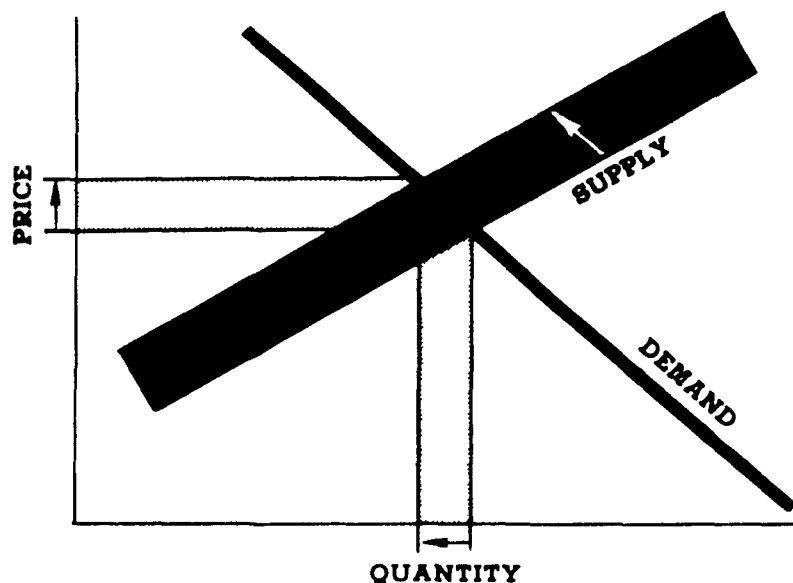


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ECONOMIC ANALYSIS OF PROPOSED EFFLUENT GUIDELINES

WOODEN FURNITURE & FIXTURE MANUFACTURING SEGMENT OF TIMBER PRODUCTS PROCESSING INDUSTRY PHASE II



U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Planning and Evaluation
Washington, D.C. 20460



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OF
PROPOSED EFFLUENT GUIDELINES

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PHASE II

Report to

U.S. Environmental Protection Agency
Office of Planning and Evaluation
Washington, D.C. 20460

October 1974

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PREFACE

The attached document is a contractors' study prepared for the Office of Planning and Evaluation of the Environmental Protection Agency ("EPA"). The purpose of the study is to analyze the economic impact which could result from the application of alternative effluent limitation guidelines and standards of performance to be established under Sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended.

The study supplements the technical study ("EPA Development Document") supporting the issuance of proposed regulations under Sections 304(b) and 306. The Development Document surveys existing and potential waste treatment control methods and technology within particular industrial source categories and supports proposal of certain effluent limitation guidelines and standards of performance based upon an analysis of the feasibility of these guidelines and standards in accordance with the requirements of Sections 304(b) and 306 of the Act. Presented in the Development Document are the investment and operating costs associated with various alternative control and treatment technologies. The attached document supplements this analysis by estimating the broader economic effects which might result from the required application of various control methods and technologies. This study investigates the effect of alternative approaches in terms of product price increases, effects upon employment and the continued viability of affected plants, effects upon foreign trade and other competitive effects.

The study has been prepared with the supervision and review of the Office of Planning and Evaluation of EPA. This report was submitted in fulfillment of Task Order No. 17, Contract 68-01-1541 by Arthur D. Little, Inc. Work was completed as of October 1974.

This report is being released and circulated at approximately the same time as publication in the Federal Register of a notice of proposed rule making under Sections 304(b) and 306 of the Act for the subject point source category. The study is not an official EPA publication. It will be considered along with the information contained in the Development Document and any comments received by EPA on either document before or during proposed rule making proceedings necessary to establish final regulations. Prior to final promulgation of regulations, the accompanying study shall have standing in any EPA proceeding or court proceeding only to the extent that it represents the views of the contractor who studied the subject industry. It cannot be cited, referenced, or represented in any respect in any such proceeding as a statement of EPA's views regarding the subject industry.

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I. EXECUTIVE SUMMARY

This report presents the contractor's final analysis of the economic impact on wood furniture manufacturers to meet 1977 and 1983 proposed effluent guidelines and new source performance standards.

A. SCOPE OF WORK

The industry sectors analyzed are: wood household furniture -

- . SIC-2511 - Wood household furniture; includes two newly established sectors, SIC-2517 - TV, radio, etc., cabinets, and 2534 - kitchen cabinets.
- . SIC-2512 - Upholstered wood household furniture;
- . SIC-2521 - Wood office furniture;
- . SIC-2531 - Public building furniture;
- . SIC-2541 - Wood partitions and fixtures.

To accomplish the economic impact analysis we have developed data on the structure of these industry sectors and an analytical model to focus on the central issues.

B. CONCLUSIONS

1. Industry Segments

The objective of segmenting the industry was to group plants into categories which would be affected similarly by effluent control requirements. For this industry, the costs of compliance and technologies to comply can be directly related to the type of process performed. Processes performed within plants vary by product mix only to the extent that upholstered furniture manufacturers do far less finishing and thereby generate less effluent than do non-upholstered manufacturers. Therefore, the costs of compliance will fall differently upon plants in each of these two major categories. Thus, upholstered and non-upholstered manufacturing operations were grouped into separate primary segments.

Within each of these two major segments the ability to bear these costs is directly related to the size of plant. There are many very small plants in this industry; i.e., more than 60% of the plants have less than 20 employees and generate less than \$500,000 in annual sales

revenues. Such plants are sensitive to small cost increments. Thus, plant size is the second important criterion used to segment the industry.

Product mix differences do not imply effluent differences. A small plant manufacturing either TV cabinets (SIC-2517) or kitchen cabinets (SIC-2534) or case goods (SIC-2511) will have essentially the same effluent load; the unit manufacturing operations of assembling, gluing, and finishing are common to each of the plants. Scale (size of plant) is the primary determinant of effluent load.

2. Financial Profiles

The representative model small plants within the manufacturing segment have the following characteristics:

	<u>Upholstered</u>	<u>Non-upholstered</u>
Annual sales	\$530,000	\$390,000
After-tax net income	9,000	5,000
Cash flow	16,000	13,000
Net assets	140,000	95,000
Number of employees	25	20

These are small plants with modest cash flows and asset bases.

3. Pricing

The success of a piece of furniture is primarily dependent upon the aesthetic attraction of the piece; that is, consumers are relatively insensitive to price, within a range of plus/minus 5%, and select a piece of furniture because of its design, color, etc., rather than strictly on the basis of price.

Furniture prices vary widely. Consumers shop within fairly broad bands of prices. For example, the price of a sofa might fall within the following price ranges:

- . Low price: \$200;
- . Middle level: \$200-400;
- . High price: \$400.

The price sensitivity within the low price category is likely to be somewhat greater than for the higher price categories. Nonetheless, aesthetics represent a strong influencing factor in all categories.

This relative price insensitivity is a key factor in determining if cost increases due to pollution control can be passed on to the consumer.

4. Methodology

Since there are many small, privately held firms in this industry which do not generally publish financial data or other statistics on their operations, data had to be developed on the various industry segments through Department of Commerce information, surveys of firms in the industry, surveys of industry associations and others knowledgeable of industry practice and background data which we have accumulated over time.

To accomplish the economic impact analysis, the data on the structure of this industry was used to develop industry segments of groups of firms which would be similarly affected by guidelines and costs, and was applied to an analytical model with the focus on the following critical issues:

- . The probability that costs of compliance will be able to be passed on to consumers via increases in product prices or will have to be absorbed by operators, resulting in a lower level of profitability;
- . If costs cannot be passed through, the extent to which the resultant effect on financial condition will cause plant closures, unemployment, and community impacts, and restrict industry growth; and,
- . The extent to which capital availability will be limited for the numerous small operators, also causing plant closures, unemployment, and community impacts, and restricting industry growth.

The analysis of whether prices are likely (or not likely) to be able to be passed on is a relatively straightforward economic analysis. Table I.B.1 presents the price increase analysis matrix which we used to derive price increase conclusions.

However, even if prices are not likely to be increased, and costs are absorbed with relatively well documented financial effects, it is far more difficult to reach conclusions regarding plant closures. The plant closure analysis matrix which was used to focus upon the central

TABLE I.B.1PRICE INCREASE ANALYSIS MATRIXPrice Increase Constraints

<u>Factor</u>	<u>Condition for Constraint</u>
Ratio of Before Tax Treatment Cost to Selling Price (%)	High
Substitute Products	High occurrence
Capacity Utilization	Low
Captive Usage	Low
Demand Growth	Low
Foreign Competition	High
Abatement Cost Differences	Unequal
Price Elasticity of Demand	High
Basis for Competition	Price
Market Share Distribution	Fragmented
Number of Producers	Many

Source: Arthur D. Little, Inc., estimates.

TABLE I.B.2PLANT CLOSURE ANALYSIS MATRIXPlant Shutdown Decision

<u>Factor</u>	<u>Condition for Shutdown</u>
Ratio of After Tax Treatment Cost at After Tax Net Income (%)	High
Cash Flow (Including Treatment Costs)	Negative
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High
Integration	Low
Multi-Plant Complex	Isolated Plant
Other Environmental Problems (Including OSHA)	Multiple
Emotional Commitment	Indifference
Ownership	Large, Multi- Industry Company

issues in these decisions is presented as Table I.B.2. The analysis is complicated by the fact that small, family-owned and operated, one-plant firms, tend to show remarkable "staying power" even in the face of extremely low rates of profitability and other burdens. The extent of subjective commitment to the business, beyond the point at which standard financial analysis would suggest shutdown, is an extremely difficult factor to measure and assess. Thus, subjective elements must be used to supplement the objective analysis.

5. Cost of Compliance

Table I.B.3 estimates the costs of compliance for the various industry sectors. For these firms, the costs represent the probable technologies firms will elect to institute to comply with 1977 effluent guidelines. Each subcategory should be able to meet the effluent limitations with anyone of four technologies: landfill, incineration, evaporation with spray, and irrigation. It was assumed for each segment and subcategory that, at most, the second least expensive option would be selected. Since these costs were developed for large plants, the costs for smaller plants are overstated. Even so, no closures are expected for any segment.

6. Economic Impact Analysis

Large firms in this industry will feel no noticeable effect due to effluent guidelines. Costs of compliance to these firms are insignificant (less than 0.2% added annual cost burden, capital investment less than 0.2% net fixed assets). Medium-sized plants will also generally not face significant impact. Again, costs are moderate (less than 1.0% added annual cost burden, capital investment less than 1.5% of net fixed assets).

Small firms, in both sectors, will face a noticeable effect on operations; however, even these small firms will not be impacted significantly since:

- . They should be able to pass on any increased costs to consumers via increased prices of their products, thereby maintaining profits.
- . There are technological options available which will allow almost all firms to avoid the maximum expenditure and enable them to reach compliance at a modest level of investment.

Finally, more than 90% of the plants in the industry (including small plants) already meet BPT guidelines; less than 10% of all plants will be required to make any new investment for abatement.

Thus, while some small firms (2% of industry) may have to change operations and to raise prices, no closures are expected and there will be no other noticeable effect on the industry due to the proposed effluent guidelines. Further, probable costs of abatement can be financed out of cash flow. Capital availability is not a problem.

TABLE I.B.3

COSTS OF COMPLIANCE* - FURNITURE MANUFACTURERS

<u>Segment</u>	<u>Total Plants</u>	<u>Number of Plants Affected</u>	<u>Probable Capital Cost</u>	<u>% Net Assets</u>	<u>Probable Annual Cost</u>	<u>% Sales</u>
Non-upholstered mfrs.						
Large Plants	552	55	\$4,500	0.2%	\$9,300	0.15%
Medium Plants	1191	119	4,500	1.5	9,300	0.8
Small Plants	<u>2853</u>	<u>285</u>	3,200	3.4	6,680	1.7
subtotal	4596	459				
Upholstered mfrs.						
Large Plants	233	23	\$3,200	.13%	\$6,680	.1%
Medium Plants	563	56	3,200	.9	6,680	.5
Small Plants	<u>705</u>	<u>70</u>	3,200	2.3	6,680	1.3
subtotal	1501	149				
Total	6097	608				

*BPT, BAT, NSPS on proposed Guidelines.

Note: Based on 1972 estimated cost and profit profiles.

7. Limits of the Analysis

The analysis of economic impact is complicated by:

- . A limited availability of data - the small, privately-held firms do not publish detailed operating and financial data; and,
- . The nature of the industry - the typical, privately-held firm views a plant closure decision more subjectively than does a publicly-held firm, requiring that financial analysis of closure be augmented by subjective considerations.

We dealt with the data limitation problem by developing our own data through surveys of the industry, collecting information on the view of the industry as a whole, but focusing on the operations of those firms and plants most likely to be impacted, i.e., the small operators. Due to the large number of plants involved (approximately 6000), it was necessary to collect data by representative samples (a 1% sample size of firms, plus interviews with persons knowledgeable of the industry, e.g., trade associations) rather than through comprehensive (100%) sampling. The consistency of the data suggests that the analysis is built upon a sound data base.

The second issue, the nature of the industry, makes it difficult to project plant closures (see I.B.4 above). Since 90% of the firms in the industry already meet 1977 guidelines and the remaining firms have low cost compliance options available and can pass on to consumers any increased cost burden, the problem of projecting plant closures is ameliorated, the conclusion of no impact is clear. However, if different guidelines were introduced, with attendant higher costs, and those costs could not be passed on, capital would become limited and the plant closure decision would be a more sensitive issue.

II. INDUSTRY SEGMENTS

The following chapter is intended to give a broad perspective on the dynamics of the wood furniture industry, in addition to providing detail on individual segments. It contains the following parts:

- a) general review of industry dynamics
- b) industry segmentation and rationale
- c) non-upholstered furniture manufacturing segment:
 - overview (basic data for all four component sectors)
 - types of firms
 - types of plants
 - financial profiles
 - pricing
- d) upholstered furniture manufacturing (single sector)
 - overview
 - types of firms
 - types of plants
 - financial profile
 - pricing

A. OVERVIEW OF THE FURNITURE INDUSTRY

Of the more than 6,000 firms which produce furniture only about 250 can be considered major factors in the industry, with no single company accounting for more than 3% of industry sales. The 10 largest producers represent about 20% of industry volume; the top 25 firms account for less than 30% of industry sales, while the 3,600 smallest firms (under 20 employees) account for about 8% of industry sales.

Furniture is manufactured in virtually every state, but the principal producing areas are the South Atlantic, the Great Lakes, California, New England, and the Middle Atlantic States. North Carolina is the leading furniture producing state, accounting for about 22% of the

industry shipments of all household furniture; Virginia (10%), California (8%), Indiana (7%), and Tennessee (6%) follow. The production of metal office furniture is highly concentrated (80%) in the Great Lakes area. Wood office furniture is manufactured principally in North Carolina, Virginia, Michigan, and New York--for the most part by the same firms that produce household furniture.

In the South Atlantic states, primarily North Carolina and Virginia, furniture manufacturing has grown as a result of both lower labor costs and widely available raw materials. Production in these states is principally a veneer construction and includes all levels of quality.

The Great Lakes states (Illinois, Michigan and Indiana) are major producers of dinette furniture and kitchen cabinets, although they also manufacture case goods and some upholstered furniture. On the West Coast, Los Angeles is the largest furniture manufacturing area, producing principally upholstered and case goods. Because of the high labor cost on the West Coast, most case goods are aimed at the lower-priced furniture markets where competition from North Carolina and Virginia is not strong due to freight costs. The furniture manufacturers on the West Coast are generally small compared to those on the East Coast, with few companies having more than \$6 million in annual sales and only two more than \$12 million. New England and the Middle Atlantic States concentrate principally on the production of solid wood furniture in the Early American design. The plants here are typically older, frequently finding it difficult to compete with the more modern producing facilities of the South.

Labor accounts for as much as 35% of the sales dollar in the furniture industry. High-quality furniture (most expensive 10%) generally requires even greater labor input. The supply of labor in the major manufacturing areas has become limited, and wages in the household furniture industry have grown faster than those of all manufacturing in the major furniture manufacturing states. In 1970 employment in the furniture industry declined by 15,000 workers to 300,000 as the industry's shipments dropped along with the general downturn of the economy in that year. By 1973, employment rose to 350,000. With the upturn in demand for furniture in 1971, vocational training programs supported by furniture firms were instituted in high schools to train future industry workers.

The furniture manufacturers make very small capital expenditures in proportion to their total sales, often less than 1% or 2% of sales. Indeed, in 1960 and 1961, the industry's depreciation exceeded its capital expenditure programs. Our surveys of the industry suggest that the industry is currently spending double its depreciation account for capital expenditure programs. Since capital requirements of the household furniture industry have traditionally been met out of current cash flow, the industry has little debt.

Table II.A.1 compares employee productivity (expressed as \$ Value Added/Production Worker and \$ Value of Shipments/Production Worker) among the various furniture sectors covered by this analysis and, as a point of reference, compares furniture to two capital intensive industry sectors, wood pulp manufacture and petroleum refining. The table demonstrates that furniture manufacturing sectors are very labor-intensive (\$10.9-17.7K Value Added/Production Worker) as contrasted with wood pulp (\$33.3K Value Added) and petroleum refining (\$65.2K Value Added), which are more capital intensive.

Another measure of capital intensitivity is the amount of investment required to generate a dollar of sales revenue. The ratio of \$ total assets to \$ total sales revenues (\$A/\$S) approximates this measure. The higher the \$A/\$S ratio, the more capital intensive the business. Our model wood furniture plant (small size) (see Section II.C.3 and II.D.3 for details) has the following capital intensivity ratio:

"Furniture" \$A/\$S: 0.25

In contrast is the same ratio for the following two major manufacturers in capital intensive businesses:

Exxon \$A/\$S = 0.97¹

U.S.Steel \$A/\$S = 0.995²

Differences in the profitability of large and small firms are explained by the nature of the industry. There are some economies of scale in production, distribution and sales of furniture to favor larger companies. But the actual profitability among smaller firms is not always apparent. Many small-to-medium size companies which are family-owned report low net incomes, though their gross profit is in many cases equal to or higher than that of the larger firms. These smaller companies often prefer to take "profits" in the form of salaries and fringe benefits rather than as corporate income.

The household furniture industry spends about 42% of its sales dollar for materials. Wood's workability, structural integrity, and functionality have made it the material of choice for furniture production. Currently, wood and wood products account for 30% of materials purchased; plastic and plastic products, about half of that. Increased

¹Source: Forbes, May 15, 1974, p. 178.

²Ibid., p. 200.

TABLE II-A-1
EMPLOYEE PRODUCTIVITY, 1972 (\$)

SIC	Value Added Per Production Worker			Value of Shipments Per Production Worker		
	<u>1972</u>	<u>1967</u>	<u>% Chg</u>	<u>1972</u>	<u>1967</u>	<u>% Chg</u>
2511	13,832	n.a.		25,905	n.a.	
2512	13,992	10,344	35.3%	26,738	19,543	36.8%
2517	10,886	n.a.		20,316	n.a.	
2531	14,927	12,869	15.9%	25,843	22,942	12.6%
2541	17,765	13,749	29.2%	32,103	24,087	33.3%
2611	33,274	33,049	.7%	82,309	59,877	37.5%
2911	65,176	62,765	3.8%	364,554	268,438	35.8
(Petroleum Refining)						

Source: 1972 Preliminary Census of Manufactures.

capital intensiveness will require the use of more homogeneous materials, of which plastic and reconstituted wood products are the prime choices. A most critical problem for the furniture industry is the tight market and higher cost for furniture (hardwood species) woods. Demand for hardwood lumber from its major consumers--the furniture, hardwood flooring and materials handling (pallets) industries--increased sharply in 1972 and continued at a high level in 1973. Plastics such as high-pressure laminates, coated fabrics, and polyurethane cushioning have reached positions as accepted materials for construction in the furniture industry. The use of molded components and vinyl veneers will contribute new growth to the use of plastics in this industry. The transition to a greater use of plastics will require additional capital because of the greater cost of equipment to manufacture plastic furniture. A typical injection molding machine costs approximately five times as much as a comparable wood manufacturing machine.

Increasing use of plastic in furniture is likely. The use of plastic has improved productivity and had a restraining effect on prices. For example, from 1967 to 1971 the value added per production worker man-hour in the household furniture industry increased 28% while wholesale furniture prices rose only 15%. At least part of this increase in production efficiency can be attributed to the use of plastics.

Foreign trade in household furniture was not significant until the late sixties, when imports began to grow at a rapid pace and now account for nearly 3% of domestic consumption. Imports for 1973 are estimated at approximately \$240 million, up 18% from the \$204 million of 1972. Major sources of imports include Canada, Italy, Japan, Denmark, Yugoslavia and Taiwan. While the large increase in 1972 may be due more to recent currency realignments, exports should continue to expand. Exports for 1973 are estimated at \$40 million compared with \$23 million in 1972. Although imports are still considerably greater than exports, U.S. furniture products are becoming more competitive with those of foreign countries, primarily aided by dollar devaluation. About 75% of U.S. exports goes to Canada, Mexico and the Bahamas.

B. SEGMENTATION

Our objective was to segment the furniture industry into groups of plants that would be impacted similarly by pollution abatement guidelines. This was done to allow us to analyze each distinct segment in terms of economic impact and to focus our efforts on those particular segments that were likely to be most severely affected.

The Development Document subcategorizes the industry for the purpose of developing Effluent Guidelines based on water usage. Other factors such as process variation, plant size and age, plant location, and land availability were determined to be of secondary importance.

Four model plants were developed for each of the technological segments as follows:

- . Model 1 - Contains only dry booths (for wood finishing); no laundry facilities and two glue spreaders.
- . Model 2 - Contains dry booths, laundry facilities, and two glue spreaders.
- . Model 3 - Contains water wash (wet finishing), no laundry, two glue spreaders.
- . Model 4 - Contains both water wash, spray booths, and laundry facilities and two glue spreaders.

This segmentation by unit process performed allows development of levels of compliance and costs. These variations among models are based on the particular mix of operations performed, but are not primarily related to product mix.

Our surveys and analyses have also demonstrated that various unit operations can be performed by any furniture manufacturing plant with any product mix, with the exception of manufacturers of upholstered furniture. Upholstered manufacturers do not utilize water wash spray booths, since they do not perform enough finishing to justify the capital investment. Rather they generally hand finish or use other low-cost methods to finish what little exposed wood appears on an upholstered furniture piece.

Thus, upholstered furniture manufacturers can be segmented and studied as a separate group. All of these manufacturers will fit within technological models 1 and 2.

Within these models, the differences in cost of compliance will not be related to product mix or other factors; rather, plant size will be the measure of the ability to bear costs, not product mix. Economic impact assessment will thus be based on differential impacts depending upon size of operation.

The rest of the industry cannot be subsegmented by product mix or other process-related variations. The key to further segmentation is, again, plant size. For example, small plants in the industry do not use the water wash spray booths; 50-60% of the largest group of plants use water wash spray booths. The capital investment required makes it necessary to process a relatively high volume to justify the investment.

Table II.B.1 compares the remaining non-upholstered furniture industry sectors on various economic characteristics related to plant size. As the table indicates, the mean values and distribution of the various indices for the various plant size categories is quite consistent among the four sectors. For sector 2541, the average plant size is smaller, and a larger proportion of plants are contained in the smallest plant size category. However, this further exemplifies the importance of considering small plants and segmenting to test economic impact on small operations.

As a point of contrast, similar data are presented for two other industry sectors, namely, petroleum refining (SIC-2911) and wood pulp manufacture (SIC-2611). In the case of petroleum refining, the average plant is more than five times the mean plant size in the furniture industry sectors; the average plant size for wood pulp manufacture is about three times larger. These latter two sectors are typified by large plants, highly capital intensive, with a great deal of automation and much less reliance on labor. Reliance on labor and lack of automation more typify the furniture industry.

Although the data is not as readily available, our review of major issues with the industry indicate that the sectors are also essentially homogeneous with respect to:

- . Price elasticity - See Section II.C.4 for analysis;
- . Costs - Cost/profit data collected correlates well with plant size variations;
- . Profitability - Cost/profit data collected correlates well with plant size variations;
- . Capital availability - In this industry and others we have analyzed (e.g., Economic Analysis of Proposed Effluent Guidelines - The Timber Products Processing Industry, Phase II; report to EPA, August 1974 #EPA-230/2-74-029), small firms have the least leverage in capital markets. The availability of capital to the small firms is an extremely important issue.

Thus, the segments which can be analyzed chosen to assess economic impact are two major segments, namely:

- . Upholstered furniture manufacturers, and
- . All other furniture manufacturers.

Within each of these larger segments the key variable is plant size, which is used to develop operating and financial profiles for various plant size categories.

TABLE II.B.1
INDUSTRY SECTOR COMPARISON, 1971

	<u>Shipments/ Production Worker</u> (1000)	<u>\$ Fixed Assets/ \$ Sales</u>	<u>\$ Fixed Assets/ Employ.</u>	<u>Capital Expend. /Plant</u>	<u>Mean Size</u>	<u>Average Plant Size (# of Employees)</u>		
						<u>1-19</u> %	<u>20-99</u> %	<u>100+</u> %
2511	22.1	.348	5,561	25,718	61	60.9	25.1	14.0
2521	23.9	.304	6,625	13,191	58	56.6	- 43.4 -	
2531	28.9	.228	5,762	21,359	57	54.9	- 45.1 -	
2541	31.0	.181	4,654	7,594	22	72.8	- 27.1 -	
Ave.	26.2	.312	5,160	16,877		59.9	- 40.1 -	
2911 (petroleum resining)	330.9	.579	149,038	3,899,683	318	13.6	- 86.4 -	
2611 (wood pulp manufacturing)	92.0	.355	23,346	2,263,793	181	43.2	- 56.8 -	

Source: Census of Manufactures.

C. NON-UPHOLSTERED FURNITURE

The ten-year growth in value of shipments for the SIC categories included in this sector is presented in Table II.C.1. That these are growth areas is demonstrated by the average annual increase in value of shipments of nearly 10%, approximately double the U.S. all manufacturing industries average and GNP growth rate.

The Wood Household Furniture Industry (SIC-2511), as defined by the U.S. Department of Commerce, includes establishments primarily engaged in manufacturing wood household furniture commonly used in dwellings. The sector includes the manufacture of infants' and children's wood furniture and wood outdoor furniture.

Table II.C.2 presents basic data for the sector. Two segments have been separated from 2511 in 1972: establishments primarily engaged in manufacturing kitchen cabinets are now classified under SIC-2434; and wood T.V., radio, phonograph and sewing machine cabinets also previously in this industry are now classified in industry 2517. Information for 2517 and 2434 is also included for comparison.

In household furniture manufacture, goods are generally more amenable to storage than in the upholstered (2512) furniture manufacture. Inventories of raw materials, primarily wood, are important and the production process is longer than in the upholstered segment. This segment represents a production process that requires at present little fixed outlay compared with that found in most industries. As suggested earlier in II.A., the introduction of plastics will change this aspect.

In 1972 the value of products shipped of establishments classified in the Wood Household Furniture Industry amounted to \$3,127 million. In 1967 the value of products shipped was \$2,439 million and in 1963 \$1,858 million. A comparable figure for 1972; that is, including 2517 and 2434, is \$4,267 million, a real increase in this industry of 36.5%. Table II.C.3 displays the change in value of shipments and employment by geographic area between 1967 and 1972. The South Atlantic Region has come in 1972 to hold 50% of the U.S. industry, as compared to 38% in 1967 when the figure included the additional industries of 2517, 2434. The West South Central, Mountain and South Atlantic Regions have experienced the largest average annual change in value of shipments, though changes in employment are not nearly so great. At the same time, the Middle Atlantic, East North Central and East South Central Regions have averaged a negative average annual change in both shipments and employment.

TABLE II-C-1

VALUE OF SHIPMENTS, TOTAL U.S.
1963-1972
(\$ Millions)

	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	Average Annual Change 63-70	Av Yr Chg 70-72
2511*	1858.0	2013.7	2201.1	2423.4	2438.9	2659.5	2862.6	2684.4	3029.7	3126.8	6.4	8.3
2517***										321.0		
2521	101.5	109.3	122.9	136.4	158.3	173.9	212.7	197.8	174.8	248.1	13.6	12.7
2531	268.6	284.4	312.8	343.5	421.2	432.3	468.5	562.6	471.8	522.1	10.3	6.4
2541	389.6	389.6	426.6	462.0	498.6	524.7	642.3	622.6	645.3	780.1	8.5	10.7

*Includes SIC 2434 & 2517 in 1963-1971.

**Includes SIC 2426 in 1963-1971

***Part of 2511, 1963-1971.

2434

319.6

2426

558.2

Source: Census of Manufactures.

TABLE II.C.2
EMPLOYEES AND VALUE OF SHIPMENTS BY GEOGRAPHICAL
REGION, SIC-2511*

	No. of Employees (1000)			Value of Shipments (\$ Million)			% of Industry
	<u>1967</u>	<u>1972</u>	<u>% Chg.</u>	<u>1967</u>	<u>1972</u>	<u>% Chg.</u>	
Total U.S.	151.4	195.7	29.3%	2438.9	4267.4	75.0%	
Northeast	27.1	28.8	6.3%	434.0	631.1	45.4%	14.8%
North Central	30.4	33.8	11.2%	489.6	817	66.9%	19.1%
South	88.0	107.4	22.0%	1318.2	2370.4	79.8%	55.5%
West	11.8	25.7	117.8%	197.1	448.9	127.8%	10.6%

*1972 data includes SIC-2517 and 2434, so the values are comparable for a real % of change. The values below represent 2511 in 1972 without 2517 and 2434,

Total U.S. -	151.4	139.6	-11.3%	2438.9	3126.8	28.2%
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Source: 1972 Preliminary Census of Manufacturers.

WOOD HOUSEHOLD FURNITURE

1972 EMPLOYMENT PROFILE, SIC-2511

	% of Value of Ship.	% of Empl. in 2511	Total # of Units	% Units/State: Employee Size		
				1-19	20-99	100+
U.S.			2714	60.9	25.1	14.1
North Carolina	23.4	21.7	170	35.2	24.7	40.1
South Carolina	1.5	12.5	412	54.9	--	45.1 --
Virginia	13.0	10.3	65	38.3	16.8	44.9
Tennessee	4.2	7.1	81	90.1	--	9.9 --
Indiana	3.9	7.0	114	42.7	29.7	27.6
California	6.6	5.8	392	67.5	26.3	6.2

Source: 1972 Census of Manufactures.

The Wood TV and Radio Cabinets Sector (SIC-2517) includes establishments primarily engaged in manufacturing wood radio, phonograph, hi-fi, and television cabinets. This industry also includes establishments primarily engaged in manufacturing sewing machine cabinets. This industry is included for the first time in the 1972 Census of Manufactures and so no comparable figures are available for 1967. In 1972 the value of shipments for this industry was \$321 million; average employment, 18,000. Cost of materials was \$155 million, 42% of which accounted for wood costs. Tables II.C.4 and II.C.5 show that the North Central and South Regions hold over 80% of the industry's value of shipments and slightly more of the employment. 60% of the plants in the U.S. have more than 20 employees, the highest concentration of those plants in the North Central, 56% of the above 20-employee plant sites are located here. The West, on the other hand, has 35% of the U.S. total of under 20-employee size plants; and 77% of its own plants are under 20 employees.

The Wood Office Furniture Sector (SIC-2521) includes establishments primarily engaged in manufacturing wood office furniture, whether padded, upholstered, or plain. In 1972 the value of shipments of this industry amounted to \$248 million, a 57% increase over 1967; value added by manufacture was 61% above 1967, at \$143 million in 1972. Average employment increased by 39% with 11,400 employees in 1972. Table II.C.6 shows the percentage of industry in each region (the South holding 42%) and the percentage change from 1967 in shipments and employment for each region. The West shows the greatest relative change, with employment up 100% and a 161% increase in the value of shipments, though actual change was greatest in the South with a 82% increase in employment to 4.9 thousand employees, and a 113% increase in value of shipments to \$106 million. The employment size unit is fairly evenly divided in the industry between plants with less than, and those with greater than, 20 employees (Table II.C.8). Only the West shows a disproportion with 70% of the smaller size unit.

The wood office furniture industry is about 8% of the size of the wood non-upholstered furniture industry and 5% of the total household furniture industry. While the household furniture industry has grown in value of sales, 41% from 1967, the wood office furniture industry, however, has grown 57% and the metal office furniture industry, 36.6%.

The other industries under study here have shown fairly similar increases in value added/production worker and value of shipments/production worker (Table II.A.2), only wood office furniture shows a markedly smaller increase. While wood household furniture represents over 86% of the household furniture industry, wood office furniture represents about 26% of the total office furniture industry; the bulk of this industry is metal, with plastics holding a small percentage. Metal's advantages over wood in office furniture are durability, lower maintenance cost and the possibility of using modular concepts for replacement in an easier and more precise manner than can be done with wood.

TABLE II.C.4
EMPLOYEES AND VALUE OF SHIPMENTS
BY GEOGRAPHICAL REGIONS, SIC-2517
WOODEN TV AND RADIO CABINETS

	No of Employees (1000)		Value of Shipments (\$ Million)	
	1972	% of Ind	1972	% of Ind
U.S.	18.2		321.0	
Northeast	2.2	12.1	52.2	16.3
North Central	7.0	38.5	137.8	42.9
South	8.5	46.7	122.8	38.3
West	0.5	2.7	8.3	2.6

Source: Census of Manufactures.

TABLE II.C.5

1972 EMPLOYMENT PROFILE

SIC-2517

	<u>% of U.S. Val. Ship.</u>	<u>% of U.S. Empl. in 2517</u>	<u>Total # Units</u>	<u>% Reporting Units/State Employee Size</u>	
				<u>1-19</u>	<u>20+</u>
U.S.			94	39.4	60.6
Northeast	16.3	12.1	27	48.1	51.9
North Central	42.9	38.5	38	15.8	94.2
South	38.3	46.7	12	41.7	58.3
West	2.6	2.7	17	76.5	23.5

Source: 1972 Census of Manufactures.

TABLE II.C.6							
EMPLOYEES & VALUE OF SHIPMENTS BY GEOGRAPHICAL REGION,							
SIC-2521							
	No. of Employees (1000)			Value & Shipments \$ Mil			% of Ind
	1967	1972	% Chg	1967	1972	% Chg	
U.S.	8.2	11.4	39.0	158.3	248.1	56.7	
Northeast	2.3	2.3	0	47.9	49.3	2.9	19.9
North Central	2.8	3.0	7.1	49.5	61.2	23.6	24.7
South	2.6	4.9	82.1	49.8	106.2	113.3	42.8
West	0.6	1.2	100	11.1	29.0	161.3	11.7

Source: 1972 Census of Manufactures.

TABLE II.C.7
1972 EMPLOYMENT PROFILE,
WOOD OFFICE FURNITURE

	<u>% of U.S.</u>	<u>% of U.S.</u>	<u>Total #</u>	<u>% Reporting</u>	
	<u>Val. of Ship.</u>	<u>Empl. in 2521</u>	<u>Units</u>	<u>Empl.</u>	<u>Units/State:</u>
				<u>1-19</u>	<u>20+</u>
U.S.			235	56.6	43.4
Northwest	19.9	20.2	58	56.9	43.1
North Central	24.7	26.3	45	54.6	44.4
South	42.8	43.0	68	44.1	55.9
West	11.7	10.5	64	70.3	29.7

Source: 1972 Census of Manufactures

Growth of office furniture market depends upon new office construction, replacement demand and style. The market growth has paralleled the recent rapid growth in new office construction and numbers of white collar workers.

The Public Building and Related Furniture Sector (SIC-2531) includes establishments primarily engaged in manufacturing furniture for schools, theaters, assembly halls, churches and libraries. Those establishments primarily engaged in manufacturing seats for public conveyances, as well as seats for automobiles and aircraft are also included.

In 1972 the Value of Shipments for this industry was \$522.1 million, a 24% increase over 1967. Value added by manufacture also increased 24% to \$289 million, while employment decreased 8% to approximately 21 thousand employees. Table II.C.8 shows that the greatest concentration of this industry is in the East North Central, and the South as a whole is again a major region with 27% of the industry as compared to 43% for the North Central. Table II.C.9 shows a profile of the employment and unit-size, the industry favoring the smaller unit a bit, though in the areas of greatest concentration. There is a fairly even split between large and small size units.

Many comments applicable to office furniture apply here but school seating is estimated to be the most important sector of this market, accounting for about half of total sales. Future growth in this market, however, is small (2%) with molded plastics the principal material used. Our surveys show 60% of total classroom seatings are now made of thermoformed plastic, 15% are fiber glass, 10% are solid plastic, and about 15% of wood and steel. Only 17% of the materials consumed were of wood in 1972, 18% of wood in 1967.

The Wood Partitions and Fixtures Sector (SIC-2541) includes establishments primarily engaged in manufacturing wood shelving, lockers, office and store fixtures, prefabricated partitions and related fabricated products.

In 1972 the value of products shipped in this industry was \$780 million, an increase of 56% compared with 1967. Value added by manufacture at \$432 million was 52% above 1967, and average employment showed an increase of 20%.

Table II.C.10 shows that though the concentration of the industry, close to 60%, is in the Northeast and North Central states, the greatest increases between 1967 and 1972 have taken place in the South Atlantic and East South Central States. This industry leans heavily toward the smaller size plants (Table II.C.11) with close to 75% of the industry units having under 20 employees.

TABLE II.C.8
EMPLOYEES AND VALUE OF SHIPMENTS BY GEOGRAPHICAL

	<u>REGION, SIC-2531</u>			<u>Val. of Shipments (\$ Mil)</u>			
	<u>No. of Employees (1,000)</u>						
	<u>1967</u>	<u>1972</u>	<u>% chg.</u>	<u>1967</u>	<u>1972</u>	<u>% chg.</u>	<u>% of Ind.</u>
U.S.	22.6	20.7	-8.4	421.2	522.1	24.0	
New England	1.0	.8	-20	18.2	21.8	19.8	4.2
Middle Atlantic	2.4	1.9	-20.8	48.8	51.2	7.0	9.8
East North Central	6.9	7.1	2.9	136.1	194.2	42.7	37.2
West North Central	1.0	1.2	20.0	19.2	31.8	65.6	6.1
South Atlantic	2.3	1.5	-34.8	30.3	28.8	-5.0	5.5
East South Central	.9	1.4	55.6	16.2	35.7	120.4	6.8
West South Central	3.7	3.5	-5.4	64.2	76.9	51.1	14.7
Mountain	.2	.4	100.0	4.3	7.7	79.1	1.5
Pacific	4.2	2.9	31.0	83.9	74.0	-11.8	14.2

Source: 1972 Census of Manufactures.

TABLE II.C.9

1972 EMPLOYMENT PROFILE, SIC-2531

	<u>% of U.S. Value of Ship</u>	<u>% of U.S. Empl. in 2531</u>	<u>Total # Units</u>	<u>% Units/Stats: Empl. Site 1-19 20 +</u>	
U.S.			412	54.9	45.1
Northeast	14.0	13.0	78	60.3	39.7
North Central	43.3	40.1	133	51.9	48.1
South	27.1	30.9	124	48.4	51.6
West	15.6	15.9	77	64.9	35.1

Source: 1972 Census of Manufactures.

TABLE II.C.10

EMPLOYEES AND VALUE OF SHIPMENTS BY GEOGRAPHICAL

	<u>REGION, SIC-2541</u>			<u>Value of Shipments (\$ M)</u>			
	<u>No. of Employees (1,000)</u>						
	1967	1972	% chg.	1967	1972	% chg.	
U.S.	25.3	30.4	20.2	498.6	780.1	56.5	
New England	1.6	1.6	0	30.5	46.0	50.8	5.9
Middle Atlantic	6.4	7.2	12.5	129.1	179.9	39.3	23.1
East North Central	6.2	6.9	11.3	131.2	184.3	40.5	23.6
West North Central	1.3	1.7	30.8	25.9	44.5	63.1	5.7
South Atlantic	2.9	4.5	55.2	48.6	97.2	100.0	12.5
East South Central	.9	1.4	55.6	17.8	37.0	107.9	4.7
West South Central	1.9	2.1	10.5	30.7	48.9	58.9	6.3
West	4.0	5.0	25.0	84.9	142.3	67.6	18.2

TABLE II.C.11

1972 EMPLOYMENT PROFILE SIC-2541

	<u>% of U.S.</u>	<u>% of U.S.</u>	<u>Total #</u>	<u>%Units/States: Empl. Size</u>	
	<u>Val. of Ship.</u>	<u>Empl. in 2541</u>		<u>1-19</u>	<u>20+</u>
U.S.			1488	72.8	27.1
Northeast	29.0	28.9	403	69.7	30.3
North Central	29.3	28.3	401	74.5	25.4
South	23.5	26.3	328	70.8	29.2
West	18.2	6.0	356	76.4	23.6

Source: Census of Manufactures.

1. Types of Firms

As demonstrated in Section II.A (Overview), the furniture manufacturing industry is comprised of firms which are generally small and privately controlled. No single manufacturer controls more than 3% of the total market. This is true historically and pertains today, although there have been acquisitions of large, independent furniture manufacturers by multi-industry firms, e.g., Champion International (Drexel and Heritage) and Armstrong Cork (Thomasville). The lack of concentration in the industry is indicated by the following table:

<u>No. of Firms</u>	<u>% of Total Industry Sales</u>
10 largest producers	Less than 20%
25 largest producers	25%
3,600 smallest producers	Less than 10%

Backward vertical integration of firms in these sectors is possible only for the largest manufacturers. The firms generally do not own their own woodlands; rather, they purchase logs and process them for their own use. Many firms also do not have cutting facilities; rather, they buy wood and wood products in "cut-to-size" configurations for assembly and finishing in-house.

Forward vertical integration into the marketplace is also limited. Firms generally do not own distribution outlets. Rather, they sell through independent or franchised, local businesses to consumers.

Integration into complementary home furnishings, such as lamps, draperies, carpets, and other household accessories, is a major goal for large firms in the furniture industry. Such integration is intended to improve the marketing effectiveness of such firms as well as to yield additional avenues for growth. Many acquisitions of furniture companies have been based on the objective to be a full line home furnishings supplier. However, again, this option is only viable for the largest 25-50 firms.

Although the industry is fragmented, the large companies do have the greatest influence on the marketplace. The small, individually owned and operated firms concentrate on specialty markets or become supporting suppliers for the largest companies. Other smaller manufacturers are considering mergers with other small companies or joint ventures to insure adequate raw material supplies and to gain greater market control. As large retail chains capable of merchandising a broad line of home furnishings through franchise programs gain share of market, pressures for consolidation will increase.

2. Types of Plants

Plants within the non-upholstered manufacturing sector are quite small. Table II.C.12 demonstrates that for the entire sector, 60% of the plants have less than 19 employees. Additionally, approximately 20-25% of the plants have 20-99 employees, indicating that 80-85% of the plants have fewer than 100 employees. At an average value of \$26,000 per production worker, this suggests that in 60% of the industry the average plant generates less than \$500,000 annual sales.

The plant size pattern is consistent for each of the individual subsectors covered under Non-upholstered Furniture, with the exception of SIC-2541, which is represented by even smaller plants. However, 2541 is not a major subsector and only reinforces the fact that the plants in this industry are indeed small.

The small manufacturer uses the same production process as its larger counterpart, although it substitutes labor for capital equipment. Further, while the small manufacturer buys raw materials from the same suppliers as the larger companies, it may have to sacrifice small quality increments in order to compensate for the extra cost of small orders. By doing this, the small manufacturer is able to main its cost of goods sold at approximately the same ratio to sales as for the larger manufacturers, even though the small manufacturer does not obtain quantity discounts.

As noted above in Section II.B, our survey of the industry indicates that water wash spray booths are only found in large plants. During the past 10-15 years the use of water wash spray booths has increased rapidly; we estimate that about 50-60% of the larger non-upholstered furniture plants in the U.S. use this device. However, due to the relatively high investment costs and relatively low throughput, such equipment is not generally found in medium-sized plants; it is never found in small-sized plants. The technological alternatives to water wash spray booths are hand rubbing or use of filter booths.

Laundry operations are found in all sizes of furniture plants. However, during the last ten years plants have not expanded laundry facilities as operations expanded. Rather, they have reduced the scope of laundry operations or eliminated in-plant laundry facilities completely. An in-plant laundry represents additional labor charges and labor recruitment. The cost of and difficulty to find labor has led companies to contract with suppliers of laundry service to either supply rags or to launder the firm's rags. The trend away from in-plant laundries is definitive and will continue, now spurred by the need to control (laundry) effluent. Our studies have not identified any firms unable to close in-plant laundries due to unavailability of local laundry services.

TABLE II.C. 12
PLANT SIZE DISTRIBUTION -
NONUPHOLSTERED FURNITURE MANUFACTURING

<u>SIC</u>	<u>Plant Size - # of Employees</u>			
	<u>Mean</u>	<u>1-19</u> %	<u>20-99</u> %	<u>100+</u> %
2511	61	60.9	25.1	14.0
2521	58	56.6	43.4	
2531	57	54.9	45.1	
2541	22	72.8	27.1	
		59.9	40.1	
All Sectors				

Source: 1972 Preliminary Census of Manufactures.

3. Financial Profiles

Table II.C.13 develops model plants for the non-upholstered furniture manufacturers. These model plants are intended to focus upon the sectors of the industry most likely to be affected. That is, the small-sized plant (eighteen employees, \$391,000 annual sales) is a very small plant; even our medium-sized plant (53 employees, \$1.175 million annual sales) is considered a small plant in the industry. However, since it is the small plants which are most sensitive to small cost increments and thus are most likely to be affected by costs to comply with effluent regulations, it is necessary to emphasize the smaller plants.

The financial condition of the small- and medium-sized plants is less favorable than that of our large-model plant. Some of this is due to the effects of economies of scale and forward integration (the greater ability to control the marketplace on the part of the large manufacturers). In addition, the net profit figure is reduced further since the smaller, privately-held firms tend to take income in the form of salaries and fringe benefits, rather than show the income on the "bottom line." Nonetheless, our model small firm is not in a strong position, with an annual cash flow of \$13,300.

While the financial profiles indicate a slightly higher profit margin for medium-sized plants than small-sized plants (2.6% sales before tax v. 2.2%), and a slightly lower return on net assets (5.0% x 5.2%), these differences are not significant. Higher profitability occurs at a much larger size level (\$5-6 million sales) as evidenced by the fact that the large model firm has nearly double the financial performance (pretax margin 7.3%, return on net assets 9.4%) than either other model plant. Further, capital productivity (\$ assets/\$ sales) is essentially the same for small and medium plants (0.24, 0.256), but is much higher (0.374) for the large plant.

4. Pricing

The demand for furniture is relatively inelastic and depends to a great extent on trends in consumer disposable income, family formations, population growth and new housing starts. Demand for new furniture arises primarily from new family formations (which dictate initial purchases); from changes in residence, including moves into newly built homes; and from wearing-out or style obsolescence of existing furniture. New family formations account for as much as one-third of the total demand for new home furnishings, of which furniture is the most important single purchase. Some advance in household formations (both through marriages and the trend to second homes) is expected over the next few years. Furthermore, with the trend to later marriages and higher incomes of the new households, furniture purchases per family can be expected to be at slightly higher levels during the 1970's than previous decades.

TABLE II.C.13
FINANCIAL PROFILE FOR NONUPHOLSTERED
FURNITURE MANUFACTURE

	<u>Small</u>		<u>Medium</u>		<u>Large</u>	
	\$	%	\$	%	\$	%
Net Sales	391,000	100.0	1,175,000	100.0	6,274,000	100.0
Cost of Sales	299,000	76.6	952,000	81.0	4,605,000	73.5
SG&A	83,000	21.2	193,000	16.4	230,000	19.2
Income Before Tax	10,000	2.2	30,000	2.6	439,000	7.3
Net Income	5,000	1.1	15,000	1.3	220,000	3.7
Net Assets	94,000		300,000		2,350,000	
Net Fixed Assets	34,000		125,000		930,000	
Return on Net Assets		5.2%		5.0%		9.4
Cash Flow	13,300		40,500		354,500	
# of Employees		18		53		295
<u>\$ Assets</u> <u>\$ Sales</u>		0.240		0.256		0.374

Source: Arthur D. Little, Inc., estimates.

The household furniture industry has traditionally used a two-level marketing system: an exhibit system or "market" to bring together manufacturers and retailers, and independent retailers to sell the finished product to consumers. The manufacturers exhibit their offerings to buyers at semi-annual shows in various regions throughout the United States. This system has done much to foster the inward orientation of the furniture manufacturers, as the retail store buyers insulate the manufacturers from the consumer. In their desire to bring new and exciting products to the retail market, the buyers often demand style, design, and product changes that result in substantial manufacturing diseconomies. Although both furniture manufacturers and retailers agree that too many shows are being held, they demonstrate little inclination to reduce the number of shows.

Up to this point, while the industry has been comprised of many small manufacturers and retailers, the exhibit system has been the best vehicle for their interaction. Now, however, with the evolution of large furniture marketors (e.g., Wickes) capable of supporting the direct sales costs of franchise programs or retail outlet ownership, we expect changes in marketing patterns. Warehouse-showroom retailing offers large in-depth inventories that permit immediate carry-out or delivery at substantially reduced prices from normal retail furniture outlets (10-25%).

Price leadership on an industry-wide basis is not present in the furniture industry. And, although firms directly competitive watch each other's prices closely, there is no consistent practice of following one or a few price leaders. Great variation in the quality levels of the product, styles and promotional efforts make direct price comparisons difficult for the majority of firms in the industry. Individual firms may adopt a policy of following the price pattern of a close competitor, but there is no industry-wide following of a price leader or leaders as it occurs in some other industries.

At the consumer level, prices are exceedingly difficult to compare. As noted above, there are nearly an infinite number of variations in styles, colors, wood used, etc., which virtually eliminates the ability to make direct price comparisons. A consumer generally chooses a piece of furniture because it is within his price range, and is of a style and color to match well with other articles of furnishings in the home or apartment. A price range in which the consumer is relatively insensitive to price may be as wide as 5-10%, that is, a consumer will choose one item over another, even though it may be 10% more expensive, simply because he likes it. A consumer does not generally buy a cheaper, less attractive item simply to save 5%. A consumer may defer the purchase until a later time, to await a period of greater financial capacity, or may wait for the item to go on sale. However, the consumer will usually not trade-off one piece

of furniture versus another strictly based on a 5-10% lower price. While this conclusion of relative price insensitivity is an important characteristic of the industry, it is not the critical factor underpinning the economic impact analysis (Section V). Rather, such factors as levels of costs associated with proposed Guidelines and the availability of capital and lower-cost compliance technologies are more important.

Prices of wood furniture in general have risen about 3%/year over the past decade. Furniture prices rose between December 1972 and December 1973, 5.2 percent at the retail level and 7.3 percent at the producer level. In addition to the influence of strong consumer demand, which was spurred by increases in disposable income and home construction, rising costs for wages and materials exerted persistent upward pressure on prices. Raw materials and wage costs are likely to rise and contribute to upward operating costs and higher prices during the year.

D. UPHOLSTERED FURNITURE

The Upholstered Household Furniture Sector includes establishments primarily engaged in manufacturing upholstered furniture on wood frames. Those establishments primarily engaged in manufacturing wood frames for upholstered furniture have been separated from 2512 for 1972 data and are included under SIC-24266.

To a large extent the small-scale upholstered furniture manufacturer performs an assembly type operation. Wood frames, springs, glue, cotton and fabrics are purchased only as needed. Some capital outlay is required for factory space, fabric cutting hand tools and a few small assembly tools. And even the smallest manufacturers carry some inventory in materials, especially fabrics and frames. Because upholstered goods are manufactured largely to order, inventories and finished products are virtually nonexistent. Naturally, as output expands, the desirability of carrying inventories of raw materials and finished goods increases, and working capital becomes increasingly important.

The value of shipments of establishments classified under 2512 amounted to \$2.1 billion, an increase of 66% compared with 1967. With the inclusion of 24266, for comparative reasons, the figure is \$2181MM, an increase of 72%. While average employment in wood household furniture, 2511, was down 11% from 1967, in the upholstered furniture industry employment showed an increase of 23% to 92,000 employees in 1972. The industry more than doubled its value of shipments, from 1967 to 1972, in the West North Central and East South Central Region, while the South Atlantic and West South Central had over 80% increases (Table II.D.1). The South Atlantic, as in sector 2511, holds the greatest part of the industry shipments, 35%, but this industry is not

TABLE II.D.1

EMPLOYEES AND VALUE OF SHIPMENTS BY GEOGRAPHICAL REGION,
SIC-2512

	<u>No. of Employees (1000)</u>			<u>Value of Shipments (\$ million)</u>			<u>% of Industry</u>
	<u>1967</u>	<u>1972</u>	<u>% Change</u>	<u>1967</u>	<u>1972</u>	<u>% Change</u>	
Total U.S.	75.2	92.2	22.6	1266.4	2104.3	66.2	
New England	3.0	2.6	-13.3	46.4	55.0	18.5	2.6
Middle Atlantic	7.6	6.6	-13.2	132.7	151.0	13.8	7.2
East North Central	11.0	10.5	-4.5	216.5	243.1	12.3	11.6
West North Central	1.9	3.0	57.9	35.4	77.5	118.9	3.9
South Atlantic	25.3	32.6	28.9	416.8	751.7	80.4	35.7
East South Central	12.5	18.8	50.4	183.4	423.9	131.1	20.1
West South Central	5.4	6.7	24.1	76.5	138.8	81.4	6.6
Mountain	.7	1.2	71.4	12.4	20.9	68.5	1.0
Pacific	7.8	10.2	30.8	146.2	242.4	65.8	11.5
Total U.S.		NA		52.4	76.9	46.8	

Source: 1972 Preliminary Source of Manufactures.

quite as unevenly distributed over the states. Table II.D.2 shows the states which account for over 50% of the employment, with North Carolina holding the lion's share, 26%, and California and Tennessee vying for second at 9%.

1. Type of Firm

The fragmentation of this industry sector parallels that of the non-upholstered sector, described in Section II.C.1. In fact, since many of the firms manufacture both upholstered and non-upholstered furniture, it is not always possible to separate the firms' activities into those two categories. It is only the small firms which specialize entirely to the extent of being in only one or the other of the businesses. In fact, many manufacturers of upholstered furniture are major merchandisers which purchase fabric, backing, frames, and produce on a custom basis a particular chair or sofa to meet a customer order.

2. Type of Plants

As is the case for non-upholstered furniture manufacturers, and as presented in Table II.D.3, this is an industry of small plants, i.e., 58% of the plants have 99 or fewer employees and, therefore, have less than \$1.5 million worth of annual sales revenues.

Very few upholstered furniture manufacturers have in-plant laundry facilities. The cost of the facilities is simply not justified by the little amount of hand finishing and, therefore, the little amount of cloths which are needed.

Companies maintain a small inventory of sprung frames and a very large inventory of fabrics. Most of the business is custom, made-to-order business.

Typically, the small manufacturer will buy a few standard makeup frames and will spring them according to standard industry techniques.

The small manufacturer buys cotton backing and foam from the same suppliers as the larger companies but may sacrifice small quality increments in order to compensate for the extra cost of small orders. Manufacturers are able to offer a very large number of patterns and colors of cloth, perhaps as many as 500 for even a small operation through the use of "books" supplied by fabric jobbers. By sacrificing some quality and having the inventory carried by a fabric jobber and spread over a number of accounts, the small manufacturer is able to maintain a cost of goods sold at approximately the same percentage of net sales as that of a large manufacturer.

TABLE II.D.2

1972 EMPLOYMENT PROFILE, SIC-2512

	<u>% of U.S. Volume of Shipments</u>	<u>% of U.S. Empl. in 2512</u>	<u>Total # Units</u>	<u>% Reporting Units/State: Employee Size</u>		
				<u>1-19</u>	<u>20-99</u>	<u>100+</u>
U.S.			1501	47.0	37.5	15.5
North Carolina	26.2	26.6	286	36.6	38.2	22.2
California	10.3	9.3	259	56.7	37.1	6.2
Tennessee	8.1	9.2	94	38.3	— 61.7 —	
Mississippi	10.2	7.3	38	29.0	29.0	42.0

Source: Preliminary Census of Manufactures.

3. Financial Profiles

Table II.D.4 presents the financial profiles for small, medium, and large-sized companies in this industry sector. Again, we have stressed smaller plants since they are the most likely to be affected by abatement costs.

Again, as with non-upholstered plants, profitability is essentially identical for small- and medium-sized plants, with large plants substantially more profitable.

4. Pricing

The pricing dynamics in the furniture industry are analogous for either upholstered or non-upholstered household furniture. Thus, the discussion in Section II.C.4 is relevant for this discussion of upholstered furniture as well.

TABLE II.D.4

FINANCIAL PROFILE FOR MODEL COMPANIES, SIC 2512

	<u>Small</u>		<u>Medium</u>		<u>Large</u>	
	<u>\$</u>	<u>%</u>	<u>\$</u>	<u>%</u>	<u>\$</u>	<u>%</u>
Net Sales	532,000	100.0	1,386,000	100.0	7,033,000	100.0
Cost of Sales	514,000	96.5	1,339,000	96.6	6,590,000	93.5
Income Before Tax	18,000	3.5	45,000	3.4	443,000	6.5
Net Income	9,000	1.8	82,500	1.7	221,500	3.3
Net Assets	138,000		360,000		2,415,000	
Net Fixed Assets	26,000		116,000		990,000	
Return on Net Assets		6.4		6.2		9.2
Cash Flow	16,200		36,700		312,963	
# of Employees		24		61		312
$\frac{\$ \text{ Assets}}{\$ \text{ Sales}}$		0.258		0.260		0.348

Source: Arthur D. Little, Inc., estimates.

III. METHODOLOGY

Since there are many small, privately held firms in this industry, which do not generally publish financial or other statistics on their operations, data had to be developed on the various industry segments through Department of Commerce information, surveys of firms in the industry, surveys of industry associations and others knowledgeable of industry practice and background data which we have accumulated over time.

To accomplish the Economic Impact Analysis, the data on the structure of this industry was used to develop industry segments of groups of firms which would be differentially affected by guidelines and costs, and was applied to an analytical model with the focus on the following critical issues.

- . The probability that cost of compliance will be able to be passed on to consumers via increase in product cost or will have to be absorbed by operators, resulting in a lower level of profitability; and,
- . If costs cannot be passed through, the extent to which the resultant effect on financial condition and capital availability will cause plant closures, unemployment, community impacts, and restrict industry growth.
- . The extent to which capital availability will be limited for the numerous small operators, also causing plant closures, unemployment, and community impacts, and restricting industry growth.

A. DATA GATHERING

Data available on firms within this industry is fragmented and incomplete. The Department of Commerce, through its Census of Manufactures and other like information, represents a general body of macroeconomic information applicable to this industry. However, since so many of these firms are privately held and therefore do not disclose financial or other operating information in any detail, that information and other similar publicly-available information represents only a general and incomplete description of this industry.

Thus, we developed new data which we believe to be an adequate base for the analysis on industry practices and representative financial data through:

- . Interviews of individual companies;
- . Interviews with trade associations and others knowledgeable in the industry and;
- . Reliance on the assignment team's own knowledge of the industry and relevant experience of colleagues.

B. PRICE EFFECTS

The analysis of whether prices are likely (or not likely) to be able to be passed on is a relatively straightforward economic analysis. Table III.B.1, presents the price increase analysis matrix which we used to derive price increase conclusions.

If the annual treatment cost (before tax) represents a significant percentage of the selling price, it will be difficult to pass this on to consumers. This is particularly true in an industry which is characterized by a high level of price elasticity of demand. In price insensitive industries, a 5% price increase can be readily passed on. In other Timber Products Processing Industry sectors, a before tax treatment cost greater than 10% of selling price seriously hampers the ability to pass the cost increase on to consumers.

A high occurrence of readily-substituted products will limit the ability to pass on cost increases through increased prices. Similarly, if demand is elastic (sensitive to price), the ability to pass on price increases is limited.

A uniformly low operating rate within the industry would also constrain such increases. Companies with low operating rates are more likely to absorb cost increases in an attempt to maintain or increase present operating rates rather than attempting to pass through cost increases.

Typically, a critical factor to analyze is the extent to which plants within the industry have to absorb comparable abatement costs. If costs are unequally distributed throughout an industry, producers which do not have to make an investment or can make less of an investment obtain a strategic cost advantage. A low-cost producer will tend to absorb abatement costs, particularly if the abatement costs to the low-cost producer are smaller than for the industry as a whole, to put the other plants in the industry at a cost disadvantage.

If products are sold within an industry on the basis of price rather than quality, service, etc., then cost increases are likely to be absorbed rather than passed through. Similarly, if market shares are generally small for any individual firm or plant, then price competition is likely to be severe and cost increases are likely to be absorbed.

Table III.B.1 and the underlying analysis is applicable to the furniture industry as a whole. However large firms, while not able to influence the market and prices dramatically, do have more leverage than do small firms. Thus, the larger the firm (and the higher its share-of-market), the greater its ability to pass on cost increases.

TABLE III.B.1

PRICE INCREASE ANALYSIS MATRIX

Price Increase Constraints

<u>Factor</u>	<u>Condition for Constraint</u>
Ratio of Before Tax Treatment Cost To Selling Price (%)	High
Substitute Products	High Occurrence
Capacity Utilization	Low
Captive Usage	Low
Demand Growth	Low
Foreign Competition	High
Abatement Cost Differences	Unequal
Price Elasticity of Demand	High
Basis for Competition	Price
Market Share Distribution	Fragmented
Number of Producers	Many

C. PLANT CLOSURE EFFECTS

Even if prices are not likely to be increased, and costs are absorbed with relatively well-documented financial effects, it is difficult to reach conclusions regarding plant closures. The plant closure analysis matrix which was used to focus upon the central issues in these decisions is presented as Table III.C.1. The analysis is complicated by the fact that small, family-owned and operated, one-plant firms tend to show remarkable "staying power" in the face of extremely low rates of profitability and other burdens. The extent of subjective commitment to the business beyond the point at which standard financial analysis would suggest shutdown is an extremely difficult factor to measure and assess. Nonetheless, subjective elements must be necessarily used to supplement the objective analysis, since objective economic analysis would tend to overstate the extent of plant closures.

The three fundamental issues to focus upon are:

- . Extent of integration - If a plant is part of an extensive manufacturing operation, it is likely to be kept open even if financial impacts are relatively severe. For example, an insulation board manufacturing plant can be an efficient consumer of otherwise low-value waste product (sawdust, shavings, etc.) from a sawmill or planing mill located on a common site.
- . Other facilities on a common site - An isolated plant is most vulnerable for the reasons described in the integration discussion above.
- . Ownership - A large, multi-industry firm would tend to make a shutdown decision based on "rational" business analysis, such as effects on profitability. Such a firm would likely have specific criteria for each of its operating facilities to meet. However, a private owner tends to have greater "staying power," a greater subjective commitment to staying in business even if profitability is substantially reduced. This is true for such reasons as the fact that the plant has been in the family for generations, but also such specific economic reasons as the fact that this may be a particular family's sole or primary source of income.

TABLE III.C.1
PLANT CLOSURE ANALYSIS MATRIX
Plant Shutdown Decision

<u>Factor</u>	<u>Condition for Shutdown</u>
. Ration of After Tax Treatment Cost at After Tax Net Income (%)	High
Cash Flow (Including Treatment Costs)	Negative
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	Low
Integration	Low
Multi-Plant Complex	Isolated Plant
Other Environmental Problems (Including OSHA)	Multiple
Emotional Commitment	Indifference
Ownership	Large, Multi-Industry Company

D. SEGMENTATION

The objective of segmenting the industry was to group plants into categories which might be affected similarly by pollution control requirements. For this industry, the costs of compliance and technologies to comply can be directly related to the type of process performed. Processes performed within plants vary by product mix only to the extent that upholstered furniture manufacturers do far less finishing and generate less effluent than do non-upholstered manufacturers. Thus, the cost of compliance will fall differently upon plants in each of these two primary categories.

Within each of these two primary segments, effects are directly related to the size of plant. There are many very small plants in this industry; i.e., more than 60% of the plants have less than 20 employees and generate less than \$500,000 in annual sales revenues. Such plants are quite sensitive to cost increments which may be small in an absolute sense (\$5,000-\$10,000) but which represent a relatively large ratio to present costs (10-20% of revenues). Thus, plant size is the second important criterion used to segment the industry.

IV. COSTS OF COMPLIANCE

The Development Document concludes that subcategorization of the furniture industry for developing effluent guidelines and standards should be based on water usage. Other factors such as process variation, nature of raw materials, plant size and age, nature of water supply, plant location and land availability were determined to be of secondary importance. The volume of waste water generated by the furniture industry is not very large, although increased usage is shown by plants which have water wash spray booths and in-plant laundry facilities. Wet scrubbers as emission control devices in some plants are also a source of water pollution.

Costs of compliance as reported in the Development Document are based on the effluent loads of large plants. Thus, those costs overstate the burden small plants would face. However, since we have no estimates of the effect of scale, we used these costs and, thus, performed a "worst case" analysis.*

A. MODEL PLANTS

Model plants were formulated in the Development Document on the basis of presence of water wash spray booths and in-plant laundry facilities, the two major contributors to wastewater volume. All plants were assumed to have two glue spreaders which generate a wastewater volume from cleanup operations.

- . Model 1 - Contains only dry booths, no laundry facilities, two glue spreaders.
- . Model 2 - Contains dry booths, laundry facilities, two glue spreaders.
- . Model 3 - Contains water wash (wet) spray booths, no laundry, two glue spreaders.
- . Model 4 - Contains both water wash booths and laundry facilities, two glue spreaders.

The volume of plant wastewater depends on the size and number of water wash spray booths and the number of loads of laundry washed each day. The wastewater from these two sources is generally very concentrated, alkaline, highly-colored, and with high levels of BOD and COD. At present, these streams may or may not be discharged from a given plant.

*Note: A small plant (less than 20 employees) probably generates less than 500 gallons of effluent process water daily and as much as 500-1000 gallons of sanitary waste water daily.

In order to develop investment and operating costs for the model plants, certain assumptions were necessary regarding the volume of wastewater to be treated; these were:

- . Model 1 - 200 gallons/day for glue spreader clean-up.
- . Model 2 - 1200 gallons/day for clean-up and laundry.
- . Model 3 - 680 gallons/day for clean-up and water wash spray booths.
- . Model 4 - 1680 gallons/day for clean-up, laundry and water wash spray booths.

B. ALTERNATIVE CONTROL METHODS

The following treatment technologies were considered applicable for furniture plant effluents:

- . Alternative B - Trucking from plant to landfill area.
- . Alternative C - Incineration via spraying on hog fuel.
- . Alternative D - Evaporation from shallow ponds using mechanical spray units in some areas where precipitation exceeds evaporation (e.g., North Carolina New England, Michigan).
- . Alternative E - Aeration ponds combined with spray irrigation of settled skimmed and treated wastewater. This is judged applicable only to Models 2 and 4 which have laundry facilities.

C. OPERATING AND INVESTMENT COSTS USING BPT

The Development Document concludes that zero discharge for furniture plants is possible using any of the alternative control technologies. Table IV.C.1 summarizes the estimated investment and operating costs for BPT. Alternative D includes costs for both shallow ponds and ponds combined with mechanical spray units.

D. COST IMPACT

Table IV.D.1 estimates the costs of compliance for the various industry sectors. For these firms, the costs represent the probable technologies firms will elect to institute to comply with 1977 Guidelines. The small- and medium-sized firms generate less effluent and can more easily opt for lower cost methods of abatement. All firms are assumed to choose the land fill alternative.

TABLE IV.D.1

COSTS OF COMPLIANCE* - FURNITURE MANUFACTURERS

<u>Segment</u>	<u>Total Plants</u>	<u>Number of Plants Affected</u>	<u>Probable Capital Cost</u>	<u>% Net Assets</u>	<u>Probable Annual Cost</u>	<u>% Sales</u>
Non-upholstered mfrs.						
Large Plants	552	55	\$ 4,500	0.2%	\$ 9,300	0.15%
Medium Plants	1191	119	4,500	1.5	9,300	0.8
Small Plants	<u>2853</u>	<u>285</u>	3,200	3.4	6,680	1.7
subtotal	4596	459				
Upholstered mfrs.						
Large Plants	233	23	3,200	0.13	6,680	0.1
Medium Plants	563	56	3,200	0.9	6,680	0.5
Small Plants	<u>705</u>	<u>70</u>	3,200	2.3	6,680	1.3
subtotal	1501	149				
Total	6097	608				

*BPT, BAT, NSPS on proposed Guidelines.

Source: Arthur D. Little, Inc. Estimates: Development Document

V. ECONOMIC IMPACT ANALYSIS

A. INTRODUCTION

This section assesses the economic impact on the furniture industry to comply with proposed Effluent Guidelines. The investment and operating costs for the alternative methods of treating plant effluents used in our analysis are taken from the Development Document.

1. Industry Segments

The furniture industry has many small operations, e.g., about 60% of the total number of plants have less than 100 employees; many are privately owned. The ability of the small producer to cope with pollution abatement costs is the central issue to analyze in assessing the economic impact on the industry. Plants with less than 100 employees are most vulnerable.

The volume of wood finishing associated with upholstered furniture plants is very small relative to non-upholstered establishments. The potential for water pollution by producers in the categories is different. Thus, they were analyzed separately, i.e., companies in SIC-2512 (upholstered furniture) were separated from the rest of the industry. Table V.A.1 shows the number of plants and number of employees in these two major segments of the industry.

It is possible to relate plant size to the use of water wash spray booths (for wood finishing), which is a significant source of effluent. In the past 10-15 years the use of water wash spray booths has increased rapidly; our surveys indicate they are found in about 50-60% of the larger non-upholstered furniture plants in the U.S. They are not generally found in medium-sized plants and essentially never in small plants, because of the relatively high investment cost; there are less expensive and adequate alternatives available such as hand rubbing or the use of filter booths. Upholstered furniture plants, with the exception of a few specialized situations, do not have water wash spray booths.

Any size plant may have in-plant laundry facilities. There are fewer laundries in the upholstered furniture segment of the industry because there are fewer wood finishing operations. Thus, it is not feasible to relate plant size to laundry facilities.

Thus, the economic impact analysis can be accomplished based on the operating and investment costs from the Development Document by allocating small, medium, and large size plants to their treatment model plants as shown in Table V.A.2.

TABLE V.A.1

NUMBER OF PLANTS AND EMPLOYEES FOR VARIOUS SIZE FURNITURE PLANTS

SIC No. - 2511, 2517 2521, 2531, 2541 (non-upholstered)		<u>Total No. Plants</u>	<u>Total No. Employees</u>
Small		2853	20,280
Medium		1191	50,570
Large		<u>552</u>	<u>151,713</u>
	total	4,596	222,563
SIC No. - 2512 (Upholstered)			
Small		705	5,863
Medium		563	27,164
Large		<u>233</u>	<u>60,282</u>
	total	1,501	93,309
GRAND TOTAL		6,097	315,872

Source: U.S. Dept. of Commerce and Arthur D. Little, Inc., estimates.

TABLE V.A.2

NUMBER OF PLANTS AFFECTED BY
EFFLUENT GUIDELINES - WOOD FURNITURE MANUFACTURING

	<u>Laundry Facilities</u>	<u>Water Wash Booths</u>	<u>Plants/Model (% of total) Model</u>			
			1	2	3	4
Non-upholstered						
Small	Yes - 50%	No	50	50		
Medium	Yes - 50%	Yes - 10%	45	45	5	5
Large	Yes - 50%	Yes - 50%	25	25	25	25
Upholstered						
Small	Yes - 50%	No	50	50		
Medium	Yes - 50%	No	50	50		
Large	Yes - 50%	No	50	50		

Source: Arthur D. Little, Inc., estimates.

2. Number of Plants Affected

Wastewater is not a major problem in the furniture industry. The Development Document reports that an estimated 95% of all furniture factories either discharge their wastewaters to municipal sewerage systems, contract them to be hauled away by commercial disposal companies, or use a combination of these disposal methods and thus are not affected by these Effluent Guidelines. In our analysis we assumed that 10% of the furniture plants would have to face the additional cost of implementing pollution controls.* Table V.A.3 summarizes the number of plants and number of employees which could be affected by the cost of compliance. Assignment to the various model plant sectors is based on the percentages shown in Table V.A.2.

3. Minimizing Impact

While certain effluent abatement technologies presented in the Development Document are relatively expensive for the small plant, there are abatement options available which are lower cost and will cause no impact. The alternatives available as control measures (with the exception of spray irrigation) can be used by all types of plants. In addition, there are also changes which can be made in the plant to reduce the volume of wastewater (for example, eliminating laundry facilities). Finally, pricing strategy can be utilized to pass pollution costs on to consumers.

B. PRICE EFFECTS

Costs of compliance will be passed on through increased end product prices. However, since the necessary price increase at maximum is so small (1.7%), and since not all firms in the industry will be required to make an investment (2.2% of sales volume), this price increase will not have a noticeable aggregate effect on the furniture industry or on its prices.

Table V.B.1 analyzes the likelihood of a price increase. The rationale is the same for both upholstered and non-upholstered furniture manufacturers.

The key issues as identified in the matrix are that:

- . The ratio of before tax treatment cost to selling price is very low; a maximum of 1.7%.
- . Price elasticity of demand is very low; the consumer is essentially price insensitive within a band of +/- 5% (see Sections II.C.4 and II.D.4 above).

*This yields a somewhat conservative or "worst case" analysis. Thus, a conclusion of significant impact under the "worst case" assumption would overstate impact.

TABLE V.A.3
NUMBER PLANTS AND EMPLOYEES IN MODEL PLANTS
(Present Situation Assumes 90% Have Disposal Contractor or Are on Sewer)

Do Not Require Pollution Controls			Require Pollution Controls								Total	
Type of Plant	# Plants	# Employ.	Model 1		Model 2		Model 3		Model 4		# Plants	# Employ.
			# Plants	# Employ.	# Plants	# Employ.	# Plants	# Employ.	# Plants	# Employ.		
<u>Non-Upholstered</u>												
Small	2,568	18,252	142	1,014	142	1,014					285	2,028
Medium	1,072	45,513	54	2,276	54	2,276	6	253	6	253	119	5,057
Large	<u>497</u>	<u>136,542</u>	14	3,793	14	3,793	14	3,793	14	3,793	<u>55</u>	<u>15,171</u>
Total	4,137	200,307									459	22,256
<u>Upholstered</u>												
Small	634	5,277	35	293	35	293					70	586
Medium	507	24,448	28	1,358	28	1,358					56	2,716
Large	<u>210</u>	<u>54,254</u>	12	3,014	12	3,014					<u>23</u>	<u>6,028</u>
Total	1,351	83,979									149	9,330

Source: Arthur D. Little, Inc., estimates.

TABLE V.B.1

PRICE INCREASE Factor	CONSTRAINTS Condition for Constraint	NON-UPHOLSTERED FURNITURE	UPHOLSTERED FURNITURE
Ratio of Before Tax Treat. Cost to Selling Price (%)	High	Low, $\leq 0.8\%$ *	Low, $\leq 0.6\%$ *
Substitute Prod.	High Occurrence	Little	Little
Cap. Utilization	Low	Moderate	Moderate
Captive Usage	Low	Low	Low
Demand Growth	Low	Moderate	Moderate
Foreign Compet.	High	Low	Low
Abatement Cost Differences	Unequal	Unequal	Unequal
Price Elasticity of Demand	High	Low-Moderate	Low-Moderate
Basis for Compet.	Price	Style, Quality	Style, Quality
Market Share Dist.	Fragmented	Fragmented	Fragmented
Number of Products	Many	Many	Many

Source: Arthur D. Little, Inc., estimates.

The table also indicates that abatement costs are spread unequally across the industry. However, in the furniture industry since the consumer is relatively price insensitive at least within the bounds of the necessary price increase, the unequal distribution of costs of compliance is not a significant factor.

Specifically, price increases for manufacturers of wood furniture will be implemented within the following ranges:

	<u>Non-Upholstered</u>	<u>Upholstered</u>
Small Plant	0-1.7%	0-1.3%
Medium Plant	0-0.8%	0-0.5%
Large Plant	< 0.2%	0-<0.1%

These are the price increases necessary for these plants to maintain the present level of profit generation. For example, the small non-upholstered furniture manufacturing plant will have to increase its selling price by 1.7% to maintain its net income after tax.

The aggregate effect on industry prices if the affected plants implemented price increases to cover fully costs of effluent abatement is small. For example, the share of market of affected upholstered furniture plants is 2.2%; it is 2.1% for non-upholstered plants. (Only small- and medium-sized plants would increase prices; abatement costs for large model plants represent less than 0.1% of the sales revenues, an insignificant effect.) The aggregate effect on industry prices is:

- . Upholstered Furniture: 0.04% Increase
- . Non-upholstered Furniture: 0.03% Increase

Small companies can find ways to limit the effect of additional higher operating costs. For example, most of them will opt for process changes to give up in-plant laundry facilities and avoid that particular abatement cost. In addition, alert management could manage the impact of compliance in several ways, including:

- . Effective pricing strategy to pass on costs of compliance selectively;
- . Reducing materials costs by modestly sacrificing quality to achieve lower prices;

- . Maintaining good plant housekeeping to reduce wastewater, including recycling of in-plant and clean-up water;
- . Selection of the least expensive most compatible method of wastewater disposal, including analysis of opportunities for cooperative facilities.

This does not suggest that small plants will not be affected by these Guidelines. Rather, they have numerous compliance options available to avoid serious impact and effects on operations.

C. FINANCIAL EFFECTS

Since abatement will be passed through, profitability will be maintained and financial condition will be unaffected.

Capital availability is not a significant problem. The amount of capital required is modest, even for the medium- and small-sized plants, e.g.:

<u>Segment</u>	<u>Abatement Investment</u>	
	Net Assets	Cash Flow
	<u>%</u>	<u>%</u>
Non-upholstered Furniture		
Large Plant	0.2	1.3
Medium Plant	1.5	11.1
Small Plant	3.4	24.0
Upholstered Furniture		
Large Plant	0.1	1.0
Medium Plant	0.9	8.7
Small Plant	2.3	19.8

Further, management will not have to resort to equity or debt markets for capital, since these investment levels can be accomplished out of cash flow.

D. SENSITIVITY ANALYSIS

Although we conclude that abatement costs will be passed on through price increases, this section tests the effect on the industry of cost absorption. In essence, it is a test of the sensitivity of our analysis to the "cost-pass-through" conclusion.

This analysis concludes:

- . Large firms would not be affected by full absorption of cost;
- . Small- and medium-sized firms face potentially severe effects at maximum levels of cost, but can comply at lower, manageable levels of cost.

Thus, even if costs were absorbed there would be no effect on the industry.

1. Large Plants

Large plants would not be seriously impacted by the absorption of the cost of compliance. Tables V.D.1 and V.D.2 summarize the financial impact due to absorption of cost of compliance for large plants with maximum cost burdens. For example, the net profit margin (net after tax income - % net sales) decreases by only 0.1% to absorb the maximum cost burden. Similarly, profitability expressed as return on net assets decreases by only 0.3% to go from no cost to maximum cost. Treatment cost represents only a small percentage of net after tax income, 5.4% as a maximum. Cash flow remains about \$354,500 a year for non-upholstered and \$310,000 for upholstered firms. Capital investment in pollution control facilities is only a small percentage of net fixed assets, 3.5% at a maximum.

Thus, there would be no financial impact on large furniture producers, either upholstered or non-upholstered, even if full absorption of costs occurred.

2. Medium Plants

Tables V.D.3 and V.D.4 show the financial impact of pollution abatement costs on different models within this size range. The net profit margin (net after tax income - % net sales) decreases from 1.3% to 0.8% to absorb the maximum cost. Profitability expressed as return on net assets is reduced from 4.2% to 2.6% to go from no cost to maximum cost. Treatment cost represents a fairly high percentage of net income after taxes, 79% as a maximum. Cash flow is reduced from \$40 500 to about \$34,500 to absorb maximum cost by non-upholstered plants and from about \$36,700 to \$30,900 by upholstered plants. Capital investment in pollution control facilities is 24% of net assets at the maximum. The maximum cost burden is shown to be for plants with laundry facilities and wet spray booths (Model 4) which elect to install aeration ponds with equipment for spray irrigation. However, a significant reduction in the financial impact can be achieved if the laundry facilities are eliminated (Model 3). The most expensive control measures then result in a decrease in net profit margin of only 0.2%; profitability as a percent of net assets decreases by 0.6% for maximum cost; maximum treatment cost as a percent of net income is 31% and cash flow is reduced from a level of \$40,500 to \$38,200 to absorb maximum cost for non-upholstered firms; and capital investment in pollution control facilities is a maximum 17% of net fixed assets.

Tables V.D.5 and V.D.6 summarize the financial impact for plants having no water wash spray booths, and with and without in-plant laundry facilities (Models 1 and 2). Profitability is lower for plants with laundry facilities; the effect is somewhat greater than shown for plants with water wash spray booths but no laundry. Plants without laundry

TABLE V.D.1
FINANCIAL IMPACT

LARGE NON-UPHOLSTERED PLANTS WITH WATER WASH SPRAY BOTTLES & LAUNDRY FACILITIES (Model 4)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	50			14		
# Employees	136,342			3793		
\$ Net Sales	6.27MM					
\$ Net Assets	2.34MM					
\$ Net Fixed Assets	934K					
\$ Total Invested Poll. Control		4,500	3,600	26,200	32,700	0
\$ Annual Cost for Poll. Control		9,300	580	7,930	12,030	300
% Net Income Sales	3.5	3.4	3.5	3.4	3.4	3.5
% Return on Net Assets	9.4	2.2	9.4	9.2	9.1	9.4
% Return on Fixed Assets	23.5	23.0	23.5	23.1	22.9	23.5
% Treatment Invested Fixed Assets	---	0.5	0.4	2.8	3.5	---
% Annual Treatment Cost Net Income	---	4.2	0.3	3.6	5.4	0.2
\$ Cash Flow	354,481	349,831	354,771	350,516	348,466	354,331

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D.2
FINANCIAL IMPACT

LARGE UPHOLSTERED FURNITURE PLANTS WITH LAUNDRY FACILITIES (Model 2)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	210					
# Employees	54,254					
\$ Net Sales	7.03MM					
\$ Net Assets	2.41MM					
\$ Net Fixed Assets	990K					
\$ Total Invested Poll. Control	0	3,200	3,400	24,500	28,300	0
\$ Annual Cost for Poll. Control	0	6,680	540	6,410	11,630	300
% Net Income Sales	3.2	3.1	3.2	3.1	3.1	3.2
% Return on Net Assets	9.2	9.1	9.2	9.1	8.9	9.2
% Return on Fixed Assets	22.4	22.0	22.3	22.0	21.8	22.3
% Treatment Invested Fixed Assets	-	0.32	0.34	2.5	2.9	
% Annual Treatment Cost Net Income	-	3.0	0.2	2.9	5.2	0.1
\$ Cash Flow	312,963	309,623	312,693	309,757	307,147	312,813

Source: Arthur D. Little, Inc., estimates.

TABLE V.D.3

FINANCIAL IMPACT

MEDIUM-SIZE NON-UPHOLSTERED FURNITURE PLANTS-WATER WASH SPRAY BOOTHS & LAUNDRY FACILITIES (Model 4)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	1072			6		
# Employees	45,513			253		
\$ Net Sales	1.17MM					
\$ Net Assets	300K					
\$ Net Fixed Assets	125K					
\$ Total Invested Poll. Control	0	9,300	580	7,930	12,030	300
\$ Annual Cost for Poll. Control	0	4,500	3,600	26,200	32,700	--
% Net Income Sales	1.3	0.9	1.3	1.0	0.8	1.2
% Return on Net Assets	4.2	3.0	4.2	3.2	2.6	3.8
% Treatment Invested Fixed Assets	11.3	7.9	11.1	8.4	6.9	10.2
% Annual Treatment Cost Net Income		3.3	2.7	0.2	24.3	
\$ Cash Flow	40,530	60.9	3.8	51.9	78.8	2.0

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D.4

FINANCIAL IMPACTMEDIUM-SIZE NON-UPHOLSTERED FURNITURE PLANTS WITH WATER WASH SPRAY BOOTHS (Model 3)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	1072		6			
# Employees	45,513		253			
\$ Net Sales	1.17MM					
\$ Net Assets	300K					
\$ Net Fixed Assets	125K					
\$ Total Invested Poll. Control	-	3,600	3,200	22,700		0
\$ Annual Cost for Poll. Control	-	4,040	510	4,740		300
% Net Income Sales	1.3	1.1	1.3	1.1		1.3
% Return on net Assets	4.2	3.7	4.2	3.6		4.2
% Return on Fixed Assets	11.3	9.8	11.1	9.6		11.2
% Treatment Invested Fixed Assets		2.7	2.4	16.9		
% Annual Treatment Cost Net Income		26.4	3.3	31.0		2.0
\$ Cash Flow	40,530	38,510	40,276	38,160		40,380

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D.5
FINANCIAL IMPACT

MEDIUM-SIZE UPHOLSTERED FURNITURE PLANTS-LAUNDRY FACILITIES (Model 2)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration Irrigation	Sewer
# Plants	507			28		
# Employees	24,448			1358		
\$ Net Sales	1.39MM					
\$ Net Assets	300K					
\$ Net Fixed Assets	116K					
\$ Total Invested Poll. Control	0	3,200	3,400	24,500	28,300	0
\$ Annual Cost for Poll. Control	0	6,680	540	6,410	11,630	300
% Net Income Sales	1.4	1.1	1.3	1.1	0.9	1.3
% Return on Net Assets	4.7	3.9	4.7	3.9	3.3	4.7
% Return on Fixed Assets	16.0	13.1	15.8	13.3	11.0	15.9
% Treatment Invested Fixed Assets	-	2.7	2.9	21.0	24.2	-- -
% Annual Treatment Cost Net Income	-	35.7	2.9	34.3	62.2	1.6
\$ Cash Flow	36,729	33,389	36,459	33,524	30,914	36,579

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D.6

FINANCIAL IMPACT

MEDIUM SIZE NON-UPHOLSTERED FURNITURE PLANTS - (Model 1)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	1072		54			
# Employees	45,513		2,276			
\$ Net Sales	1.17MM					
\$ Net Assets	300K					
\$ Net Fixed Assets	125K					
\$ Total Invested Poll. Control	0	3,200	2,300	20,900		0
\$ Annual Cost for Poll. Control	0	1,520	380	3,330		300
% Net Income Sales	1.3	1.2	1.3	1.2		1.3
% Return on Net Assets	4.2	4.0	4.2	3.8		4.2
% Return on Fixed Assets	11.3	10.8	11.2	10.1		11.2
% Treatment Invested Fixed Assets	--	2.3	1.7	15.5		--
% Annual Treatment Cost Net Income		10.0	2.5	21.8		2.0
\$ Cash Flow	40,530	39,770	40,340	38,866		40,380

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

facilities or water wash spray booths show no significant change in profitability. These plants would not be affected.

Thus, medium-sized furniture producers are not expected to close even if they absorb the costs of compliance.

3. Small Plants

Small-sized plants would be the most severely affected by the absorption of the cost of compliance. Tables V.D.7 and V.D.8 summarize the financial effects. The control method with maximum cost results in negative profitability. The second highest cost alternative had the following financial effects on non-upholstered producers. For non-upholstered producers the net profit margin (net income as a % sales) would decrease from 1.2% to 0.8%; profitability expressed as return on net assets from 5.2% to 4.3%. Treatment cost (after tax) represents a very high percentage of net income, 69% for this system. Cash flow is reduced from \$13,000 to \$10,000 and capital investment in pollution control facilities is 73% of net fixed assets for maximum cost. Small upholstered furniture plants show a similar pattern.

The maximum cost for compliance is for plants with laundry facilities. There is less serious financial effect on the small producer when there are no laundry facilities. The cost of treating the relatively large volume of wastewater from laundry facilities is apparent by comparing the costs for Models 1 and 2. It is interesting to note that the volume of wastewater from the laundry facilities is five times the volume from glue spreader clean-up.

For the non-upholstered producer the net profit margin is reduced from 1.2 to 0.8% to absorb maximum cost. (It becomes negative to absorb maximum cost with laundry facilities.) Small upholstered furniture plants show a similar but less severe impact. Tables V.D.8a. and V.D.8b. summarize the financial effects on these furniture plants. The second highest cost alternative had the following effects on upholstered producers. The net profit margin (net income as a % sales) would decrease from 1.8% to 1.1%; profitability expressed as return on net assets from 6.7% to 5.5%. Treatment cost (after tax) represents a very high percentage of net income, 69% for this system. Cash flow is reduced from \$13K to \$10K, and capital investment in pollution control facilities is 60% of net fixed assets for maximum cost.

If costs were truly objective, all plants would have to elect the lower-cost compliance option; the financial effect would be quite severe otherwise. Again, we expect plants to be able to comply through these lower cost options and thus to avoid a serious result.

4. Sensitivity - Conclusion

Table V.D.9 summarizes the sensitivity analysis. As the table demonstrates, only small furniture producers are at risk of cost increase. The primary concern is for small furniture producers to raise capital if needed.

TABLE V.D.7

FINANCIAL IMPACT

SMALL NON-UPHOLSTERED FURNITURE PLANTS - LAUNDRY FACILITIES (Model 2)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	2,568					
# Employees	18,252					
\$ Net Sales	391K					
\$ Net Assets	94K					
\$ Net Fixed Assets	34K					
\$ Total Invested Poll. Control		3,200	3,400	24,500	28,300	0
\$ Annual Cost for Poll. Control		6,680	540	6,410	11,640	300
% Net Income Sales	1.2	0.4	1.2	0.4	neg	1.2
% Return on Net Assets	5.2	1.6	4.9	1.8	--	5.0
% Return on Fixed Assets	14.6	4.6	13.8	5.0	--	14.1
% Treatment Invested Fixed Assets	--	9.5	10.1	73.1	--	6.1
% Annual Treatment Cost						
Net Income	--	69.1	5.8	68.3	--	3.2
\$ Cash Flow	13,304	9,964	13,034	10,099	--	13,154

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D.8

FINANCIAL IMPACT

SMALL NON-UPHOLSTERED FURNITURE PLANTS (Model 1)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration & Irrigation	Sewer
# Plants	2,568		142			
# Employees	18,252		1014			
\$ Net Sales	391K					
\$ Net Assets	94K					
\$ Net Fixed Assets	34K					
\$ Total Invested Poll. Control	0	3,200	2,300	20,900		0
\$ Annual Cost for Poll. Control	0	1,520	380	3,330		300
% Net Income Sales	1.2	1.0	1.2	0.8		1.2
% Return on New Assets	5.2	4.4	5.0	3.4		5.0
% Return on Fixed Assets	14.6	12.3	14.0	9.6		14.1
% Treatment Invested Fixed Assets	---	9.5	6.9	62.2		----
% Annual Treatment Cost Net Income	---	16.2	4.0	37.6		3.2
\$ Cash Flow	13,304	12,544	13,114	11,639		13,154

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D. 8a

FINANCIAL IMPACTSMALL UPHOLSTERED FURNITURE PLANTS (Model 1)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration and Irrigation	Sewer
# Plants	634					
# Employees	5,277					
\$ Net Sales	532K					
\$ Net Assets	138K					
\$ Net Fixed Assets	26K					
\$ Total Invested Poll. Control	0	3,200	2,300	20,900		0
\$ Annual Cost for Poll. Control	0	1,520	380	3,330		300
% Net Income Sales	1.7	1.6	1.7	1.4		1.7
% Return on New Assets	6.5	5.8	6.3	4.6		6.6
% Return on Fixed Assets	34.6	31.7	33.9	28.2		34.6
% Treatment Invested Fixed Assets	---	12.3	8.9	80.4		---
% Annual Treatment Cost Net Income	---	18.5	4.3	45.4		3.4
\$ Cash Flow	16,200	15,500	16,000	14,500		16,100

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D. 8b

FINANCIAL IMPACTSMALL UPHOLSTERED FURNITURE PLANTS - LAUNDRY FACILITIES (Model 2)

	No Treatment (Total all Models)	Landfill	Burn with Hog Fuel	Evap. Ponds with Spray	Aeration and Irrigation	Sewer
# Plants	634					
# Employees	5,277					
\$ Net Sales	532K					
\$ Net Assets	138K					
\$ Net Fixed Assets	26K					
\$ Total Invested Poll. Control		3,200	3,400	24,500	28,300	0
\$ Annual Cost for Poll. Control		6,680	540	6,410	11,640	300
% Net Income Sales	1.7	1.1	1.6	1.1	6.0	1.7
% Return on Net Assets	6.5	4.0	6.2	3.6	1.9	6.4
% Return on Fixed Assets	34.6	21.8	33.6	22.3	12.2	34.0
% Treatment Invested Fixed Assets	---	12.3	13.1	94.2	108.9	--
% Annual Treatment Cost Net Income	---	118.0	6.2	110.6	366.0	3.4
\$ Cash Flow	16,200	12,900	15,900	13,000	10,400	16,100

Source: Arthur D. Little, Inc., estimates; costs from Development Document.

TABLE V.D.9

SENSITIVITY ANALYSIS - CONCLUSION MATRIX

<u>Price Result</u>	<u>Type of Plant - Extent of Effect</u>					
	<u>Non-Upholstered</u>			<u>Upholstered</u>		
	<u>Small</u>	<u>Medium</u>	<u>Large</u>	<u>Small</u>	<u>Medium</u>	<u>Large</u>
. Price Increase:						
- Probable Tech.	None	None	None	None	None	None
- Highest Cost Tech.	None	None	None	None	None	None
. No Price Increase:						
- Probable Tech.	Moder.	Minor	None	Moder.	Minor	None
- Highest Cost Tech.	High*	Minor	None	High*	Minor	None

*Due to Limited Availability of Capital.

E. PRODUCTION EFFECTS

Based on our preceding analyses which indicate that costs will be passed on and that companies can elect technological and strategic options to avoid significant impact, we do not expect any plant closures to result from the implementation of these effluent guidelines. We only temper this analysis with the comment that at higher levels of capital and/or operating costs, the analysis would change. For example, if small companies were to make capital investments in the \$10-15,000 range, and to bear operating costs in the \$10-15,000 range, our analysis would indicate a significant number of plant closures.

F. EMPLOYMENT EFFECTS

Since no plant closures will result, there will be no attendant unemployment.

G. REGIONAL EFFECTS

There will be no regional effects resulting from these guidelines.

H. BALANCE OF TRADE EFFECTS

The modest aggregate cost increases we foresee being added onto furniture prices (<0.05%) will not significantly alter the competitive position of United States furniture in foreign markets, neither will it cause a dramatic influx of imported furniture. Both imports and exports will be influenced more by other factors, such as style changes or raw material costs and availability.

I. INDUSTRY GROWTH EFFECTS

Industry growth will not be affected by the proposed effluent guidelines. New plants in this industry tend to be larger than our model small plant, the only sector of operations at all likely to be affected. Further, the modest price increases likely to be implemented will have no effect on furniture purchases in any important market segment.

VI. LIMITS OF THE ANALYSIS

The two central problems limiting the accuracy of the present analysis are:

- . A limited availability of data in suitable form; and,
- . The nature of the industry segments.

A. DATA LIMITATIONS

Data on these industry sectors is generally present only in a broad, descriptive format. What information is available of a detailed nature tends to focus on the operations and characteristics of larger firms and their large plants. However, these industry sectors are typified by small, privately-owned firms which are more likely to be affected by effluent guidelines than their larger counterparts. Thus, as noted in Section III on Methodology, it was necessary to gather new data through a series of interviews to collect information on the industry as a whole and to focus on the operations of those firms and plants most likely to be impacted, i.e., the small operators. Due to the large number of plants involved (approximately 6,000), it was necessary to collect data by representative samples rather than through comprehensive (100%) sampling. The consistency of the data suggests that the analysis is built upon a sound data base.

Excepting the large manufacturers which tend to be publicly-held corporations, these industries are composed of many small, privately-held family-managed firms which is an additional data limitation. Due to the fragmented nature of the industry and the fact that privately-held firms do not publish as much data as do publicly-held firms, it is difficult to get accurate financial data. Even where financial data is available, that data is not always directly comparable to similar data from publicly-held firms, since a small firm may choose to pay its principals higher salaries and fringe benefits, rather than reporting such earnings as net income, which is the more standard practice for a publicly-held corporation. As such, net income and, more importantly, annual cash flow may be understated for these firms.

However, the costs of compliance are relatively modest and the technological alternatives relatively straightforward. Further, the consistency of our data within the various industry sectors gives us confidence that is indeed representative. Thus, the analysis can be used to judge the economic impact of proposed effluent guidelines on the industry.

B. NATURE OF THE INDUSTRIES

The most difficult issue to analyze in these sectors is the likelihood of plant closure. A large, multi-industry, publicly-held firm tends to make a shutdown decision based on objective business analysis, such as effects on profitability or importance of a product line to overall corporate strategy. Such a firm would likely have specific criteria for each of its operating facilities to meet.

However, a private owner tends to have a greater subjective commitment to staying in business even if profitability is substantially reduced. This is true for such factors as commitment to a facility which has been operated by the family for generations and for such specifically economic reasons as the fact that this may be a particular family's sole or primary source of income. Further, the privately-held firm considers the magnitude of cash flow as the important issue, rather than profitability ratios. The management of such firms is not likely to perform a discounted cash flow analysis as part of its shutdown decision-making.

Thus, the factors listed in the plant closure analysis matrices (see Table III.C.1) can be used as a guide and to highlight the central issues related to plant closure, but must be assigned different weights when analyzing the decision-making process and the likelihood of closure for a publicly-held firm versus a private enterprise. Where costs approach a level of significance, such as for small non-upholstered furniture plants, the plant closure analysis becomes more suggestive than definitive. On balance, however, the costs of compliance are relatively modest, not relatively high, and the plant closure decision is more straightforward.

C. MOST SENSITIVE ISSUES

The most sensitive issues of this analysis are listed in Table VI.C.1. In essence, the key issues are the facts that small firms, which are numerous in wood furniture manufacturing, can be impacted by small increments of cost and that capital is limited for such firms.

Given that 90% of the industry now meets proposed 1977 effluent guidelines, even guidelines with costs that would impact small firms would affect less than 10% of the plants in the industry. Thus, the modest level of costs which the industry faces in aggregate indicates this analysis can be considered, in toto, accurate within a narrow band of error.

TABLE VI.C.1

MOST SENSITIVE ISSUES

<u>Issue</u>	<u>Effect on Present Analysis</u>	<u>Condition To Cause Significant Effect</u>
Price Increase Analysis	Moderate	- Higher costs (capital: \$5-10,000), and - Larger # of plants affected
Capital Availability	Minimal	- Inability to implement low capital compliance technologies
Plant Closure Analysis	Minimal	- Higher costs and - Larger # of plants affected

Source: Arthur D. Little, Inc., estimates.

Appendix

Industry
Impact
Summaries

TABLE A-1
INDUSTRY SUMMARY

Industry: Non-Upholstered Wood Furniture Manufacturers

No. of Plants in Segment	4,596	
Percent Total Plants in Industry	100%	
No. of Plants Direct Discharging	459	
Percent Total Plants in Segment	10%	
No. of Plants with BPT Treatment in Place		BPT, BAT 4,137
Percent Total Plants in Segment		90%
Cost of Pollution Abatement		BPT, BAT
Capital Costs for Segment		
Total Capital Cost		\$1,200,000
Total Capital Expenditures as Percent of Average Annual Investment		<1%
Total Capital Expenditures as Percent of Total Capital In Place		<0.1%
Annualized Costs for Segment		
Total Incremental Increase Including Capital Charges		\$3,500,000
Total Incremental Increase Excluding Capital Charges		\$3,500,000
Total Incremental Increase Including Capital Charges as Percent of Sales		<0.05%
Expected Price Increase		
Expected Increase Due to Pollution Control		0.03
Plant Closures		
Total Closures Anticipated		-
Percent Reduction of Segment Capacity Due to Closures		-
Employment		
Total Number of Employees Affected		-
Percent of Total Employees in Segment		-
Community Effects		1
Impact on Industry Growth		-
Balance-of-Trade Effects		-

TABLE A-2

INDUSTRY SUMMARY

Industry: Upholstered Wood Furniture Manufacturers

No. of Plants in Segment	1,500
Percent Total Plants in Industry	100%

No. of Plants Direct Discharging	149
Percent Total Plants in Segment	10%

	BPT, BAT
No. of Plants with BPT Treatment in Place	1,351
Percent Total Plants in Segment	90%

Cost of Pollution Abatement	BPT, BAT
------------------------------------	----------

Capital Costs for Segment

Total Capital Cost	\$ 500,000
--------------------	------------

Total Capital Expenditures as Percent of Average Annual Investment	<1%
--	-----

Total Capital Expenditures as Percent of Total Capital In Place	<0.1%
---	-------

Annualized Costs for Segment

Total Incremental Increase Including Capital Charges	1,000,000
--	-----------

Total Incremental Increase Excluding Capital Charges	1,000,000
--	-----------

Total Incremental Increase Including Capital Charges as Percent of Sales	< 0.05%
--	---------

Expected Price Increase	-
--------------------------------	---

Expected Increase Due to Pollution Control	-
--	---

Plant Closures

Total Closures Anticipated	-
----------------------------	---

Percent Reduction of Segment Capacity Due to Closures	-
---	---

Employment

Total Number of Employees Affected	-
------------------------------------	---

Percent of Total Employees in Segment	-
---------------------------------------	---

Community Effects	-
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Impact on Industry Growth	-
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Balance-of-Trade Effects	-
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