# ECONOMIC IMPACT AND SMALL BUSINESS ANALYSIS: METAL FURNITURE 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 metal furniture 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 metal surfaces. The NESHAP is scheduled to be published by 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 metal furniture 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 metal furniture manufacturing originates from the coating and painting of these products.

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.

## 2 ECONOMIC IMPACTS

The MACT standards on metal furniture manufacturing facilities require these 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 metal furniture industry.
- Baseline market data as projected from industry and secondary sources.
- Compliance cost estimates for industry segments (through model plants) to meet the MACT floor standards.

The Agency has estimated the national total annual compliance costs for this regulation to be \$14.77 million in 1997.

Metal furniture 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. Production of metal furniture involves coating operations that emit HAPs through use of coatings with high solvent concentrations. Coatings and paints are applied to the metal surfaces to protect them from wear and corrosion. The coatings possess varying characteristics which make them suitable for different applications.

Households, businesses, and institutions purchase and use metal furniture and related products. The Standard Industrial Classification (SIC) of the industries that manufacture the various products covered under this source category are provided in Table 2-1. For the purposes on this analysis, the metal furniture industry segments are defined as:

- **Metal furniture** classified by SIC codes 2514, 2522, and 2531 and include household metal furniture, office metal furniture, and public building metal furniture.
- **Metal fixtures** classified by SIC 2542, 3645, 3646, and 2599 and includes cabinets, counters, display cases, residential lighting fixtures, commercial and industrial lighting fixtures, and institutional lighting fixtures.

- **Fabricated metal products** covered by SIC codes 3429, 3469, and 3495 and includes furniture hardware, wastebaskets, stamped metal, and furniture springs.
- **Dental and laboratory metal furniture and apparatus** covered by SIC codes 3821 and 3843 and include dental cabinets and chairs; and laboratory furniture, benches, tables, and cabinets.

Table 2-1 also lists the corresponding North American Industrial Classification System (NAICS) codes.

**Table 2-1. SIC Codes and Metal Furniture Product Descriptions** 

SIC Code	NAICS Code	Title	Product Description
2514	337124	Metal Household Furniture	Bookcases, Chairs, Tables, Swings, Kitchen Cabinets, Medical Cabinets, Camp Furniture, Frames for Boxsprings, Cribs, Cots, Garden Furniture, Serving Carts
2522	337214	Office Furniture, Except Wood	Bookcases, Chairs, Tables, Desks, File Cabinets, Wall Cases, Partitions, Modular Furniture, Benches
2531	33636 3371271 3371274	Public Building and Related Furniture	Benches, Portable Bleacher Seating, Stadium Seating, Theater Seating, School Furniture, Church Furniture
2542	337215	Office and Store Fixtures, Partitions, Shelving, and Lockers, Except Wood	Cabinets, Counters, Display Cases, Display Fixtures, Bar Fixtures, Shelving, Showcases, Sorting Racks, Lunchroom Fixtures
3645	335121	Residential Electric Lighting Fixtures	Chandeliers (Residential), Floor Lamps, Lamps (Residential), Wall Lamps, Desk Lamps, Lamp Shades (Metal), Table Lamps

3646	335122	Commercial, Industrial, and Institutional Electric Lighting Fixtures	Chandeliers (Commercial), Desk Lamps
2599	3371277	Furniture and Fixtures, Not	
	337127A	Elsewhere Classified	
	3391137		
3429	332951	Hardware, Not Elsewhere Classified	Furniture hardware, Convertible bed mechanisms
3469	3321165	Metal Stampings, Not Elsewhere Classified	Wastebaskets, Stamped Metal
3495	3326124	Wire Springs	Furniture Springs, Spring Units for Seats
3821	339111	Laboratory Apparatus and Furniture	Laboratory Furniture, Benches, Tables, Cabinets
3843	339114	Dental Equipment and Supplies	Dental Cabinets, Dentists' Chairs

The following subsections address the economic impacts of the regulation on the individual industry segments and the product markets served by those facilities within each segment.

# 2.1 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.

Table 2-2 presents total annual compliance costs 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 metal furniture industry segment.

Table 2-2. Effect of Compliance Costs on Metal Furniture Producers by Industry Segment: 1997

Industry Segment	Value of Shipments (\$10 <sup>6</sup> /yr) <sup>a</sup>	Total Compliance Costs (\$10 <sup>6</sup> /yr)	Cost Share <sup>b</sup>	
Metal Furniture	\$11,791	\$4.4	0.04%	
Household (SIC 2514)	\$2,275	\$1.7	0.07%	
Office (SIC 2522)	\$8,001	\$1.9	0.02%	
Institutional (SIC 2531)	\$1,515	\$0.9	0.06%	
Metal Fixtures (SICs 2542, 3645, 3646, 2599)	\$10,334	\$7.5	0.07%	
Fabricated Metal Products (SICs 3429, 3469, 3495)	\$5,150	\$1.8	0.04%	
Dental and Laboratory (SICs 3821, 3843)	\$4,686	\$1.1	0.02%	
Total, all industry segments	\$31,961	\$14.8	0.05%	

Notes: aTotal compliance cost are representative of the expected costs faced by affected facilities within the listed SIC codes.

Table 2-2 shows that compliance costs are an extremely small share of the value of shipments. Within the metal furniture industry segment, costs range from 0.02 to 0.07 percent of the value of shipments; therefore, indicating that the costs of meeting this regulation are not deemed significant. If the metal furniture producers were to partially or fully absorb the costs of complying with this rule, market prices would either increase by less than shown in Table 2-2 or not at all. Because of the product diversity within these SIC codes, the government and industry data do not provide the requisite production and/or price data upon which to base the economic modeling. In lieu of these data, the Agency has employed a 1997 baseline characterization for each industry segment where price is normalized to \$1 so that the "value of shipments" proxies the production quantity. The cost

<sup>&</sup>lt;sup>b</sup>Relative cost shares computed as the total compliance costs divided by the value of shipments.

shares across the industry segments are then used as the "shifters" of the market supply curve in a partial equilibrium model.

Based on the Agency's partial equilibrium modeling, as shown in Table 2-3, the projected change in market price and output is minimal as a result of the proposed MACT standard on existing sources. The market price and output impacts are less than 0.1 percent across all industry segments. The metal household furniture and the metal fixtures industry segments are projected to incur the largest impacts of 0.04 percent.

Table 2-3. Market Impacts on Metal Furniture Producers by Industry Segment: 1997

	_	Market In	npacts <sup>a</sup> (%)
Industry Segment	Cost Share of Sales (%)	Price	Output
Metal Furniture	0.04%	0.02%	-0.02%
Household (SIC 2514)	0.07%	0.04%	-0.04%
Office (SIC 2522)	0.02%	0.01%	-0.01%
Institutional (SIC 2531)	0.06%	0.03%	-0.03%
Metal Fixtures (SICs 2542, 3645, 3646, 2599)	0.07%	0.04%	-0.04%
Fabricated Metal Products (SICs 3429, 3469, 3495)	0.04%	0.02%	-0.02%
Dental and Laboratory (SICs 3821, 3843)	0.02%	0.01%	-0.01%
Total, all industry segments	0.05%	0.02%	-0.02%

<sup>&</sup>lt;sup>a</sup> Percent change in market price and output result from the Agency's partial equilibrium model with unitary market supply and demand elasticities. As a result, the predicted percent change for price and output will be the same.

## 2.2 Social Costs and Their Distribution

The value of a regulatory action is traditionally measured by the change in economic welfare that it generates. Welfare impacts, or the social costs required to achieve the environmental improvements, stem from the regulation's effect on market outcomes and will extend to the many consumers and producers of metal furniture and related products. 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 \$14.77 million. 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 metal furniture and related products). The economic welfare impacts of the regulation on producers and consumers can be considered under three different scenarios:

- full-cost absorption by producers,
- full-cost pass-through to consumers, and
- 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.

#### 2.2.1 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., \$14.77 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 2-4, the

welfare change is composed entirely by a loss in producer surplus with no change (by assumption) in consumer surplus in this case.

Table 2-4. Economic Welfare Impacts of Metal Furniture MACT on Producers, Consumers, and Society: 1997

	Welfare Change					
Stakeholders	Full-Cost Absorption	Partial-Cost Pass-Through (Fig. 3-2)	Full-Cost Pass-Through (Fig. 3-1)			
Producers	- \$14.77 million	- 7.38 million	0			
Consumers	\$0	- 7.38 million	- 14.76 million			
Society	- \$14.77 million	- 14.76 million	- 14.76 million			

## 2.2.2 Full-Cost Pass-Through

Under full-cost pass-through, producers can pass the entire burden of the regulation onto consumers of metal furniture and related products. In Figure 2-1, 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 examining the market demand curve (the new equilibrium point c). As shown in Figure 2-1, the loss in consumer surplus here is the area  $P_0$ ac $P_1$ , which is less than the full compliance costs, i.e., area  $P_0$ ab $P_1$ , because consumers reduce their consumption from  $Q_0$  to  $Q_1$ . Thus, as shown in Table 2-4, the welfare change is composed entirely by a loss in consumer surplus of \$14.76 million with no change in producer surplus.

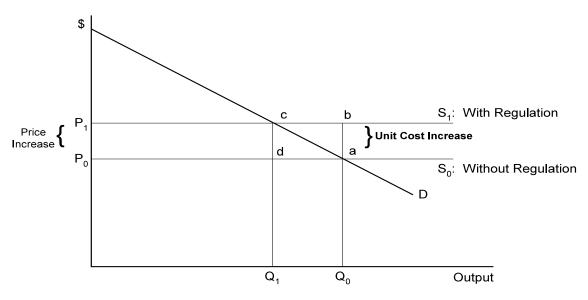


Figure 2-1. Full-Cost Pass-Through of Regulatory Costs

# 2.2.3 Partial-Cost Pass-Through

The economic welfare effects of a partial cost pass through can be examined by referring to Figure 2-2. 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 metal furniture and related products 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 area abfe in Figure 2-2. Thus, as shown in Table 2-4, the welfare change here is \$14.76 million and is composed of a change in both consumer surplus (\$7.38 million) and producer surplus (\$7.38 million).

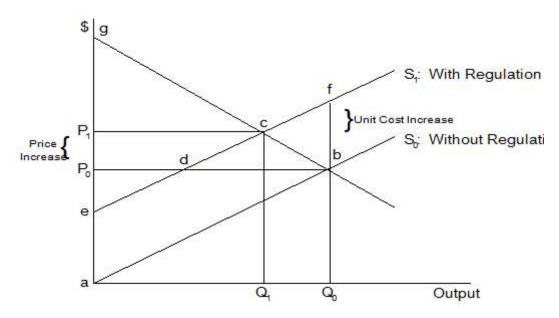


Figure 2-2. Partial-Cost Pass-Through of Regulatory Costs

# **2.2.4** *Summary*

As summarized in Table 2-4, 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 \$14.77 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. However, in this case, the sum of the loss in welfare is slightly less than the full compliance costs. In full-cost pass-through, the reduction in welfare consumers would incur would also be slightly less than the total estimated compliance costs of \$14.77 million.

Regardless of whether the costs of regulating the metal furniture manufacturing industry were fully absorbed by producers or fully passed on to consumers, the per unit costs are negligible. As a result, the effect of this regulation on the price of metal furniture and related products is not distinguishable from random price fluctuations (or 'noise'). Therefore, the trivial magnitude of these relative costs indicate negligible distributional effects of this regulation across society.

## 3 SMALL BUSINESS IMPACTS

This regulatory action will potentially affect the economic welfare of owners of metal furniture 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 that 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 memorandum examines the Metal Furniture industry and provides a preliminary 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 Inc., 1999)
- Company Websites.

The facilities surveyed by the Agency represent a sample of the total number of facilities included in this source category (estimated at 655 nationwide). Appendix A provides a listing of the 24 companies that own and operate the 64 potentially affected facilities that responded to this survey.

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/NAICS Code) of the impacted facility. Responses to the industry survey indicated multiple SIC/NAICS codes with a small business definition ranging from 100 to 1,000 employees or less than \$5 million in annual sales. The Agency developed a company's size standard based on the reported industry classification for these facilities. In cases where companies own facilities with multiple classifications, the primary SIC/NAICS code and associated SBA definition was used. Based on EPA's database, 10 companies were identified as small (42 percent) and the remaining 14 being large (58 percent) (See Appendix A for detailed listing).

To assess the potential impact of this rule on these 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, or cost-to-sales ratio (CSR). 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 3-1 reports total annual compliance costs, the number of companies impacted at the one percent and three percent levels, and summary statistics for the cost-to-sales ratios for small and large companies.

Although small businesses represent 42 percent of the companies sampled within this source category, Table 3-1 shows that their aggregate compliance costs represents only 14 percent, or \$176,000, of the industry sample's total of \$1.3 million. The annual compliance costs for small businesses range from zero to 0.7 percent of their sales with 30 percent of the small businesses (i.e., 3 out of 10) not incurring any regulatory costs. The vast majority of small companies with sales data have CSRs below 0.5 percent. The mean (median) compliance cost-to-sales ratio is 0.15 (0.10) percent for the identified small businesses and 0.01 (0.01) percent for the large businesses. These results are expected to be "representative" of the distributional impacts across companies by size and, of course, depends upon the sample's representativeness of the total population of potentially affected facilities.

The U.S. Census Bureau (1998) reports the after-tax return to sales for corporations in the Furniture and Fixtures industry grouping at 4.5 percent for 1997. Corporations with less than \$25 million in assets within this grouping experienced higher return to sales of 5.1 percent during this time period. Reviewing the range of costs to be borne by small businesses in light of the 4.5 to 5.1 percent profit margins typical of this industry, the Agency has

determined the costs are typically small and, overall, do not constitute a significant impact on a substantial number.

Table 3-1. Summary Statistics for SBREFA Screening Analysis on Metal Furniture Sample: MACT Floor: 1997

	Small		Large		All Companies	
Total Number of Companies	10		14		24	
Total Annual Compliance Costs (\$10 <sup>3</sup> /yr)	\$176		\$1,116.7		\$1,293	
Average TAC per company (\$10 <sup>3</sup> /yr)	\$17.6		\$79.8		\$53.9	
	Number	Share	Number	Share	Number	Share
Companies with Sales Data	10	100%	14	100%	24	100%
Not Impacted, i.e., = 0%	3	30%	2	14%	5	21%
Impacted at >0 to 1%	7	70%	12	86%	19	79%
Impacted at ≥1 to 3%	0	0%	0	0%	0	0%
Impacted at ≥3%	0	0%	0	0%	0	0%
Cost-to-Sales Ratios						
Average		0.15%		0.01%		0.06%
Median		0.10%		0.01%		0.01%
Minimum		0.00%		0.00%		0.00%
Maximum		0.70%		0.05%		0.70%

Because of the small survey sample, the Agency conducted a supplemental SBREFA screening analysis using the Toxics Release Inventory (TRI) database that was employed by the engineering analysis to estimate the number of major source facilities within this source category. Based on the TRI sample of facilities, the Agency identified the owning entities and obtained sales and employment data where available. A total of 28 small companies were identified from this sample of 57 companies that owned 70 major source facilities. Lacking compliance estimates specific to these facilities, the potential impacts were analyzed using the following costing scenarios:

1) Minimal impact = \$17,600 per major source, which reflects the average cost per small business from Table 1 above; and

2) Maximum impact = \$53,600 per major source, which reflects the costs for a large model plant.

The minimal impact scenario is likely to be more representative of the cost impacts for small businesses because they are likely to own facilities represented by the small model plant. Alternatively, the maximum impact scenario is a worst-case costing scenario since most small businesses are not likely to own facilities represented by the large model plant.

The supplemental screening analysis provided the following small business impacts for each cost scenario:

- 1) Minimal impact had an average CSR of 0.15% (median of 0.09%) with range of 0.04 to 1.04%.
- 2) Maximum impact had an average CSR of 0.45% (median of 0.27%) with range of 0.13 to 3.15%.

The minimal impact scenario provides results comparable to those summarized in Table 1. Although the maximum impact scenario is a worst-case scenario, we only observe 2 of the 28 small companies (7 percent) with CSRs greater than 1 percent, and only 1 small company (3.2 percent) with a CSR > 3 percent. Therefore, the Agency believes that the supplemental analysis confirms the negligible impacts observed from the initial SBREFA screening analysis based on the industry survey.

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Appendix A. Summary Data for EPA Sampled Companies Operating Metal Furniture Manufacturing Facilities: 1997

			No. of Facilities		_
Company Name	<b>Sales</b> (\$10 <sup>6</sup> )	Employment	Total	Major Source	Small Business
Arrowhead Holdings Corporation	\$165.50	1,990	3	3	No
Atlas Springs Manufacturing Corporation	\$9.40	140	1	1	Yes
B-Line Systems	\$223.50	1,400	1	1	No
Crown Metal Manufacturing Company	\$13.00	125	1	0	Yes
Davies Office Refurbishing, Inc.	\$2.50	200	1	1	Yes
Dehler Manufacturing Company, Inc.	\$10.00	120	1	0	Yes
Den-Tal-Ez, Inc.	\$23.10	327	1	1	Yes
Genlyte Group Incorporated	\$664.10	3,490	1	1	No
Hickory Springs Manufacturing Company	\$23.10	295	2	2	Yes
HON Industries	\$1,696.40	9,824	7	4	No
Kimball International	\$1,107.00	9,556	2	2	No
Leggett & Platt Incorporated	\$3,370.40	27,000	10	10	No
Lozier Corporation	\$281.10	2,400	3	3	No
L.A. Darling Company, Inc.	\$300.00	3,000	2	2	No
Metal Creations	\$37.00	NA	1	1	Yes
Mid-West Chandelier Company	\$17.80	NA	1	1	Yes
National Service Industries, Inc.	\$2,031.30	16,700	7	1	No
Nevin Laboratories, Inc.	NA	NA	1	0	No
Professional Refinishing Organization	\$2.20	58	1	1	Yes
Republic Storage Systems, Inc.	\$52.00	450	1	1	Yes
Siemens Medical System, Inc.	\$11,144.00	57,950	1	1	No
Standex International Corporation	\$616.20	5,500	1	1	No
Steelcase Incorporated	\$2,742.50	16,400	11	11	No
Virco Manufacturing Corporation	\$273.60	2,373	1	1	No
			62	49	10