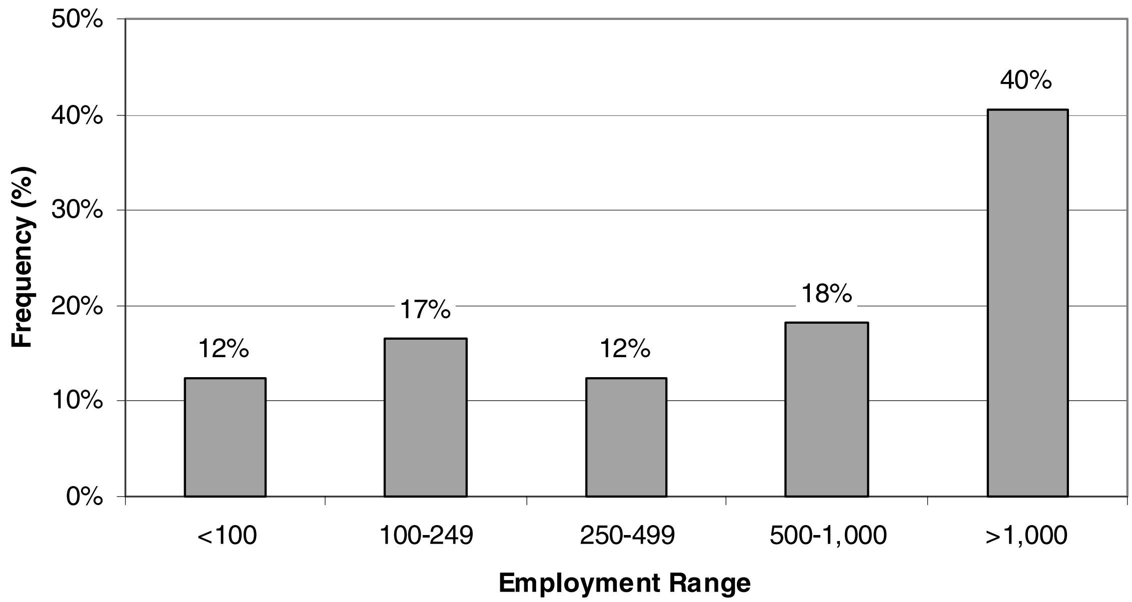

Figure 3-3. Distribution of Firm Employment (n=121)

where

TACC	=	total annual compliance costs,
i	=	indexes the number of affected plants owned by company j,
n	=	number of affected plants, and
TRj	=	total revenue of parent company j.

Given the profitability data presented in previous sections, we selected 1 and 3 percent CSR thresholds as indicators of significant economic impact.

3.4 Results

Small firms do not bear a disproportionate share of the total annual compliance costs (TACC). As shown in Table 3-1, small companies account for approximately 21 percent of

Table 3-1. Summary Statistics for SBREFA Screening Analysis: 2000

	Small		Large		Total	
Total number of companies	67		63		130	
Total annual compliance Costs ($TACC)	$2,301,368		$8,580,662		$10,882,030	
Average ($TACC) per company	$34,349		$136,201		$83,708	
	Distribution of Cost-to-Sales Ratios					
	Number	Share	Number	Share	Number	Share
Companies with sales data	58	87%	63	100%	121	93%
Compliance costs are <1% of sales	55	95%	63	100%	118	98%
Compliance costs are 1% to 3% of sales	3	5%	0	0%	3	2%
Compliance costs are ≥3% of sales	0	0%	0	0%	0	0%
	Compliance Cost-to-Sales Ratios					
Mean	0.260%		0.032%		0.141%	
Median	0.081%		0.008%		0.029%	
Maximum	1.834%		0.425%		1.834%	
Minimum	0.003%		0.000%		0.000%	

the rule's $10.8 million TACC. In addition, the average small company's TACC is much smaller than large firms ($34,000 per company compared to $136,000).[5]

The results of the screening analysis show that three small firms are projected to incur compliance costs that are between 1 and 3 percent of sales. This represents approximately 5 percent of the affected small firms with data. No small firm is projected to incur costs greater than 3 percent of sales. For small firms with sales data, the average (median) CSR is 0.26 percent (0.08 percent). In contrast, none of the 62 large firms are affected at greater than 1 percent of sales. The average (median) CSR is 0.03 percent

[5]For more information on costs, see Teal and Burlew (2001).

(0.01 percent) for all large firms with data. Figure 3-4 summarizes the distribution of impacts by firm size.

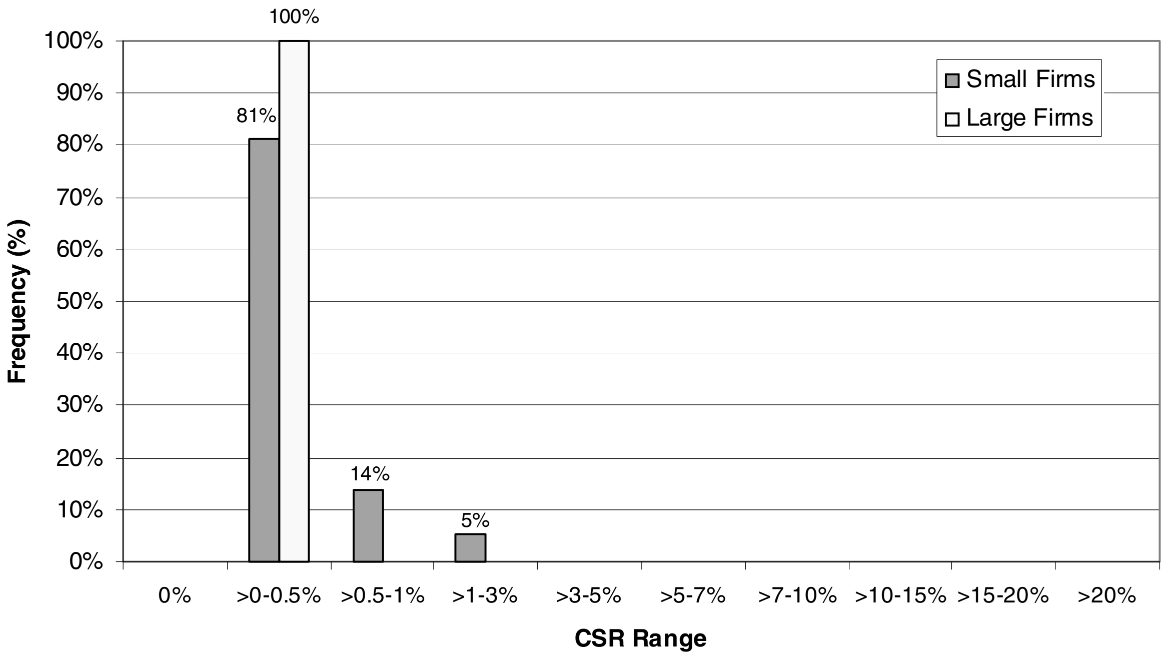

Figure 3-4. Distribution of Cost-to-Sales Ratios (CSRs): Small and Large Firms (n=121)

3.5 Estimated Impacts on Small Businesses

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

For purposes of assessing the impacts of today's rule on small entities, a small entity is defined as (1) a small business whose parent company has fewer than 500 or 1,000 employees, depending on the size definition for the affected North American Industry Classification System (NAICS) code; (2) a small governmental jurisdiction that is a government of a city, county, town, school district, or special district with fewer than 50,000 people; and (3) a small organization that is any not-for-profit enterprise that is independently owned and operated and is not dominant in its field. It should be noted that companies in 32 NAICS codes are affected by this rule, and the small business definition applied to each industry by NAICS code is that listed in the Small Business Administration (SBA) size standards (13 CFR 121).

After considering the economic impacts of today's rule on small entities, EPA certifies that this action will not have a significant economic impact on a substantial number of small entities. We have determined that 67 of the 130 firms, or 51 percent of the total, affected by this rule may be small. While the number of small firms appears to be a large proportion of the total number of affected firms, the small firms only experience 21 percent of the total national compliance cost of about $11 million (1997$). Of the 67 affected small firms, only three firms are estimated to have compliance costs that exceed 1 percent of their revenues. The maximum impact on any affected small firm is a compliance cost of 1.8 percent of its sales. Finally, while there is a difference between the median compliance cost-to-sales estimates for the affected small and large firms (0.08 percent compared to 0.01 percent for the large firms, and 0.03 percent across all affected firms), no adverse economic impacts are expected for either small or large firms affected by the rule. Therefore, the affected small firms are not disproportionately affected by this rule as compared to the affected large firms.

Although this rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities. Small entities will be afforded extensive flexibility in demonstrating compliance through pollution prevention rather than the use of add-on control technology. Pollution prevention methods of compliance will not only minimize capital and operating costs but will result in reduced burden associated with recordkeeping and reporting. The Agency has also reached out to stakeholders that are small entities or that represent small entities as part of our outreach to affected industries.

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TECHNICAL REPORT DATA

(Please read Instructions on reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-452/R-03-019		

4. TITLE AND SUBTITLE Economic Impact Analysis of the Plastic Parts and Products NESHAP: Final Report	5. REPORT DATE August 2003 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO. RTI Project Number 7647-004-392
9. PERFORMING ORGANIZATION NAME AND ADDRESS RTI International Center for Regulatory Economics and Policy Research, Hobbs Bldg. Research Triangle Park, NC 27709	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO. 68-D-99-024
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 14. SPONSORING AGENCY CODE EPA/200/04

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report evaluates the economic impacts of the Surface Coating of Plastic Parts and Products NESHAP. The report includes an industry profile and assesses the impact of the regulation by comparing the engineering cost estimates to baseline company sales. The report also provides the screening analysis for small business impacts.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
economic impacts small business impacts social costs	Air Pollution Control Economic Impact Analysis Regulatory Flexibility Analysis	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(Report)*	21. NO. OF PAGES
Release Unlimited	Unclassified	83
	20. SECURITY CLASS *(Page)* Unclassified	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

United States
Environmental Protection
Agency

Office of Air Quality Planning and Standards
Air Quality Strategies and Standards Division
Research Triangle Park, NC

Publication No. EPA-452/R-03-019
August 2003