ECONOMIC IMPACT ANALYSIS: LARGE APPLIANCE COATING

1 INTRODUCTION

Under Section 112(d) of the Clean Air Act, the U.S. Environmental Protection Agency (referred to as EPA or the Agency) is developing a National Emissions Standard for Hazardous Air Pollutants (NESHAP) for the large appliance coating source category. This source category produces emissions of hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) through the process of painting or otherwise coating appliance surfaces. The NESHAP is scheduled to be published in the Fall of 2000. The Innovative Strategies and Economics Group (ISEG) has developed this economic impact analysis (EIA) to support the evaluation of impacts associated with regulatory options considered for this NESHAP.

1.1 Scope and Purpose

This report evaluates the economic impacts of pollution control requirements on large appliance coating operations. These requirements are designed to reduce emissions of hazardous air pollutants (HAPs) into the atmosphere. The Clean Air Act's purpose is to protect and enhance the quality of the nation's air resources (Section 101(b)). Section 112 of the Clean Air Act Amendments of 1990 establishes the authority to set national emission standards for hazardous air pollutants. The emissions of HAPs from large appliance manufacturing originates from the coating and painting of these large appliances.

To reduce emissions of HAPs, the Agency establishes maximum achievable control technology (MACT) standards. The term "MACT floor" refers to the minimum control technology on which MACT standards can be based. For existing major sources, the MACT floor is the average emissions limitation achieved by the best performing 12 percent of sources (if there are 30 or more sources in the category or subcategory). The MACT can be more stringent than the floor, considering costs, non-air quality health and environmental impacts, and energy requirements. The estimated costs for individual plants to comply with the MACT standards are inputs into the economic impact analysis presented in this report.

1.2 Organization of the Report

The remainder of this report is divided into three sections that describe the methodology and present results of this analysis. Section 2 provides a summary profile of the large appliance coating industry while Section 3 presents an overview of the economic impacts associated with this regulatory action. The Agency's analysis of the regulation's impact on small businesses appears in Section 4.

2 INDUSTRY PROFILE

Large appliance production is an assembly-line process in which components are cut, assembled, and coated. The common structural materials used in production are steel and aluminum; however, there has been a recent trend toward the use of plastics for certain components. Households, the construction industry, and the food service industry purchase and use large appliances. These products include washing machines and dryers, refrigerators, dishwashers, ovens, heaters, and air conditioners. For the purposes of this industry profile, we focused on the following Standard Industrial Classification (SIC) codes of the industries that manufacture large appliances:

- SIC 3585 - Refrigeration and Heating Equipment,
- SIC 3589 - Service Industry Machinery, not elsewhere classified (n.e.c.),
- SIC 3631 - Household Cooking Equipment,
- SIC 3632 - Household Refrigerators and Freezers,
- SIC 3633 - Household Laundry Equipment, and
- SIC 3639 - Household Appliances, (n.e.c.).

Although these are the primary SIC codes for manufacture of large appliances and account for the majority of sales and production, the economic impact analysis does account for impacts on facilities that reported a SIC code not included in the above list.

Production of large appliances involves coating operations that emit HAPs through use of coatings with high solvent concentrations. Coatings and paints are applied to the metal surfaces of large appliances to protect them from wear and corrosion. The three types of coatings used in the manufacture of large appliances are waterborne, organic-solvent-borne,

and powdered coatings. The coatings possess varying characteristics which make them suitable for different applications.

This section provides an overview of the large appliances coating industry. Section 2.1 describes the production processes involved in large appliance manufacturing with an emphasis on coating operations. Also discussed are the various categories of large appliances and their production costs. Section 2.2 describes the uses of large appliances and the consumer groups who purchase them. A summary of the organization of the large appliance coating industry is presented in Section 2.3. It describes the market structure, the facilities that manufacture large appliances, and the companies that own the facilities. The Agency also identifies small businesses potentially affected by the proposed rule. Finally, Section 2.4 presents available market data and trends for the industry.

2.1 Production Overview

The following discussion of the production process, coating operations, and coating materials is derived from EPA (1980). As Figure 2-1 shows, large appliance manufacturing is a continuous and highly automated process where metal components are assembled and coated. Coiled or sheet metal is first cut and stamped into the appropriate shapes. These pieces are then welded together to form the large appliances. The welded parts are cleaned with organic degreasers and a mild caustic detergent to remove any grease that might have accumulated during handling of the product. Next, the metal is treated in a phosphate bath to prepare the surface for coating. Iron phosphate or zinc phosphate is used because these compounds increase the adherence of coatings and improve corrosion resistance of large appliances. It is at this point that the product is coated and cured. The coated and cured parts then enter the final assembly stage where the last parts are attached to the large appliances.

2.1.1 Coating Operations

Several available methods exist to coat the surfaces of large appliances. The alternative methods differ in transfer efficiency, which is measured as the ratio of the amount of paint solids deposited on a surface to the total amount of coating solids used in the coating process. When liquid spray systems are used, transfer efficiency is equal to the ratio of the solids deposited on the surface to the amount delivered through the application device. The liquid spray systems include the following:

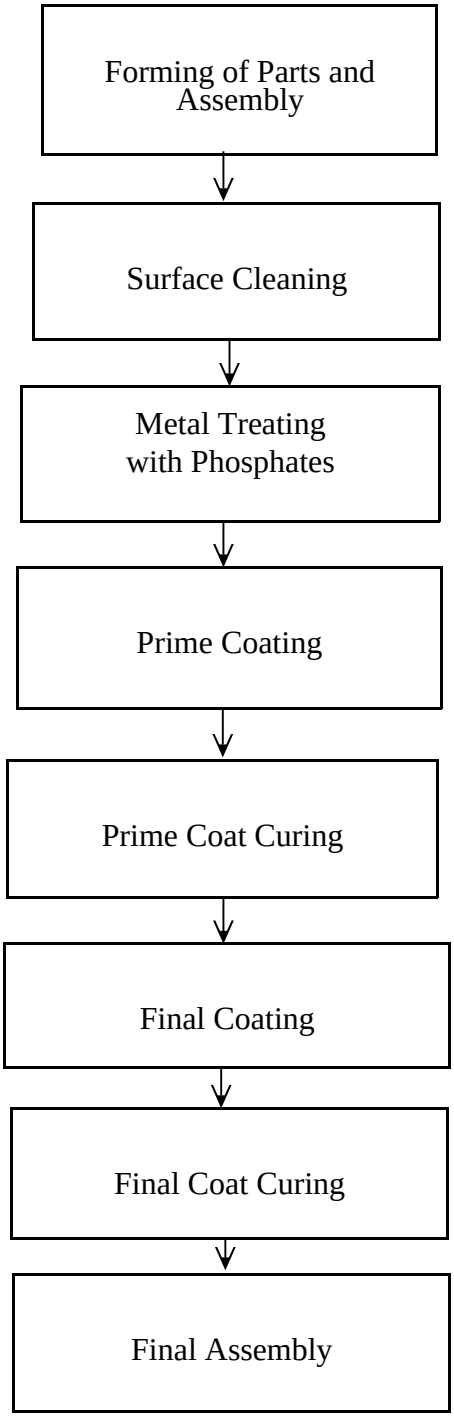


Figure 2-1. Flow Diagram of Large Appliance Manufacturing

- **Air and airless spray coating** uses compressed air, which may be heated, filtered, or humidified. The compressed air is used to atomize the coating which is then directed towards the part to be coated. The transfer efficiency of air spraying is 40 percent. The airless spray method sprays coating through special nozzles without using air. The transfer efficiency of the airless spray method is slightly higher at 45 percent.

- **Electrostatic spray** deposits coatings evenly on all sides of the part. The transfer efficiency of this method ranges between 55 and 60 percent. With this system, the paint particles are negatively charged, while the part to be coated is positively charged. Because of the opposing charge, the paint particles are electrically attracted to the part. This results in a uniform coating.

- **Electrostatic bell or disk coating** uses centrifugal forces to cause atomization. A bell or disk with a negatively charged surface is spun around, which then negatively charges the coating particles passing across it. These coating particles then become attracted to the positive grounded parts to be coated. The transfer efficiency of this method is 90 percent, which far surpasses that of the electrostatic spray coating method.

When recycling coating systems are used instead, transfer efficiency is calculated as the ratio of the solids adhering to the surface to the amount of coating solids delivered, excluding the solids that are recovered for re-use. Recycling coating systems include the following:

- **Dip coating** is used on parts not visible after assembly. Hence, the coating surface need not be smooth. Parts are lowered into a tank that contains the coating. After the parts are coated, they proceed to an area where the excess paint drips off and is recycled. The transfer efficiency of this method is approximately 85 percent.

- **Flow coating** also has a transfer efficiency of 85 percent. It entails running a stream of coating over a part. Coatings are pumped through mechanical arms that have been fitted with nozzles. These arms pass over the part so that it is

coated, while the excess paint drips off and is recycled. This coating method is also used for parts that are not visible after assembly.

- **Electrostatic dip coating** produces an extremely smooth uniform coat with a transfer efficiency of approximately 95 percent. A DC voltage is applied between electrodes that are located in a bath of coating and attached to the part to be coated. The part is then dipped into the bath. Since it possesses a charge opposite of the coating, the coating particles are attracted to it.

2.1.2 Coating Types

The three major types of coatings are waterborne, conventional organic-solvent-borne, and powder coatings. The different types of coatings vary in their content, in the coating operations in which they can be used, and in their advantages and disadvantages for use as coatings. While the purpose of coatings is to provide decoration, wear protection, and corrosion resistance, some may be better than others for specific large appliances based on the appliance's function, life-expectancy, and intensity of use.

The content of waterborne coatings varies based on the coating operation it will be used in. For spray, dip, and flow coating systems, 56 percent of the coating is water, 14 percent is organic solvent, and 30 percent is paint solids. In electrostatic methods, the content of the waterborne coatings is 90 percent water, 4 percent organic solvents, and 6 percent paint solids. The presence of solvents is the only source of VOC emissions from waterborne coatings. Since relatively small amounts of solvents are present, use of waterborne coatings results in relatively fewer emissions than other coatings. Another advantage that stems from low levels of solvent is that waterborne coatings are nonflammable. While these advantages of waterborne solvents exist, there are also some disadvantages. Waterborne coatings render large appliances more susceptible to rust and corrosion relative to organic-solvent-borne coatings. These coatings also do not have the degreasing ability that some organic solvent-borne coatings do. Use of waterborne coatings will therefore require increased expenditures on the pre-cleaning process in large appliance manufacturing.

Conventional organic-solvent-borne coatings contain approximately 30 percent paint solids and a much higher solvent content than waterborne coatings. They are commonly used in air, airless, and electrostatic coating systems. Since organic-solvent-borne coatings contain a higher percentage of solvents, their advantages and disadvantages are contrary to those of

waterborne coatings. The solvent-borne coatings result in higher levels of emissions, but they provide greater protection to the large appliances. They are also more flammable in comparison to waterborne coatings.

One of the main advantages to using powder coatings is that they contain no organic-solvents. Powder coatings therefore have low toxicity levels and no organic-solvent VOC emissions when applied. Even though there are no organic-solvent VOC emissions released when powder coatings are used, some VOCs are emitted in the post-coating application stages. Still, powder coatings have low VOC emissions relative to the other types of coatings. The use of powder coatings is associated with high transfer efficiencies when used with certain coating systems, but there have been problems associated with controlling the thickness of powdered coatings when they are applied. Another problem associated with powder coatings is their explosion potential. Organic powders suspended in air have the potential to ignite. To alleviate this problem, ventilation rates in the powder coating booths must be maintained at a high enough level.

2.1.3 Large Appliance Products

The primary large appliance industry segments are:

- **household appliances** classified by SIC codes 3631, 3632, 3633, and 3639 and include ovens, ranges, refrigerators, freezers, laundry equipment, dishwashing machines, microwave ovens, and garbage disposals,
- **service industry machinery** classified by SIC 3589 and includes commercial food preparation equipment, display cases, commercial carpet cleaners and vacuums, and floor polishing and scrubbing equipment, and
- **heating and air conditioning equipment** covered by SIC 3585 and includes air conditioners and heaters for homes and motor vehicles, commercial refrigeration, furnaces, heat pumps, drinking fountains, and ice making machinery.

Table 2-1 provides product descriptions of the large appliances and lists the corresponding SIC codes.

Table 2-1. SIC Codes and Large Appliance Product Descriptions

Product Description	SIC Code	Example Products
Refrigeration and Heating Equipment	3585	Air conditioners and parts, including motor vehicle; cold drink dispensing equipment; refrigerated cabinets and display cases; condensers and condensing units; coolers; dehumidifiers; electric warm furnaces; drinking fountains; heat pumps; humidifying equipment; ice making machinery; industrial refrigeration machinery and equipment; snow making machinery; soda fountains
Service Industry Machinery (n.e.c.)	3589	Cafeteria food warming equipment; commercial carpet sweepers; car washing machinery; including dirt sweeping units; commercial dishwashing machines; commercial food warming equipment; commercial garbage disposers; janitors' carts; coin-operated servicing machines, except dry cleaning and laundry; sewage treatment equipment; power sewer cleaning equipment; sludge processing equipment; industrial and commercial electric vacuum cleaners and sweepers; water conditioners for swimming pools; household water filters and softeners; household water purification equipment; industrial water treatment equipment
Household Cooking Equipment	3631	Household ovens, ranges, stoves, and microwaves; barbeques, grills, and braziers for outdoor cooking
Household Refrigerators and Freezers	3632	Household refrigerators and freezers
Household Laundry Equipment	3633	Household dry cleaning and laundry machines, including coin-operated; domestic laundry wringers
Household Appliances (n.e.c.)	3639	Household dishwashing machines and garbage disposal units; household water heaters; household sewing machines and attachments; buttonhole and eyelet machines and attachments; household floor waxers and polishers; household trash compactors

2.1.4 Costs of Production

This section discusses the cost of coating operations as part of total cost of producing large appliances. The main cost elements of coating operations include:

- **cost of materials**, i.e., coating materials, solvents, etc.,
- **substrates**, i.e., steel, aluminum, and other materials to be coated, and
- **other costs**, i.e., labor, energy, capital expenditures, etc.

Absent specific cost data, the focus of this section is the cost of coating materials. The prices of the various types of coatings used in large appliance production are not available; however Census Bureau information is available on coating material costs, total material costs, and value of product shipments by SIC code for the years 1992 and 1997.

Table 2-2 shows that for all SIC codes representing large appliance manufacturing, coatings are a small share of the costs of materials used in production and an even smaller share of the value of final product shipments. The cost of other materials, such as metal, plastics, iron and steel castings, and metal stamping equipment make up larger shares of the manufacturing costs of large appliances since larger quantities of these inputs are used to produce a single large appliance and the cost these inputs is high compared to coating costs.

The industry segment with the highest share of coating material costs is SIC 3633, Household Laundry Equipment. In 1997 the cost of coatings are almost 3 percent of the total cost of materials Although this cost share is small in absolute terms, it is much larger in comparison to the cost shares for the other large appliance industry segments. This perhaps is due to the quality of the coatings used for these large appliances. Because washing machines are exposed to water and dryers are exposed to extreme heat during operation, the corrosion resistance of the coatings used for this equipment must be resilient. The only other industry segment with a coating cost share approaching this magnitude is Household Cooking Equipment (SIC 3631). Since ovens, microwaves, and ranges are also exposed to high temperatures when they are in use, they also require high quality coatings. In 1997, the cost of coatings were equal to just over 2 percent of the total cost of materials.

Table 2-2. Cost of Materials Consumed by Large Appliance Industry Segment: 1992 and 1997 (10^6)

SIC Code/Description	1992	1997
SIC 3585 - Refrigeration and Heating Equipment		
Coating Material Cost[a]	$55.0	$73.76
Total Material Cost	$10,341.2	$15,404.59
Coatings as a Percentage of Total Materials	0.53%	0.48%
Value of Product Shipments	$18,072.2	$26,172.57
Coatings as a Percentage of Product Shipments	0.30%	0.28%
SIC 3589 - Service Industry Machinery (n.e.c.)		
Coating Material Cost	NA	NA
Total Material Cost	$2,388.3	$4,311.86
Coatings as a Percentage of Total Materials	NA	NA
Value of Product Shipments	$5,057.2	$8,801.67
Coatings as a Percentage of Product Shipments	NA	NA
SIC 3631 - Household Cooking Equipment		
Coating Material Cost	$27.8	$40.79
Total Material Cost	$1,811.7	$1,754.60
Coatings as a Percentage of Total Materials	1.53%	2.32%
Value of Product Shipments	$3,006.8	$3,606.92
Coatings as a Percentage of Product Shipments	0.92%	1.13%

Table 2-2. Cost of Materials Consumed by Large Appliance Industry Segment: 1992 and 1997 (10^6) continued

SIC Code/Description	1992	1997
SIC 3632 - Household Refrigerators and Freezers		
Coating Material Cost	$29.1	$30.90
Total Material Cost	$2,596.6	$2,896.73
Coatings as a Percentage of Total Materials	1.12%	1.07%
Value of Product Shipments	$4,047.6	$4,775.24
Coatings as a Percentage of Product Shipments	0.72%	0.65%
SIC 3633 - Household Laundry Equipment		
Coating Material Cost	$46.3	$57.17
Total Material Cost	$1,721.2	$2,081.23
Coatings as a Percentage of Total Materials	2.69%	2.75%
Value of Product Shipments	$2,995.0	$3,586.85
Coatings as a Percentage of Product Shipments	1.55%	1.59%
SIC 3639 - Household Appliances (n.e.c.)[b]		
Coating Material Cost	$16.7	$24.75
Total Material Cost	$1,954.5	$2,642.6
Coatings as a Percentage of Total Materials	0.85%	0.94%
Value of Product Shipments	$2,278.8	$5,247.5
Coatings as a Percentage of Product Shipments	0.73%	0.47%

Notes: [a]Coating materials include paints, varnishes, shellacs, enamels, and lacquers.

[b]The 1997 cost information for SIC 3639 does not include information on Household Sewing Machines due to the lack of available data.

NA means data not available.

Source: U.S. Department of Commerce, Bureau of the Census. *1992 Census of Manufactures: Industry Series for Service Industry Machines* and *Household Appliances*.

U.S. Department of Commerce, Bureau of the Census. *1997 Economic Census: Manufacturing*

Industry Series for Commercial Refrigerator and Heating Equipment, Motor Vehicle Air Conditioning, Household Cooking Appliances, Household Refrigerators and Freezers, Household Laundry Equipment, and *Other Household Appliances*.

2.2 Uses, Consumers, and Substitutes

Large appliances are generally purchased by three major groups of consumers:

- households,
- the construction industry, and
- the food service industry.

Households purchase a variety of items such as ovens, refrigerators, microwaves, dishwashers, laundry machines, clothes dryers, and heating and cooling units, to operate in their homes. Some or all of these large appliances were once considered luxury items, but now they are common in most homes. They simplify the tasks of cooking and cleaning and they make homes more comfortable places to live. When individuals or businesses in the construction industry purchase large appliances, they do so to include them in the construction of new homes and buildings. It is more cost-effective for contractors and construction companies to build homes with these large appliances in place because it is more difficult for the owners to install them after the structures have been built. These appliances may be customized to fit the decor or space dimensions of the planned structure.

Based on The Freedonia Group (1998), Table 2-3 shows the projected demand for major appliances in 2001 with a breakdown of appliances purchased for the first time (new) and those purchased to replace an old appliance (replacement). As shown, a majority of the demand for large appliances is made up by consumers who are replacing existing large home appliances. The demand for replacements stems from either the worn condition of existing large appliances or from the desire to upgrade to higher quality large appliances. First time purchases of major appliances are mainly made by contractors who acquire these products to install in new buildings. While there are households that do purchase large appliances without ever having owned them before, most individuals purchase homes with these products pre-installed (either new or existing).

Table 2-3. Projected U.S. Large Appliance Demand: 2001

	New		Replacement		Total
Product	**Units (10^6)**	**Share (%)**	**Units (10^6)**	**Share (%)**	**Units (10^6)**
Refrigeration Units	1.38	12.2%	9.91	87.8%	11.29
Ovens/Ranges	1.10	16.1%	5.71	83.9%	6.81
Microwave Ovens	1.22	13.1%	8.09	86.9%	9.31
Dishwashers	0.94	16.4%	4.79	83.6%	5.73
Washing Machines	1.20	16.9%	5.90	83.1%	7.10
Clothes Dryers	0.92	15.4%	5.05	84.6%	5.97
Total	6.76	100%	39.45	100%	46.21

Source: The Freedonia Group. 1998. Report #952, *World Major Household Appliances to 2001.*

For the household kitchen appliances industry, 26 percent of the revenues in the early 1990s came from individual consumer purchases, 20 percent from residential contractors and construction companies, 24 percent from commercial and institutional builders, 5 percent from exports, and the remaining revenues from the government, mobile home builders, and others. For laundry equipment, over 80 percent of output was purchased by individual consumers, 6 percent by laundromats and dry cleaners, and 14 percent by government institutions (Tardiff, 1998).

Businesses in the food service industry purchase many of the same appliances found in households, but larger in size. Commercial-sized ovens, microwaves, garbage disposals, refrigerators, and dishwashers, as well as floor cleaning equipment and refrigerator display cases are used by restaurants, catering services, grocery stores, and convenience stores. These products allow businesses in the food service industry to preserve and prepare food. Some businesses in the food service industry, such as restaurants and catering services, are more interested in the appliances that assist them in food preparation. Other businesses, such

as grocery stores and convenience stores, are more interested in large appliances that allow for the display or preservation of food items.

No suitable substitutes exist for large appliances. The only substitutes available to individuals are changes in behavior to accommodate for the lack of major appliances associated with cooking, cleaning, food preparation, and food preservation. In earlier times, major appliances were not available. Individuals in households would perform more housework by hand, e.g., laundry would be hand-washed and air-dried, dishes would washed by hand, food would be preserved using salts, and food preparation would rely on fire rather than stoves and ovens. Large appliances were invented to alleviate the burden of performing these tasks in a rudimentary manner. Over time, individuals have come to rely upon refrigerators, ovens, dishwashers, and laundry machines because they enable them to complete household tasks more effectively and in less time (i.e., improve quality of life).

2.3 Affected Producers

This section presents information about the market structure of the large appliances industry. This includes descriptions of the types of manufacturing facilities in the industry and the companies that own these facilities. Also included are example of large appliance manufacturing firms and their market shares in different segments of the appliance market.

2.3.1 Market Structure

Market structure is of interest because it determines the behavior of producers and consumers in the industry. In perfectly competitive industries, no producer or consumer is able to influence the price of the product sold. In addition, producers are unable to affect the price of inputs purchased for use in production. This condition most likely holds if the industry has a large number of buyers and sellers, the products sold and inputs used in production are homogeneous, and entry and exit of firms is unrestricted. Entry and exit of firms are unrestricted for most industries, except in cases where the government regulates who is able to produce output, where one firm holds a patent on a product, where one firm owns the entire stock of a critical input, or where a single firm is able to supply the entire market. In industries that are not perfectly competitive, producer and/or consumer behavior can have an effect on price.

Concentration ratios (CRs) and Herfindahl-Hirschman indices (HHIs) can provide some insight into the competitiveness of an industry. The U.S. Department of Commerce reports these ratios and indices for the four-digit SIC code level for 1992, the most recent

year available. Table 2-4 provides the value of shipments, the four- and eight-firm concentration ratios, and the Herfindahl-Hirschman indices that have been calculated by four-digit SIC code. From an examination of these concentration ratios, it is evident that the industries involved in the manufacture of large household appliances are more concentrated than the industries producing Service Machinery (SIC 3589) and Refrigeration and Heating Equipment (SIC 3585). Of the large household appliance industries, Household Refrigerators and Freezers (SIC 3632) and Household Laundry Equipment (SIC 3633) are the most concentrated with CR4s of 82 and 94 percent, respectively[1]. The Service Industry Machinery industry (SIC 3589) is the least concentrated industry segment with a CR4 of only 14 percent and a CR8 of 23 percent.

Table 2-4. Market Concentration Measures for the Large Appliances Industries: 1992

SIC Code/Description	Value of Shipments (10^6)	CR4	CR8	HHI
3585 - Refrigeration and Heating Equipment	$19,697.0	35%	51%	410
3589 - Service Industry Machinery	$5,344.6	14%	23%	102
3631 - Household Cooking Equipment	$2,950.0	60%	81%	1214
3632 - Household Refrigerators and Freezers	$4,232.4	82%	100%	1891
3633 - Household Laundry Equipment	$3,328.50	94%	NA	NA
3639 - Other Household Appliances	$3,169.10	70%	91%	1750

Notes: NA means data not available.

Source: U.S. Department of Commerce, Bureau of the Census. *1992 Census of Manufactures: Industry Series for Service Industry Machines* and *Household Appliances*.
U.S. Department of Commerce, Bureau of the Census. 1999. *Concentration Ratios in Manufacturing*.

[1] This means that the four largest firms in the Household Refrigerators and Freezers industry control 82 percent of the market and that the four largest firms in the Household Laundry Equipment industry control 94 percent of the industry.

The criteria for evaluating the HHIs are based on the 1992 Department of Justice's Horizontal Merger Guidelines. According to these criteria, industries with HHIs below 1,000 are considered unconcentrated (i.e., more competitive), those with HHIs between 1,000 and 1,800 are considered moderately concentrated (i.e., moderately competitive), and those with HHIs above 1,800 are considered highly concentrated (i.e., less competitive). In general, firms in less concentrated industries are more likely to be price takers, while those in more concentrated industries have more ability to influence market prices. Based on these criteria, the Refrigeration and Heating Equipment industry (SIC 3585) and the Service Industry Machinery industry (SIC 3589) are unconcentrated while the large household appliance industries (SICs 3631, 3632, and 3639) are more concentrated. Of the industries for which HHI data are available, the most concentrated industry is SIC 3632, the Household Refrigerators and Freezers industry. By the Horizontal Merger Guidelines, it is considered highly concentrated. The HHI data supports the conclusions drawn from the concentration ratio data.

The organization of the large household appliance industry has changed over the years. During the 1970s, 1980s, and early 1990s, it became increasingly saturated and competitive. This led to a period of consolidation where the number of manufacturers decreased but grew in size. At the end of this period of mergers, only a few full-line large household appliance producers dominated the industry: AB Electrolux, General Electric (G.E.), Maytag, and Whirlpool. Table 2-5 provides the market shares of these producers for certain large household appliances. The two producers with the largest market share in most of the markets are Whirlpool and General Electric.

The food service appliance industry has been extremely fragmented with numerous specialty manufacturers, but some consolidation did take place in the 1990s. The producer Hussman dominates the refrigerator display case market with 44 percent of the market and is also the largest seller of commercial food refrigeration systems (SEC, 1997). They sell refrigeration systems to supermarkets, convenience stores, restaurants, and florists. Two other food service appliance suppliers are Berisford, PLC and Specialty Equipment Companies. These firms supply commercial cooking and food warming equipment to hotels and restaurants.

Table 2-5. Market Shares of Selected Large Household Appliance Producers: 1997

Producer	Dishwasher Market Share	Washer Market Share	Dryer Market Share	Oven Range Market Share	Refrigerator Market Share
Electrolux	8%	8%	9%	9%	16%
G.E.	39%	16%	18%	49%	37%
Maytag	15%	21%	15%	17%	11%
Whirlpool	38%	52%	53%	20%	29%
Other	0%	3%	5%	5%	7%

Source: Appliance Manufacturer, *Special Report: 1998 Market Profile*. Volume 46, no. 5. p. 21 - 28.

The air conditioning and heating industry is difficult to characterize, as there are several different market segments within it. Also, the companies vary widely in the number and type of markets in which they participate. The industry as a whole is not very concentrated, but certain market segments within the industry may be served by only a few suppliers. The air conditioning market segment is quite competitive with no single firm possessing more than 14 percent of the market share. The largest heating and air-conditioning producer is United Technologies, through its subsidiary Carrier. The company also produces ventilating and refrigeration equipment. In the 1940s, Carrier had a 90 percent share of the heating and air-conditioning market; however this fell to a 37 percent share and since has continued to decline. The dehumidifier market is primarily served by two suppliers, Electrolux and Whirlpool, which continue to account for 60 percent of this market (Tardiff, 1998).

2.3.2 Manufacturing Facilities

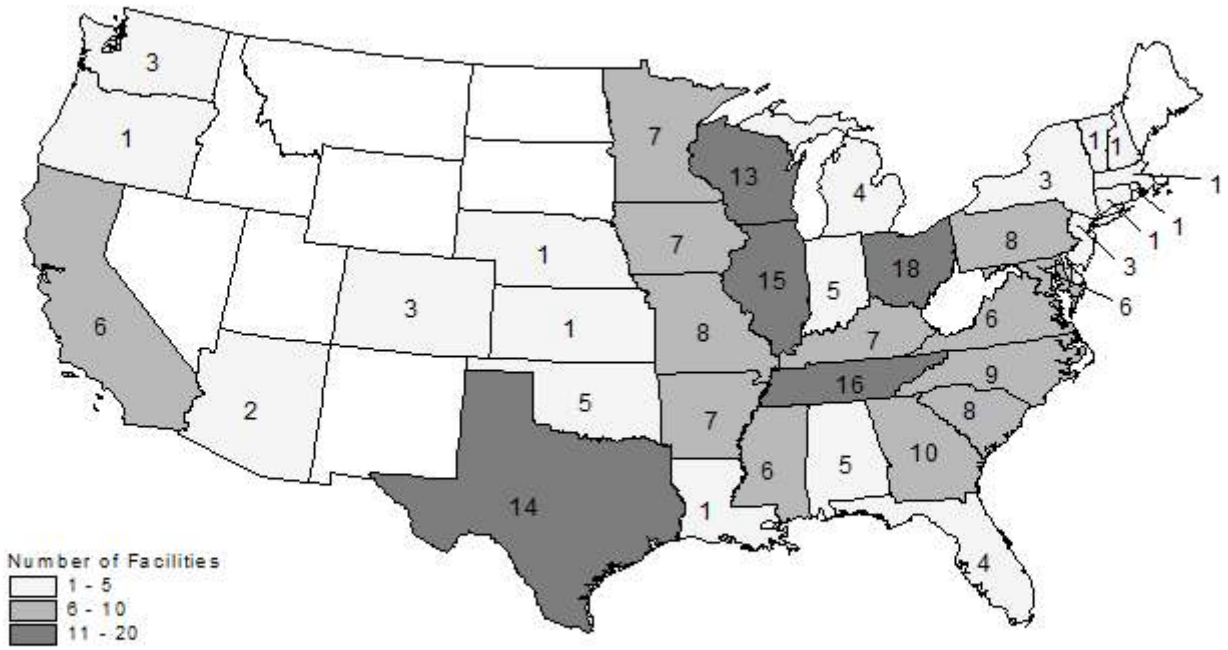
Based on responses to the Section 114 letters, the Agency identified 221 facilities within this source category, of which, 74 facilities (or 33.5 percent) are projected to be major

sources subject to the MACT standard and its associated costs. The survey responses identified two types of producers: integrated coaters and non-integrated coaters. Integrated coaters produce large appliances and then perform their own coating operations after the large appliances have been manufactured. Non-integrated coaters manufacture large appliances using pre-coated metal. From the survey, almost all large appliance manufacturers were identified as integrated coaters. Most choose this production method because the quality of the large appliances improves if the they are coated after manufacturing and assembly occurs.

Large appliance manufacturing facilities are located nationwide; however, there is a much larger concentration in the eastern half of the country. The states along the West Coast have some large appliance facilities, but nowhere near as many in comparison to the Midwest and the Southeast. In fact, only 36 facilities (16 percent) operate west of Kansas City. As shown in Figure 8-1, the states with the largest number of facilities are Ohio with 18, Tennessee with 16, Illinois with 15, Texas with 14, and Wisconsin with 13.

Facility size can be measured by the number of employees working in the facilities. Figure 8-2 shows the distribution of the potentially affected large appliance facilities by the number of employees. Of the 207 facilities reporting employment data, almost 50 percent have between 100 and 499 employees and 38 percent have more than 500 employees. Therefore, this figure illustrates that large appliance facilities tend to be larger in order to accommodate the manufacturing, assembling, and coating operations required to produce large appliances. Most producers require at least 100 employees to carry out the multiple stages required for large appliance production.

The distribution of coating operation employees across facilities can also be examined. Figure 8-3 shows the distribution of the potentially affected facilities by the number of employees working on coating operations. Of the 166 facilities reporting coating operations employment, almost 55 percent have fewer than 10 coating line employees and almost 89 percent have less than 50 coating line employees. This figure illustrates that coating operations do not require a large share of total large appliance facility employment. Most facilities conduct their coating operations with a small number of employees, possibly indicating that coating operations are relatively capital intensive. Only the largest facilities that manufacture a large number of appliances use more than 100 employees solely for coating operations.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6 - 10
11 - 20

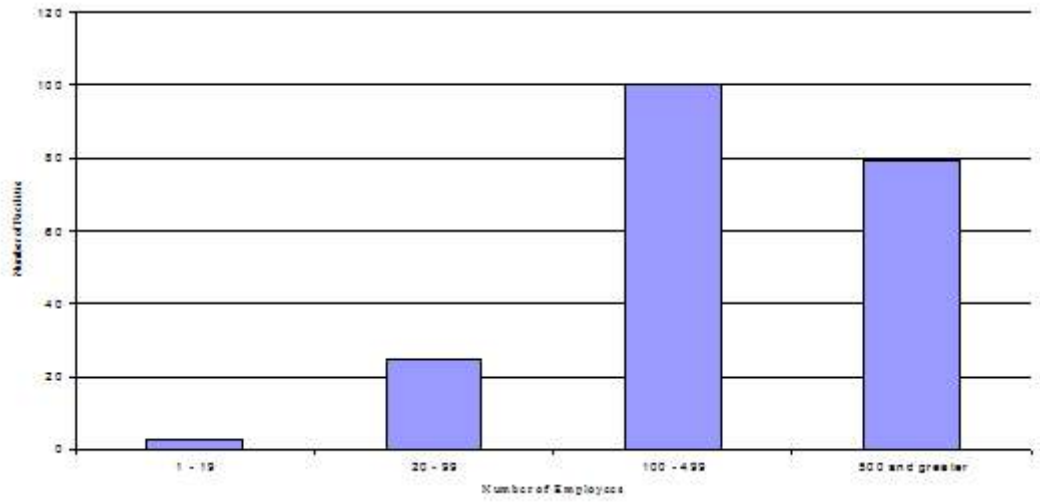


Figure 2-1. Location of Large Appliance Facilities By State

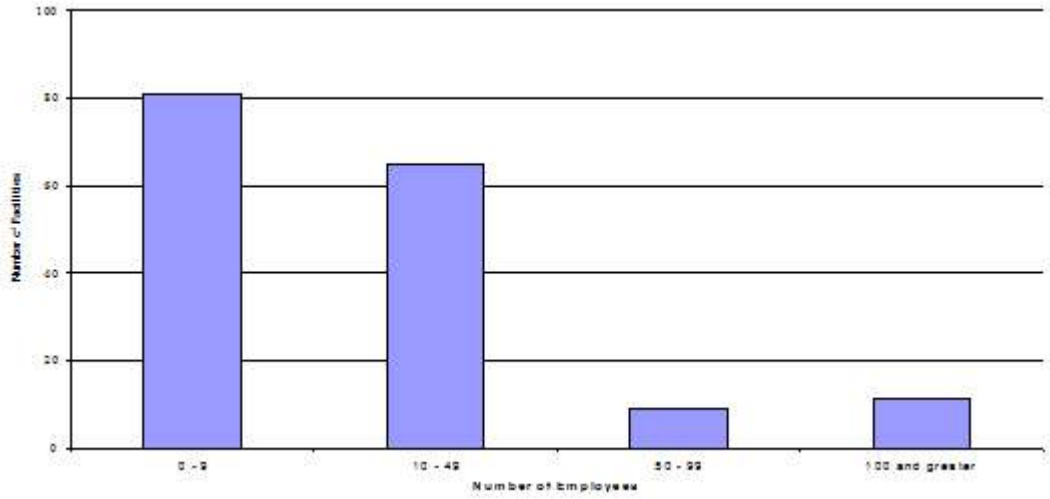


Figure 8-2. Employment Distribution of Large Appliance Coating Facilities: 1997

Source: U.S. EPA. 1998. *Preliminary Industry Characterization of Large Appliance Surface Coating Source Category*. Office of Air Quality Planning and Standards. EPA-450/3-80-037.

Figure 8-3. Employment Distribution of Coating Operations in Large Appliance Facilities: 1997

Source: U.S. EPA. 1998. *Preliminary Industry Characterization of Large Appliance Surface Coating Source Category*. Office of Air Quality Planning and Standards. EPA-450/3-80-037

2.3.3 Companies

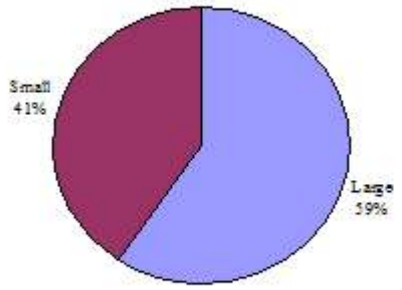
The Agency identified 84 ultimate parent companies within the large appliance coating source category and obtained their sales and employment data from either their survey response or one of the following secondary sources:

1. Dun and Bradstreet Market Identifiers (Dun & Bradstreet, 1999)
2. Hoover's Company Profiles (Hoover's, Incorporated, 1999)
3. Company Websites.

Appendix A provides a listing of these 84 companies that own and operate the 221 facilities within this source category.

Annual sales data was available for 83 of the companies (99 percent) and annual employment data was available for 74 of the companies (88 percent). The average (median) annual sales of companies reporting data were $2.5 billion ($155.9 million). This includes revenues from operations other than large appliance manufacturing. The average (median)

employment for these companies was 14,487 employees (1,481 employees). The top four companies in annual sales are:



4. General Electric Company – $88.5 billion with 276,000 employees,

5. United Technologies Corporation – $24.5 billion with 180,100 employees,

6. AB Electrolux – $14.5 billion with 99,322 employees, and

7. Emerson Electric – $13.4 billion with 111,800 employees.

Large appliance manufacturing companies can be grouped into small and large categories using Small Business Administration (SBA) general size standard definitions by SIC codes. For most SIC codes, the size standard is based on the number of employees but in some cases, the size standard is based on the annual sales of the company. Although responses by large appliance facilities to the industry survey indicated six different SIC codes, there are twenty-four different SIC codes across the ultimate parent companies owning these facilities. For these SIC codes, the small business definition ranges are 100 to 1,000 employees and $5 million in annual sales. Using these guidelines and available data, the Agency has identified 34 small businesses, or 40.5 percent of all companies within this source category. Figure 2-5 provides a breakdown of the large and small businesses.

Figure 2-5. Distribution of Owning Companies by Size:1997

For 1997, the annual average (median) sales for the small companies was $164.6 million ($19.9 million) and the average (median) employment was 183 employees (120 employees). For large companies, the annual average (median) sales was $4.1 billion ($799 million) and the average (median) employment was 21,320 employees (3,750 employees). Small companies owned and operated 38 large appliance facilities, or only 17.2 percent of the total within this source category. This reflects an average of 1.1 facility per company. Alternatively, the 50 large companies owned and operated 183 large appliance facilities, or 82.8 percent, with an average of 3.66 facilities per company.

Based on survey responses, Table 2-6 provides descriptive statistics for large appliance manufacturing facilities and their coating operations by ownership size. As expected, the average facility and coating operations employment levels are greater for large companies. The average number of employees in facilities owned by large companies is 730, while it is only 165 for small companies. For coating operations, facilities owned by large companies have an average of 33 employees, while the facilities owned by small companies have an average of 13 employees.

Table 2-6. Summary of Large Appliance Facility and Coating Operations Employment Data by Ownership Size: 1997

Descriptive Statistics	Employment in Small Companies	Employment in Large Companies	All Facilities
Facilities			

Average	165	730	637
Median	134	400	330
Minimum	11	22	11
Maximum	450	5,500	5,500
Coating Operations			
Average	13	33	29
Median	6	10	10
Minimum	1	1	1
Maximum	107	600	600

Notes: [a]Of the 221 large appliance facilities, 207 reported facility employment data. Of those reporting employment data, 38 facilities are owned by small companies and 169 are owned by large companies.
[b]Of the 221 large appliance facilities, 166 reported coating operations employment data. Of those reporting coating operation employment data 27 facilities are owned by small companies and 139 are owned by large companies.

Facilities owned by small companies may dedicate a smaller absolute number of employees to their coating lines, but the share of coating line employees to facility employees is higher than it is for large companies. Large companies dedicate an average of 4.5 percent of their employees to work on the coating lines, while small companies have 7.8 percent of their employees coating large appliances.

2.4 Market Data and Industry Trends

This section presents historical market data, including foreign trade and market prices for large appliances by the major industry segments. Historical market data include U.S. production, foreign trade, and apparent consumption of large appliances across the industry segments for the years 1993 through 1997. The importance of foreign trade is measured by concentration ratios, i.e., the relation of exports to U.S. production and the relative importance of imports to U.S. apparent consumption. Lastly, this section presents the quantities, values, and market prices for large appliances by industry segment, as represented by SIC codes.

2.4.1 U.S. Production and Apparent Consumption

The U.S. production, exports, imports, and apparent consumption of large appliances are presented by industry segment in this section. Table 2-7 presents historical data on production, foreign trade, and apparent consumption, while Table 2-8 presents the average annual growth rates of these measures for the large household appliances industry. As shown, the value of U.S. production and apparent consumption for the household appliance industry segments generally increased over the time period examined, with the exception of household laundry equipment.

During the early 1990s, growth of the large household appliance market had slowed due to consolidation and fewer opportunities for companies to expand. However, a reduction in interest rates in 1992 led to an increase in home building. It continued to rise through 1997 in response to a strong U.S. economy and high levels of consumer spending and construction activity. New large household appliances were purchased by construction companies and contractors so they could be installed into the homes they built. Consumer expenditures also rose during this time period and with it came a surge in home remodeling (Tardiff, 1998). As home owners remodeled, they often upgraded their large household appliances. This led to increased demand for both new and replacement household appliances during the 1990s. The largest increases in the value of production from 1993 to 1997 were for Household Refrigerators and Freezers (SIC 3632) and Other Household Appliances (SIC 3639). The average annual growth rates, discussed next and displayed in Table 2-8, confirms these increases in production value for these segments of large household appliances.

Table 2-7. Market Data for Large Household Appliances: 1993 - 1997 (1997 10^6)

Year	Production	Exports	Imports	Apparent Consumption

SIC 3631 - Household Cooking Equipment				
1993	$3,055.9	$262.0	$890.4	$3,684.4
1994	$3,228.7	$259.2	$1,283.7	$4,253.2
1995	$3,289.6	$219.3	$1,375.9	$4,446.2
1996	$3,333.2	$464.3	$1,459.6	$4,328.5
1997	$3,244.5	$472.4	$837.8	$3,609.9
SIC 3632 - Household Refrigerators and Freezers				
1993	$4,268.0	$650.3	$295.1	$3,912.8
1994	$4,839.8	$689.5	$325.7	$4,476.0
1995	$4,753.2	$658.6	$343.9	$4,438.5
1996	$5,120.3	$704.4	$386.3	$4,802.2
1997	$5,002.4	$739.7	$449.7	$4,712.5
SIC 3633 - Household Laundry Equipment				
1993	$3,299.8	$302.9	$35.6	$3,032.5
1994	$3,275.5	$336.6	$74.0	$3,012.8
1995	$3,032.8	$297.4	$101.1	$2,836.6
1996	$3,141.4	$341.0	$129.5	$2,929.9
1997	$3,216.0	$378.3	$129.7	$2,967.4
SIC 3639 - Other Household Appliances				
1993	$2,413.4	$109.0	$299.1	$2,603.6
1994	$2,815.6	$113.2	$328.3	$3,030.8
1995	$2,718.0	$128.8	$602.1	$3,191.3
1996	$2,855.5	$105.1	$315.0	$3,065.4
1997	$2,886.9	$129.2	$349.7	$3,107.4

Table 2-7. Market Data for Large Household Appliances: 1993 - 1997 (1997 $10^{6}) continued

Year	Production	Exports	Imports	Apparent Consumption
All Household Appliances				
1993	$13,037.1	$1,324.2	$1,520.2	$13,233.1
1994	$14,159.6	$1,398.5	$2,011.7	$14,772.8
1995	$13,793.6	$1,304.1	$2,423.0	$14,912.5
1996	$14,450.4	$1,614.8	$2,290.4	$15,126.0
1997	$14,349.8	$1,719.6	$1,766.9	$14,397.1

Source: U.S. Department of Commerce, Bureau of the Census. 1993 - 97. *Current Industrial Reports: Major Household Appliances* and *Refrigeration, Air Conditioning, and Warm Air Heating Equipment.*

Overall, the average annual growth rates for production and consumption are extremely similar within each SIC code, as shown in Table 2-8. The similarities in the growth rates for production and consumption, along with the relatively low quantities of exports and imports, implies that many of the large household appliances produced in the U.S. were consumed in the U.S. The average annual growth rates for imports and exports were also calculated and are displayed in Table 2-8. These rates look large relative to the growth rates calculated for production and apparent consumption, but in actuality, the overall value of foreign trade is quite low in comparison to the value of production and apparent consumption. In other words, the absolute values of exports and imports are small, therefore fluctuations in their values translates into large changes in annual growth rates. As the next section on foreign trade measures will show, neither exports nor imports of large appliances is large relative to the production and consumption of U.S. produced large appliances.

Table 2-9 displays the market data associated with the commercial refrigeration and heating equipment industry. The average value of production in this industry is $18.6 billion and the average annual growth rate of production is 7.2 percent. This average growth rate is much higher than the rate of 2.5 percent for all large household appliances.

Table 2-8. Average Annual Growth Rates for Large Household Appliances by Industry Segment: 1993 - 1997

SIC Code	Production	Exports	Imports	Apparent Consumption
3631	1.55%	24.25%	3.71%	0.18%
3632	4.26%	3.38%	11.17%	4.97%
3633	-0.55%	6.27%	43.18%	-0.48%
3639	4.84%	5.54%	14.12%	4.78%
All SICs	2.52%	7.29%	6.11%	2.30%

Source: U.S. Department of Commerce, Bureau of the Census. 1993 - 97. *Current Industrial Reports: Major Household Appliances* and *Refrigeration, Air Conditioning, and Warm Air Heating Equipment.*

Table 2-9. Market Data and Growth Rates for Commercial Refrigeration and Heating Equipment (SIC 3585): 1993 - 1997 (1997 10^6)

Year	Production	Exports	Imports	Apparent Consumption
1993	$15,333.2	$1,733.4	$1,185.0	$14,784.8
1994	$18,176.3	$1,292.7	$1,172.5	$18,056.2
1995	$18,998.6	$1,576.7	$1,252.8	$18,674.8
1996	$20,640.4	$1,458.1	$1,245.9	$20,428.2
1997	$20,013.4	$1,538.4	$1,198.7	$19,673.7
Average Annual Growth Rates				
1993 - 1997	7.2%	-1.4%	0.4%	7.8%

Source: U.S. Department of Commerce, Bureau of the Census. 1993 - 97. *Current Industrial Reports, Major Household Appliances* and *Refrigeration, Air Conditioning, and Warm Air Heating Equipment.*

While the average annual growth rate of household appliance production is lower than it is for commercial refrigeration and heating equipment production, the export and import data reveal a higher degree of international trade in the large household appliance market. The values of exports are similar in the two industry segments, but the value of production is higher in the commercial refrigeration and heating equipment market. Exports therefore represent a larger share of large household appliance production than they do of commercial

refrigeration and heating equipment. A similar conclusion can be drawn from an examination of import values. A comparison of the value of imports across industry segments reveals that the average import value is higher in the household appliance market. This means that U.S. demand for foreign household appliances is higher than that of the refrigeration and heating equipment industry.

Table 2-10 provides market data on the service industry machinery segment of the large appliances industry. It is the smallest segment of the entire large appliances industry, with an average value of production equal to $6.8 billion. The values of production are the lowest of the three large appliance industry segments, however, this segment has the largest average annual growth rate for both production and apparent consumption. The average annual growth rate of the value of production for the service machinery market is 8 percent.

Table 2-10. Market Data and Growth Rates for Service Industry Machinery (SIC 3589): 1993 - 1997 (1997 10^6)

Year	Production	Exports	Imports	Apparent Consumption
1993	$6,065.1	$179.4	$127.7	$6,013.4
1994	$6,422.8	$195.2	$129.6	$6,357.1
1995	$7,068.4	$241.4	$131.8	$6,958.9
1996	$7,641.3	$287.0	$157.5	$7,511.8
1997	NA	$309.0	$172.2	NA
Annual Average Growth Rates				
1993 - 1997	8.0%	14.7%	8.0%	7.7%

Notes: NA means data not available.

Source: U.S. Department of Commerce, Bureau of the Census. 1993 - 97. *Current Industrial Reports, Major Household Appliances* and *Refrigeration, Air Conditioning, and Warm Air Heating Equipment*.
U.S. Department of Commerce, Bureau of the Census. 1993 - 96. *Annual Survey of Manufactures*.

2.4.2 Foreign Trade

Average foreign trade concentration ratios can be examined by industry segment and SIC code to determine the share of U.S. large appliance production sold abroad and the share of U.S. consumption supplied from abroad. Table 2-11 shows a higher degree of international trade occurred in the large household appliances market while very little occurred in the service industry machinery market. While some of the large household appliances produced in the U.S. were exported, very little domestically produced service industry machinery went to supply the foreign large appliance market. Examination of the import side from the U.S. perspective shows that consumption of certain household appliances, such as cooking equipment and other household appliances, relied heavily on foreign supply. Consumption of service industry machinery, however, relied mainly on domestically produced products.

Table 2-11. Average Foreign Trade Concentration Ratios by SIC Code: 1993 - 1997

Description/SIC Code	Exports as a Share of U.S. Production	Imports as a Share of U.S. Apparent Consumption
Large Household Appliances	11.98%	12.27%
Household Cooking Equipment (SIC 3631)	10.35%	28.44%
Service Industry Machinery (SIC 3632)	14.38%	8.03%
Household Laundry Equipment (SIC 3633)	10.38%	3.20%
Other Household Appliances (SIC 3639)	4.29%	12.54%
Commercial Refrigeration and Heating Equipment (SIC 3585)	8.29%	6.68%
Service Machinery (SIC 3589)	3.30%	2.04%

Source: U.S. Department of Commerce, Bureau of the Census. 1993 - 97. *Current Industrial Reports, Major Household Appliances* and *Refrigeration, Air Conditioning, and Warm Air Heating Equipment.* U.S. Department of Commerce, Bureau of the Census. 1993 - 96. *Annual Survey of Manufactures.*

Between these two extremes is the commercial refrigeration and heating market. Commercial refrigeration and heating equipment was imported and exported more than service industry machinery, but the foreign trade concentration ratios for this market show that there was not a heavy reliance on international trade. Exports of commercial

refrigeration and heating equipment were a larger share of U.S. production (8.3 percent) than imports were of apparent U.S. consumption (6.7 percent).

Within the household appliances industry, exports as a share of U.S. production range between 10 and 14 percent for cooking equipment, service industry machinery, and laundry equipment. The exported share of other household appliances was much smaller at approximately 4.3 percent. What stands out about the foreign trade of large household appliances is the share of cooking equipment consumed in the U.S. from abroad. Over 28 percent of household cooking equipment consumed here was imported. The U.S. therefore relies heavily on the foreign supply of cooking equipment. In contrast, the consumption of household laundry equipment does not rely on as heavily on foreign supply, since only 3.2 percent consumed was from abroad.

2.4.3 Market Prices

Using quantity and value of shipments data from the U.S. Department of Commerce, unit prices by large appliance industry segment can be calculated. Table 2-12 shows the market prices, which were derived by dividing the value of shipments by the number of units produced. The price variations seem to be consistent with the product categories they represent. Household refrigerators and freezers are the most expensive household appliance with a price of $438 per unit, followed by household laundry equipment at $263 per unit, and household cooking equipment at $178 per unit. Other household appliances have the lowest market price of all household appliances at $130 per unit. These tend to be smaller appliances, such as sewing machines and garbage disposal units. The products in the Refrigeration and Heating Equipment (SIC 3585) and Household Laundry Equipment (SIC 3633) market segments have market prices around $250.

Table 2-12. Quantity, Value of Shipments, and Market Prices by Large Appliance Industry Segment: 1997

Industry Segment/SIC Code	Quantity (10^6 units)	Value of Shipments ($\$10^6$)	Market Prices ($/unit)
All Household Appliances	63.81	$14,205.5	$222.66
Household Cooking Equipment (SIC 3631)	18.24	$3,244.5	$177.88
Household Refrigerators and Freezers (SIC 3632)	11.09	$4,858.2	$437.98
Household Laundry Equipment (SIC 3633)	12.28	$3,216.0	$262.80
Other Household Appliances (SIC 3639)	22.20	$2,886.8	$130.04
Refrigeration and Heating Equipment (SIC 3585)	70.25	$17,517.0	$249.35
Service Industry Machinery (SIC 3639)	NA	NA	NA

Note: NA means data not available.

Source: U.S. Department of Commerce, Bureau of the Census. 1997. *Current Industrial Reports: Major Household Appliances* and *Refrigeration, Air Conditioning, and Warm Air Heating Equipment*.

3 ECONOMIC IMPACTS

The MACT standards on large appliance manufacturing facilities require major source producers to reduce the level of HAPs in their coatings and solvents to meet the levels specified by the floor. The costs of meeting the MACT standards will vary across facilities depending upon their physical characteristics and current usage of coatings and solvents. These regulatory costs will have financial implications for the affected producers, and broader implications as these effects are transmitted through market relationships to other producers and consumers. These potential economic impacts are the subject of this section.

Inputs to the economic analysis include:

- Baseline characterization of large appliance manufacturing facilities based on responses to the Section 114 letters.
- Baseline market data as projected from industry and secondary sources.
- Compliance cost estimates for individual facilities (through model plants) to meet the MACT floor standards.

The Agency has estimated the national total annual compliance costs for this regulation on existing sources to be $1.63 million in 1997. Because these costs are such a small share of the coating operations and overall economic activity at large appliance coating facilities, the analysis focuses on the magnitude and distribution of these costs across these entities (facilities and coating operations) and their products (large appliances). The following subsections address the economic impacts of the regulation on large appliance manufacturing facilities, coating lines at these facilities, and the product markets served by these facilities.

3.1 Facility Impacts

Absent facility-level sales data, the Agency measured the economic impact on large appliance facilities based on the compliance costs incurred per facility and per facility employee. Although these costs directly impact only the 74 major source facilities, the facility impacts presented in this section account for all entities because of its focus on the distribution of costs. As described in Section 2, these facilities may be categorized by the type of large appliance produced (household appliances, refrigeration and heating equipment, or service industry machinery) and by ownership size (owned by small or large company). The economic impacts on these facilities are presented for both categories. The projected economic impacts on the owners of these facilities are provided in Section 4.

3.1.1 Impacts Across Industry Segments (Product Type)

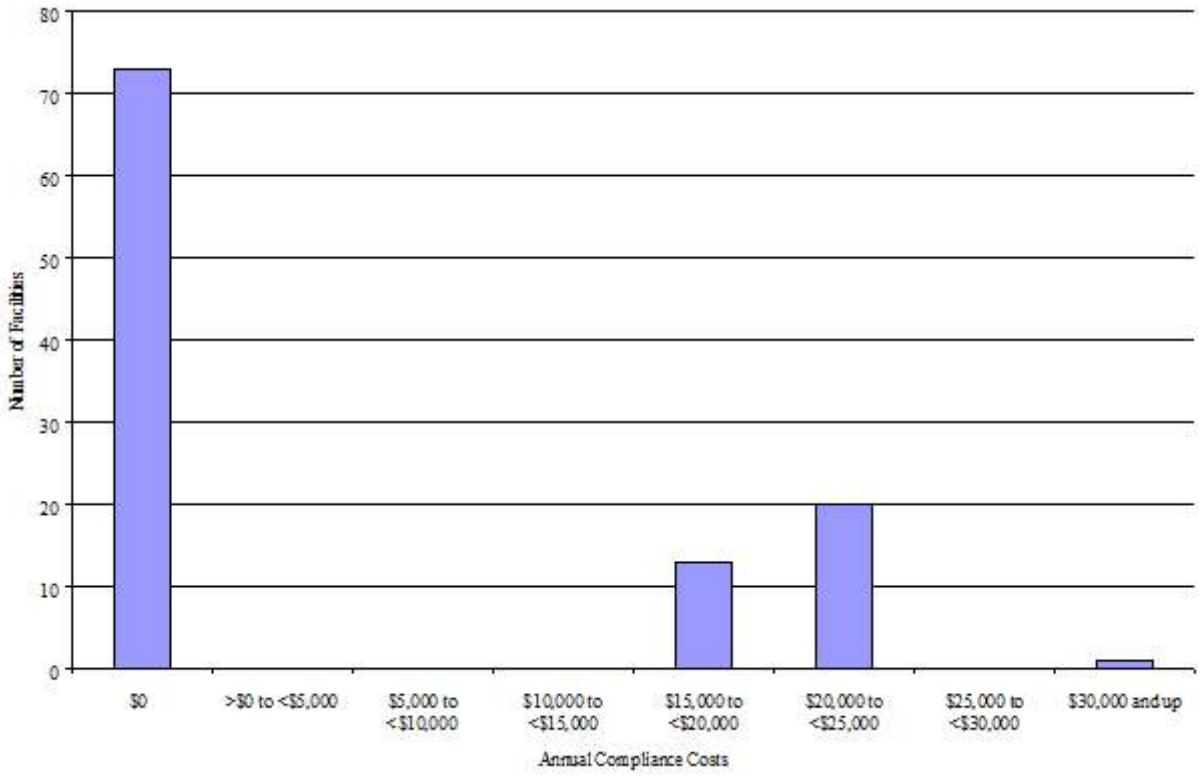
Table 3-1 summarizes the magnitude and distribution of compliance costs across facilities by product type. Because some facilities reported multiple SIC codes or listed no SIC code, a category of "Others" was created to account for these facilities. Facilities in the household appliance industry segment are expected to incur 35 percent of the total annual compliance costs of the regulation ($567,870 of $1.63 million for all facilities), while refrigeration and heating equipment facilities incur 40 percent ($654,610). Facilities that produce service industry machinery are expected to only incur only 8 percent ($124,750).

Table 3-1. Summary of Compliance Cost Burden on Large Appliance Facilities by Industry Segment:1997

Compliance Costs	Industry Segment				Total Industry
	Household Appliances	Refrigeration and Heating	Service Machinery	Others[a]	
Total Facilities (#)	43	107	18	53	221
Major Sources (#)	21	35	6	12	74
Share of Total (%)	49%	33%	33%	23%	34%
Total Costs ($/yr)	$567,870	$654,610	$124,750	$283,660	$1,630,890
Per Facility ($/yr)					
Average	$13,205	$6,120	$6,930	$5,350	$7,380
Median	$0	$0	$0	$0	$0
Minimum	$0	$0	$0	$0	$0
Maximum	$41,500	$41,500	$21,625	$41,500	$41,500
Per Facility Employee ($/yr)					
Average	$16	$16	$22	$27	$19
Median	$0	$0	$0	$0	$0
Minimum	$0	$0	$0	$0	$0
Maximum	$204	$250	$155	$355	$355

Notes: [a]Includes facilities reporting multiple SICs or not reporting a SIC at all (i.e., residual category)

The refrigeration and heating equipment facilities face the largest share of compliance costs since this segment has the largest absolute number of major source facilities (35 out of 74 major source facilities). However, the average compliance cost per facility of $6,120 for this industry segment is lower than the average cost per facility for household appliances ($13,205). This is because there is a relatively larger number of household appliance facilities that are major sources (49 percent) and, therefore, incur compliance costs. The cost estimates shown in Table 3-1 also indicate that the distribution of costs across facilities is skewed toward the lower impact levels, i.e., the median value is equal to zero in every case and therefore less than each average value. As illustrated in Figure 3-1 for the refrigeration and heating equipment segment, this outcome results from the fact that a large number of facilities within this source category are not major sources and, therefore, do not incur



compliance costs. Furthermore, as shown in Table 3-1, similar relative impacts for costs per facility employee are observed across industry segment.

Figure 3-1. Distribution of Annual Compliance Costs for Refrigeration and Heating Equipment Facilities: 1997

Table 3-1 examines the distribution of compliance costs across the three major segments of the large appliances industry; however, this aggregation masks differences across the household appliances segment which includes four SIC codes. The facilities manufacturing products for the other industry segments are each covered by one SIC code only. Table 3-2 examines the compliance costs per facility by SIC code within the household appliances industry segment to illustrate the distribution of costs across these facilities.

Table 3-2. Summary of Compliance Cost Burden on Large Household Appliance Facilities by SIC Code:1997

Compliance Costs	SIC 3631	SIC 3632	SIC 3633	SIC 3639	All HH App. Facilities
Total Facilities (#)	10	9	8	16	43
Major Source (#)	3	4	6	8	21
Share of Total (%)	30%	44%	75%	50%	49%
Total Costs ($/yr)	$61,180	$73,820	$229,120	$203,750	$567,870
Per Facility ($/yr)					
Average	$6,120	$8,200	$28,640	$12,735	$13,205
Median	$0	$0	$41,500	$8,165	$0
Minimum	$0	$0	$0	$0	$0
Maximum	$21,625	$21,625	$41,500	$41,500	$41,500
Per Facility Employee ($/yr)					
Average	$10	$28	$19	$12	$16
Median	$0	$0	$19	$5	$0
Minimum	$0	$0	$0	$0	$0
Maximum	$72	$204	$49	$44	$204

The Household Laundry Equipment (SIC 3633) and Other Household Appliances (SIC 3639) facilities bear larger shares of the total costs on all household appliance facilities with 40 percent and 36 percent, respectively. However, the per facility compliance costs for SIC 3633 are much higher than they are for SIC 3639 because there relatively more of these facilities that are major sources and incur compliance costs. The compliance costs per facility for Household Cooking Equipment (SIC 3631) and Household Refrigerators and Freezers (SIC 3632) are relatively lower, but an examination of the compliance costs per facility employee reveals relatively higher costs for SIC 3632. This higher cost figure is due to the smaller number of employees working in facilities that produce refrigerators and freezers.

3.1.2 Impacts Across Ownership Size

Table 3-3 summarizes the magnitude and distribution of compliance costs across facilities by ownership size. Facilities owned by small companies (as defined in Section 2) are expected to incur only 9 percent of the total annual compliance costs of the regulation

($150,200 of $1.63 million for all facilities), while facilities owned by large companies incur the remaining 91 percent, or $1.48 million). Furthermore, the relative impact of these costs per facility is much lower for facilities owned by small companies at $3,950 per year compared to the average across all facilities at $7,380 per year. The annual cost per facility for those owned by large companies is higher than the industry average at $8,090 per year. Similar to the earlier table, the estimates here indicate that the distribution of costs across facilities is skewed toward the lower impact levels, i.e., the median value is equal to zero in every case, and is therefore lower than each average value. The compliance cost per facility employee can also be examined. The facilities owned by small companies face a cost burden per employee of $31, which exceeds the cost burden of $19 per employee across all the facilities. This is because there are fewer employees working in facilities owned by the smaller companies, thereby leading to a higher average cost per facility employee.

Table 3-3. Summary of Compliance Cost Burden on Large Appliance Facilities by Ownership Size: 1997

Compliance Cost	Facilities Owned by		All Facilities
	Small Companies	Large Companies	
Total Facilities (#)	38	183	221
Major Sources (#)	9	65	74
Share of Total (%)	24%	36%	33%
Total Costs ($/yr)	$150,180	$1,480,710	$1,630,890
Per Facility ($/yr)			
Average	$3,950	$8,090	$7,380
Median	$0	$0	$0
Minimum	$0	$0	$0
Maximum	$17,930	$41,500	$41,500
Per Facility Employee ($/yr)			
Average	$31	$17	$19
Median	$0	$0	$0
Minimum	$0	$0	$0
Maximum	$204	$355	$355

3.3 Market Impacts

In conducting an economic impact analysis, the Agency typically models the responses by producers and markets to the imposition of the proposed regulation. The alternatives available to producers in response to the regulation and the context of these choices are important in determining the economic and financial impacts. Economic theory predicts that producers will take actions to minimize their share of the regulatory costs. Producers decide whether to continue production and, if so, determine the optimal level consistent with market signals. These choices and market feedback allow them to pass costs forward to the consumers of their end-products or services and/or to pass costs backward to the suppliers of production inputs. However, based on the small absolute and relative magnitudes of the estimated regulatory costs, the Agency focuses the economic impact analysis on the initial distribution of costs across facilities and coating lines presented above. The financial impact of the regulation on affected businesses is analyzed in Section 4.

Table 3-7 presents total annual compliance costs per unit of output produced and as a share of the value of shipments for the major industry segments affected by this regulation. These estimates are also provided for each SIC code within the large household appliances industry segment. Because value of shipments data and quantity data are unavailable for the service industry machinery segment, the following discussion will focus only on the household appliances and refrigeration and heating industry segments.

Table 3-7. Effect of Compliance Costs on Large Appliance Producers by Industry Segment : 1997

Industry Segment	Compliance Costs		Cost Share[b] (%)
	Total ($/yr)[a]	Per Unit of Output ($/unit)	
Household Appliances	$567,870	$0.01	0.004%
SIC 3631	$61,180	<$0.01	0.002%
SIC 3632	$73,820	$0.01	0.002%
SIC 3633	$229,120	$0.02	0.007%
SIC 3639	$203,750	$0.01	0.007%
Refrigeration and Heating (SIC 3585)	$654,610	$0.01	0.004%
Service Machinery (SIC 3589)	$124,750	NA	NA

Notes: [a]Total compliance cost reflects those costs faced by facilities reporting SIC codes within these groupings and, thus, does not account for those facilities with multiple SIC codes across groupings or not reporting an SIC code.

[b]Relative cost shares are the same for both shipments and price, i.e., the total compliance costs divided by the value of shipments is equal to total compliance cost per unit divided by the value of shipments per unit, i.e. market price.

Table 3-7 shows that compliance costs are an extremely small share of the value of shipments. In both the household appliances and refrigeration and heating industry segments, costs are less than 0.01 percent of the value of shipments; therefore, indicating that the costs of meeting this regulation would not significantly change market prices or output. If the large appliance producers were to partially or fully absorb the costs of complying with this rule, market prices would either increase by less than the amount shown in Table 3-7 or not at all. For both household appliances and refrigeration and heating equipment, market prices would increase less than one cent per unit on average with full cost pass-through to consumers. This would indicate that compliance costs incurred by these large appliance industry segments are trivial and have an insignificant effect on prices. Within the household appliances industry segment, the largest impact is 2 cents per unit of output for Household Laundry Equipment (SIC 3633). This would increase market price for 1997 (as shown previously in Table 2-11) from $262.80 to $262.82.

3.4 Social Costs and Distributional Impacts

The social cost of a regulation should represent its opportunity cost, which is the value of goods and services that society foregoes to allocate resources to the pollution control activity. The social costs stem from the regulation's effect on market outcomes and will extend to the many consumers and producers of large appliances. For this analysis, based on applied welfare economics principles, social costs are measured as the sum of the regulation induced changes in consumer and producer welfare (otherwise known as 'surplus'). Consumers experience reductions in their surplus because of increased market prices and reduced levels of consumption. Producers may experience either increases or decreases in their surplus (i.e., profits) as a result of increased market prices and changes in production levels and compliance costs. However, it is important to emphasize that these surplus measures do not include benefits that occur outside the market, that is, the value of reduced levels of air pollution with the regulation.

The national estimate of compliance costs is often used as an approximation of the social cost of the rule. Under the MACT Floor, the engineering analysis estimated annual costs of $1.63 million on existing sources. However, this estimate does not account for behavioral responses by producers or consumers to the imposition of the regulation (e.g., shifting costs to other economic agents, closing product lines or facilities). Accounting for these responses results in a social cost estimate that differs from the engineering estimate and provides insights on how the regulatory burden is distributed across society (i.e., the many consumers and producers of large appliances). The economic welfare impacts of the regulation on producers and consumers can be considered under three different scenarios:

8. full-cost absorption by producers,
9. full-cost pass-through to consumers, and
10. partial-cost pass-through to consumers.

Full-cost absorption lacks any accounting for behavioral responses to regulation and in this scenario, producers bear the full compliance costs of the regulation. The other scenarios account for behavioral responses to regulation both by consumers and producers. Full-cost pass-through refers to a situation where producers are able to pass the social costs of the regulation fully onto consumers. Alternatively, partial-cost pass-through refers to a situation where regulatory costs are borne both by consumers and producers.

3.4.1 Full-Cost Absorption

Under full-cost absorption, producers have no behavioral response to the implementation of a regulation. The full regulatory compliance costs are incurred by affected facilities, whose owners experience a loss in profits equal to that amount, i.e., $1.63 million. Since output is unchanged, market prices remain the same under the full-cost absorption scenario and consumers continue to demand the same quantity. As shown in Table 3-8, the welfare change is composed entirely by a loss in producer surplus with no change (by assumption) in consumer surplus in this case.

Table 3-8. Economic Welfare Impacts of Large Appliance MACT on Producers, Consumers, and Society

Stakeholders	Welfare Change (10^6)		
	Full-Cost Absorption	**Partial-Cost Pass-Through (Fig. 3-2)**	**Full-Cost Pass-Through (Fig. 3-1)**
Producers	- $1.63	- $0.81	$0
Consumers	$0	- $0.81	- $1.62
Society	- $1.63	- $1.62	- $1.62

Note: Welfare impacts for partial-cost pass-through and full-cost pass-through scenarios were estimated using a simple partial equilibrium model using market data from the industry profile with assumed supply and demand elasticities of 1 and -1, respectively.

3.4.2 Full-Cost Pass-Through

Under full-cost pass-through, producers can pass the entire burden of the regulation onto consumers of large appliances. In Figure 3-1, the demand of consumers is represented by the downwards-sloping curve D and the original supply curve of producers is represented by S_0. Implementing the regulation results in a shift in the supply curve from S_0 to S_1. This leads to an increase in the market price from P_0 to P_1 to incorporate the compliance costs. This rise in price leads consumers to purchase a smaller quantity, Q_1, as can be seen by

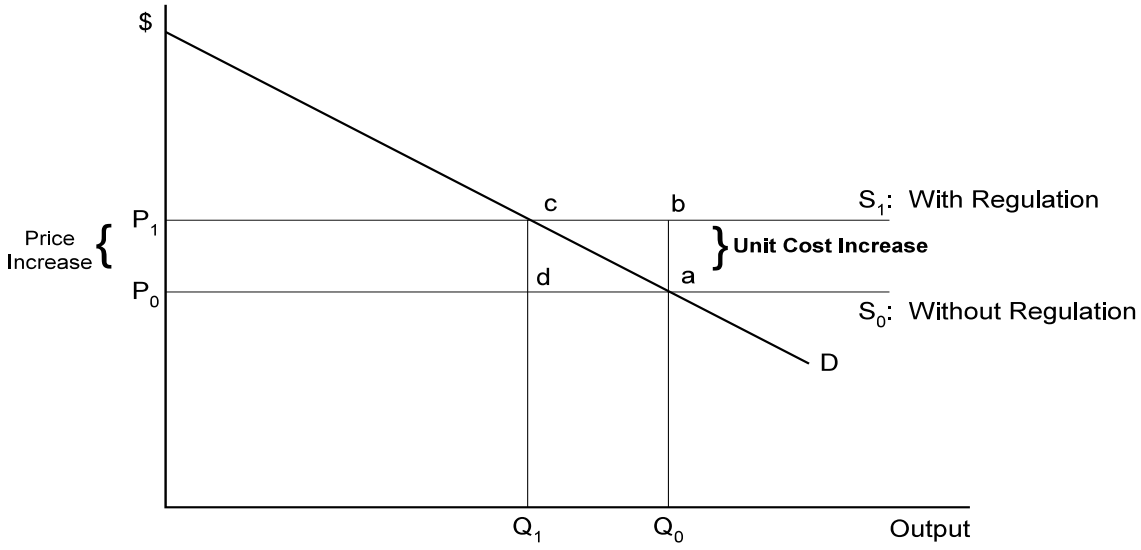


Figure 3-1. Full-Cost Pass-Through of Regulatory Costs

examining the market demand curve (the new equilibrium point c). As shown in Figure 3-1, the loss in consumer surplus here is the area P_0acP_1, which is less than the full compliance costs, i.e., area P_0abP_1, because consumers reduce their consumption from Q_0 to Q_1. Thus, as shown in Table 3-8, the welfare change is composed entirely by a loss in consumer surplus of $1.62 million with no change in producer surplus.

3.4.3 Partial-Cost Pass-Through

The economic welfare effects of a partial cost pass through can be examined by referring to Figure 3-2. In this case, both consumers and producers experience a change in welfare. Once again market demand is represented by a standard downward-sloping curve. The supply curve is represented as an upward-sloping curve; equilibrium is determined by the intersection. The effect of the regulation is to shift the supply curve from S_0 to S_1. This will lead to a change in both consumer and producer surplus. The loss in consumer surplus is represented by the area P_0bcP_1. This loss in surplus occurs because consumers face a higher price for large appliances and as a response, they purchase a smaller quantity. The net change in producer surplus is equal to the area abde (loss) - P_0dcP_1 (gain due to a transfer from consumers). Combining the losses in surplus leads to the social costs of the regulation, which is equal to the area abce. This is less than the full compliance costs represented by

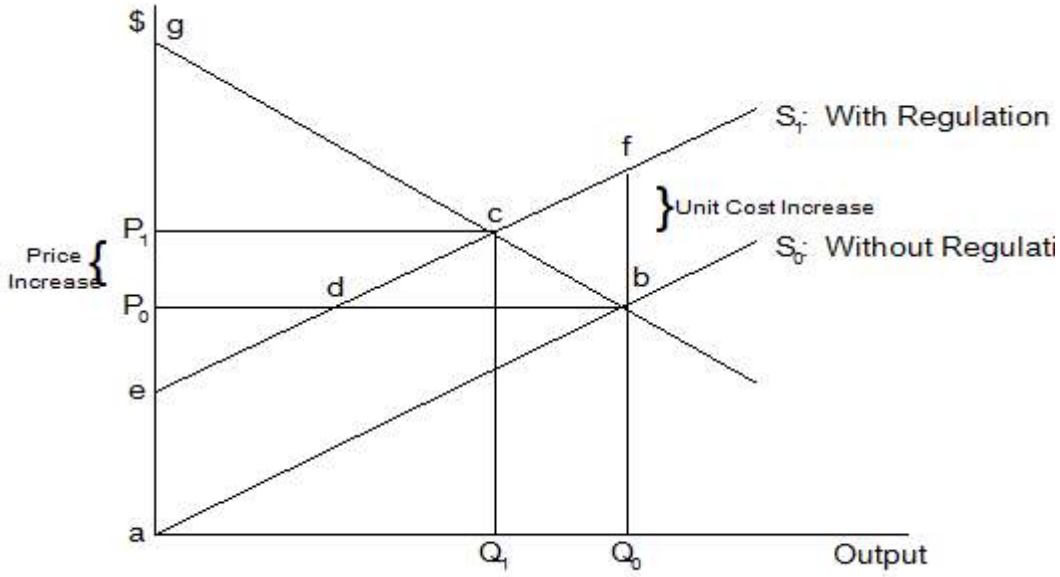


Figure 3-2. Partial-Cost Pass-Through of Regulatory Costs

area abfe in Figure 3-2. Thus, as shown in Table 3-8, the welfare change here is $1.62 million and is composed of a change in both consumer surplus ($0.81 million) and producer surplus ($0.81 million).

3.4.4 Summary

As summarized in Table 3-8, the economic welfare impacts for producers, consumers, and society as a whole vary across the three scenarios considered. The largest economic impact would occur if producers made no behavioral change in response the regulation and were to fully absorb the compliance costs of $1.63 million. Consumers would bear no costs; therefore, the total welfare change of society would be equal to the change in welfare experienced by producers. Under partial-cost pass-through, both producers and consumers experience a welfare change with the total loss in welfare being slightly less than the full compliance costs. In full-cost pass-through, the reduction in welfare for consumers is also slightly less than the full compliance costs of $1.63 million. However, the trivial magnitude of these costs, i.e., per unit costs of less than $0.01, results in little difference in the overall welfare impacts across these scenarios.

4 SMALL BUSINESS IMPACTS

This regulatory action will potentially affect the economic welfare of owners of large appliance coating facilities. The ownership of these facilities ultimately falls on private individuals who may be owner/operators that directly conduct the business of the firm (i.e., "mom and pop shops" or partnerships) or, more commonly, investors or stockholders that employ others to conduct the business of the firm on their behalf (i.e., privately-held or publicly-traded corporations). The individuals or agents that manage these facilities have the capacity to conduct business transactions and make business decisions that affect the facility. The legal and financial responsibility for compliance with a regulatory action ultimately rests with these agents; however, the owners must bear the financial consequences of the decisions. While environmental regulations can affect all businesses, small businesses may have special problems in complying with such regulations.

The Regulatory Flexibility Act (RFA) of 1980 requires special consideration be given to small entities affected by federal regulation. The RFA was amended in 1996 by the Small Business Regulatory Enforcement Fairness Act (SBREFA) to strengthen the RFA's analytical and procedural requirements. Under SBREFA, the Agency implements the RFA as written with a regulatory flexibility analysis required only for rules that will have a significant impact on a substantial number of small entities. This section examines the Large Appliance industry and provides a screening analysis to determine whether this rule is likely to impose a significant impact on a substantial number of the small entities (SISNOSE) within this industry. The screening analysis employed here is a "sales test," which computes the annualized compliance costs as a share of sales for each company.

Based on facility responses to the Section 114 letters, the Agency identified the ultimate parent company and obtained their sales and employment data from either their survey response or one of the following secondary sources:

- Dun and Bradstreet Market Identifiers (Dun & Bradstreet, 1999),
- Hoover's Company Profiles (Hoover's Incorporated, 1999), and
- Company Websites.

Appendix A provides a listing of the 84 companies that own and operate the 221 potentially affected facilities within this source category.

The Small Business Administration (SBA) defines a small business in terms of the sales or employment of the owning entity. These thresholds vary by industry and are evaluated based on the industry classification (SIC Code) of the impacted facility. Responses to the industry survey indicated multiple SIC codes with small business definitions ranging from 100 to 1,000 employees and $5 million in annual sales. The Agency developed a company's size standard based on the reported SIC codes for these facilities. In cases where companies own facilities with multiple SIC's, the primary SIC code and associated SBA definition were used. Based on EPA's database, 34 companies were identified as small (40.5 percent) with the remaining 50 being large (59.5 percent) (See Appendix A for detailed listing).

To assess the potential impact of this rule on small businesses, the Agency calculated the share of annual compliance cost relative to baseline sales for each company, i.e., employed the "sales test." When a company owns more than one facility, the costs for each facility are summed to develop the numerator of the test ratio. Annual compliance costs are defined in this analysis as the engineering estimate of regulatory costs imposed on these companies; thus, they do not reflect the changes in production expected to occur in response to imposition of these costs and the resulting market adjustments. Table 4-1 reports total compliance costs, the number of companies impacted at the one percent and three percent levels, and provides summary statistics for the cost-to-sales ratios (CSRs) for small and large companies.

Although small businesses represent just over 40 percent of the companies within this source category, Table 4-1 shows that their aggregate compliance costs total roughly $150,200 or only 9 percent of the total industry costs of $1.63 million. Under the proposed rule, the annual compliance costs for small businesses range from zero to 0.18 percent of sales with 26 of the 34 small businesses (76 percent) not incurring any regulatory costs. All of the small companies with sales data have CSRs below 0.5 percent. The mean (median) compliance cost-to-sales ratio is 0.02 (zero) percent for the identified small businesses and <0.01 (zero) for the large businesses. Clearly, from this data, it is evident that there are no significant impacts of concern on small businesses.

Table 4-1. Summary Statistics for SBREFA Screening Analysis for Large Appliance Manufacturing: MACT Floor

	Small		Large		All Companies	
Total Number of Companies	34		50		84	
Total Annual Compliance Costs (TACC)	$150,181		$1,480,712		$1,630,893	
Average TACC per Company	$4,417		$29,614		$19,415	
	Number	Share	Number	Share	Number	Share
Companies with Sales Data	34	100%	50	100%	84	100%
	26	76%	20	40%	46	55%
	8	24%	30	60%	38	45%
	0	0%	0	0%	0	0%
	0	0%	0	0%	0	0%
Compliance Cost-to-Sales Ratios						
	0.02%		0.00%		0.01%	
	0.00%		0.00%		0.00%	
	0.00%		0.00%		0.00%	
	0.18%		0.03%		0.18%	

Note: Assumes no market responses (i.e., price and output adjustments) by regulated entities.

Compliance costs are 0% of sales

Compliance costs are >0 to 1% of sales

5 REFERENCES

Appliance Manufacturer. 1998. Market Trends Study. <http://www.ammagazine.com/trends_study.html>

Appliance Manufacturer. 1998. Special Report: 1998 Market Profile. 46(5): 21 - 28.

Dun & Bradstreet. 1999. Dun's Market Identifiers [computer file]. New York, NY: Dialog Corporation.

The Freedonia Group. 1998. Report #952, World Major Household Appliances to 2001.

Hoover's Incorporated. 1999. Hoover's Company Profiles [computer file]. Austin, TX: Hoover's Incorporated. <http://www.hoovers.com/>.

Securities Exchange Commission. 1998. 10-K Reports. <http://www.sec.gov>

U.S. Environmental Protection Agency. 1980. Industrial Surface Coating: Appliances - Background Information for Proposed Standards. Emissions Standards Division, Office of Air Quality Planning and Standards. EPA-450/3-80-037.

U.S. Environmental Protection Agency. 1998. Preliminary Industry Characterization Large Appliance Surface Coating Industry.

U.S. Department of Commerce, Bureau of the Census. 1993, 1994, 1995, and 1996. Annual Survey of Manufactures.

U.S. Department of Commerce, Bureau of the Census. 1993, 1994, 1995, 1996, and 1997. Current Industrial Reports. Major Household Appliances.

U.S. Department of Commerce, Bureau of the Census. 1993, 1994, 1995, 1996, and 1997. Current Industrial Reports. Refrigeration, Air Conditioning, and Warm Air Heating Equipment.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Commercial Refrigerator and Heating Equipment.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Household Cooking Appliances.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Household Laundry Equipment.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Household Refrigerators and Freezers.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Motor Vehicle Air Conditioning.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Other Household Appliances.

U.S. Department of Commerce, Bureau of the Census. 1997 Economic Census: Manufacturing Industry Series for Service Industry Machines.

U.S. Department of Commerce, Bureau of the Census. 1999. Concentration Ratios in Manufacturing (for the year 1992).

Tardiff, Joseph C. 1998. U.S. Industry Profiles, The Leading 100, Gale Research.

Appendix A-1. Summary Data for Companies Operating Large Appliance Coating Facilities

Company Name	Sales (10^6)	Employment	No. of Facilities	Small Business
AAF-McQuay Group, Inc.	$947.90	6,100	1	No
AB Electrolux, White Consolidated Industries	$14,505.00	99,322	13	No
Advanced Thermal Technologies, LLC	$0.40	NA	1	Yes
Air Technology Systems, Inc.	$16.31	145	1	Yes
Alto US, Inc.	$84.20	678	1	No
American Precision Industries, Inc.	$216.60	1,976	1	No
American Standard Companies	$6,007.50	51,000	17	No
Ampco-Pittsburgh Corporation	$173.90	1,340	2	No
Amsted Industries, Inc.	$1,104.50	8,500	4	No
Amtrol Holdings, Inc.	$53.30	950	1	No
Appliance Distributors LLC, Brown Stove Works, Inc.	NA	NA	1	No
Associated American Industries, Inc., Bakers Pride Oven Co.	$22.90	520	1	Yes
Bard Manufacturing Company	$55.00	370	1	Yes
Behr America, Inc.	$170.00	NA	1	Yes
BMIL International (Bally Refrigerated Boxes, Inc.)	$25.00	200	1	Yes
Bock Corporation	$2.00	40	1	Yes
Coin Machines, Inc.	$1.90	NA	1	Yes
Copeland Corporation	$1,200.00	871	6	No
Culligan Water Technologies	$371.00	2,768	1	No
DEC International, Inc.	$141.70	875	1	No
Doucette Industries, Inc.	$4,619.00	28	1	Yes
Dover Corporation	$4,547.70	28,758	2	No

Emerson Electric Co.	$13,447.20	111,800	1	No

Company Name	**Sales (10^6)**	**Employment**	**No. of Facilities**	**Small Business**
EVAPCO, Inc.	$19.70	235	3	Yes
Fedders Corporation Delaware	$314.10	3,000	2	No
Gas Fired Products	$12.10	NA	1	Yes
General Electric Company	$88,540.00	276,000	1	No
Gold Medal Products, Inc.	$36.00	NA	1	Yes
Goodman Holding Co.	$1,900.00	7,500	6	No
Heat Controller, Inc.	$20.10	225	1	Yes
Henny Penny Corp.	$72.00	450	1	Yes
Hoshizaki Electric Co., Limited	$1,000.00	NA	1	No
Hussmann International, Inc.	$1,096.20	8,000	7	No
Icelease	$30.00	NA	1	Yes
IMI Americas, Inc.	$650.00	5,000	3	No
International Comfort Products	$576.70	2,500	1	No
Lennox International, Inc.	$1,450.00	14,000	5	No
LSB Industries, Inc.	$307.20	1,563	2	No
Manitowoc Company, Inc.	$545.90	3,000	1	No
Master Disposers, Inc.	$0.99	10	1	Yes
Matsushita Electric Corporation of America	$8,000.00	23,000	3	No
Maytag Corporation	$3,407.90	20,464	6	No
MIDCO International, Inc.	$9.37	100	1	Yes
Modine Manufacturing Company	$1,111.40	8,700	7	No
Most Dependable Fountains, Inc.	$2.00	15	1	Yes
Nortek, Inc.	$1,134.10	9,262	1	No
Northland Corporation	$22.24	190	1	Yes

Company Name	Sales (10^6)	Employment	No. of Facilities	Small Business
Osmonics, Inc.	$155.90	1,107	2	No
Paul Mueller Company	$86.70	903	1	No
Peerless-Premier Appliance Company	$42.00	350	1	Yes
PI US Holdings Inc. Corporation	$470.00	5,300	3	No
Porcelain Metals Corporation	$10.00	400	1	Yes
Premark International, Inc.	$2,739.10	19,300	14	No
RAE Corporation	$23.30	261	1	Yes
Rare Median Group (formerly ICC Technologies)	$6.00	NA	1	Yes
Red Dot Corporation	$56.00	390	1	Yes
Reftec International, Inc.	$7.50	21	1	Yes
Robbins Group, Inc.	$27.80	500	1	No
Royal Appliance Mfg. Company	$282.70	1,380	4	No
Scotsman Industries	$633.00	4,500	2	No
Sewer Equipment Co. of America	$8.00	43	1	Yes
Sharp Electronics Corporation	$3,069.00	2,300	1	No
Smith Investment Company	$147.10	13,156	1	No
Snow Economics, Inc.	$0.72	7	1	Yes
Specialty Eqp. Companies Del	$401.20	2,274	4	No
Stabler Industries, Inc.	$3.00	NA	1	Yes
State Holding Company	$152.40	2,505	1	No
Sub Zero Freezer Company, Inc.	$150.00	594	2	Yes
Sunbeam Corporation	$1,168.20	7,500	1	No
Tecumseh Products Company	$1,728.30	17,400	5	No
Tennant Company	$372.40	2,019	1	No
The Ducane Company	$43.60	425	1	Yes

The Whalen Company	$6.00	50	1	Yes

Company Name	**Sales (10^6)**	**Employment**	**No. of Facilities**	**Small Business**
Thermal Engineering Corporation	$14.00	120	1	Yes
Thermo King Corporation	$1,000.00	2,275	6	No
Toastmaster Inc.	$154.30	1,300	2	No
U.S. Natural Resources, Inc.	$124.20	1,400	1	No
United States Filter Corporation	$3,234.60	18,500	2	No
United Technologies Corporation	$24,495.00	180,100	11	No
Viking Range Corporation	$37.00	500	2	Yes
Vilter Manufacturing Corporation	$53.59	358	1	Yes
Welbilt Corporation	$249.50	2,000	2	No
Whirlpool Corporation	$8,617.00	61,370	9	No
York International Corporation	$3,193.70	22,000	11	No
Total	$210,933.81	1,072,063	221	34