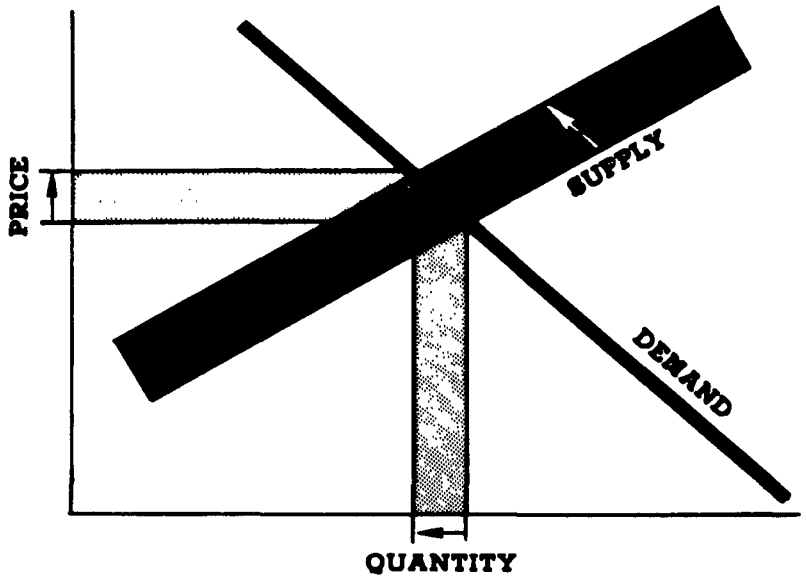
EPA-230/1-73-029
AUGUST 1973

ECONOMIC ANALYSIS OF PROPOSED EFFLUENT GUIDELINES

THE TIMBER PROCESSING INDUSTRY (Hardboard, Wood Preserving, Plywood & Veneer)



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

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ECONOMIC ANALYSIS OF PROPOSED EFFLUENT GUIDELINES - TIMBER PROCESSING INDUSTRY

August 1973

Contract No. 68-01-1541

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

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ENVIRONMENTAL PROTECTION AGENCY

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 promulgation 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 the EPA. This report was submitted in fulfillment of Task Order No. 1, Contract 68-01-1541 by Arthur D. Little, Inc. Work was completed as of August 1973.

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 has not been reviewed by EPA and is not an official EPA publication. The study 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. SUMMARY

This report presents the contractor's final analysis of the economic impact of meeting 1977 and 1983 effluent guidelines on certain timber processing industry sectors.*

A. PURPOSE AND SCOPE

Specifically, the impact was defined as: the financial impact on companies in these industry sectors, e.g., in terms of cost/profitability changes and forced mill closures, and the impact on employment and communities because of curtailed production or plant closures.

To evaluate these two parameters, the contractor:

- defined the structure of the timber processing industries and indicated which industry segments have the highest probability of significant economic impact;
- determined how prices are set in the industry to ascertain how much of the increased costs due to abatement requirements firms could pass on;
- developed a financial perspective on the industry; and
- determined the economic impact on these industry segments, based on the information supplied in the effluent guideline document.**

As part of this analysis, the contractor developed a structural model of the industry, and the points of sensitivity to water pollution related costs and technology, so EPA or its subcontractors can revise the basic analysis as new information becomes available.

In the interests of clarity, the basic outline supplied originally by the EPA was modified to treat each industry sector in independent sections. Moreover, as a prelude to the industry structure discussion (Chapter II), a chapter entitled "Industry Structure" was added. This

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* Defined by EPA as SIC-2432, Plywood and Veneer; SIC-2661, Building Board Mills--Hardboard Only; SIC-2491, Wood Preserving.

** Developed for the EPA by Environmental Sciences and Engineering, Inc., and Dr. Warren S. Thompson, June 1973.

chapter analyzes the basic supply/demand patterns and market structure in the industry. In addition, a section entitled "Overview" was added to the economic impact analysis sections. These overviews indicate any major simplifying assumptions and any concerns regarding the applicability of technological and cost information used as input to the analysis.

This analysis was based on discussions with industry personnel, the contractor's own background knowledge, published information on the industry, and technical and cost data supplied in the effluent guidelines document. The contractor was instructed by the EPA to use this technological and cost information for the analysis and did so. As indicated in the report, however, there is substantial concern about the applicability of this data to specific situations.

B. CONCLUSIONS

It is necessary to view timber products processing not as a single industry, but rather as four separate, only partially interrelated sectors. The products are generally noncompetitive; the sectors are in differing states of growth; and, the companies active in one sector are not necessarily active in another. Each of these four sectors requires a separate analysis of economic impact.

In general, the costs, as reported in the effluent guidelines document, are not overwhelming on these industry sectors. There is essentially no major impact on the hardboard and the softwood plywood sectors. The impact is focused more specifically on hardwood plywood and wood preserving, since these industries are the province of the small, independent business -- the type of firm and plant that will face the most serious kinds of problems.

There will be essentially no impact on production in any of these industry sectors. Where companies will be forced to close, the companies closing will be smaller firms, with relatively little impact on total industry output. In addition, with the exception of the hardboard industry which is operating at a 90%+ capacity utilization rate, these industry sectors are characterized by flexible capacity. (Certain producers move in and out of production depending on price/profitability levels.) The industries typically operate at 70-80% of total capacity. Thus, any production deficiency that results from plant closures can be offset by the remaining facilities.

In many cases, plants that are categorized as high-probability-of-closure plants are already marginal operations because of their low profitability over the preceding 5-10 years. Furthermore, many of these companies will also face the added burden of air pollution abatement costs. The combination of previous low profitability and anticipated air pollution costs, when added to the burden of effluent costs, will precipitate a plant shut-down decision.

Finally, a small operation with a relatively small asset base will have difficulty in raising the capital required to purchase the necessary abatement equipment, and the owner/manager of the facility will not be willing to assume the risk of a substantial investment in new equipment for effluent control. If the capital cost of abatement equipment cannot be financed out of the cash flow from operations, the firms will have to resort to debt financing. Many of the firms will not be willing to support the risk of debt to finance such equipment.

Prices will not be affected materially by pollution abatement costs. That is, price increases of more than 1% per year are not necessary to cover the costs of abatement. Similarly, profit margins will not be altered substantially if price increases are not possible. Although some firms with low profitability may be forced out of business because of an inability to absorb increased costs, that will not be a common occurrence for the industry sectors at large.

Unemployment effects will impact most severely on operations in the mid-South and Southeast. The total effect on unemployment will not be great, but 30-40 individual communities in this region could be impacted with as much as a quarter of their work forces becoming unemployed.

Abatement costs will not affect export trade, such as it is; little of these products is exported. Imports are significant only in hardwood plywood. Here, the balance of payment situation will be affected more significantly by other factors than by abatement costs.

1. Hardboard

Hardboard is manufactured primarily from wood cellulose fiber, and used for paneling, siding, furniture, and millwork. The product can be produced by either of two basic methods, the first being the "dry process," which uses little process water; the second being the "wet process," which is analogous to the manufacture of pulp and paper and which uses substantial process water.

Seventeen dry process mills were considered in this analysis. Water pollution control requirements to meet 1977 or 1983 recommended guidelines will have no economic impact on these 17 mills.

Nine wet process mills were considered in this analysis. These mills will face added costs of pollution control. However, this added cost burden will not be severe.

Specifically, for wet process mills:

- Added costs of abatement will result in increased prices.
- To meet 1977 guidelines, prices will increase by a maximum of 8%; to meet 1983 costs, prices will increase approximately 15%.

- Four of the nine wet process mills will be unable to pass on the full amount of the cost increase. These four mills will absorb up to 6% added costs.

- The absorption of added costs places one of the mills into the high-probability-of-closure category, the other three into the moderate-probability-of-closure category.

- Total industry production is running at a 95%+ capacity utilization rate. Production will not be materially affected by abatement costs.

- A maximum of 300 persons could be displaced by plant closures. However, this will not result in any major community effects.

- U.S. producers have not expanded capacity enough to meet demand. The balance of trade in this industry sector will be affected more by the willingness of producers to build new plants than by abatement cost increments.

2. Wood Preserving

The wood preserving industry is composed of more than 400 small, privately-owned companies with long-standing technology and largely depreciated plant and equipment. The top four producers account for about 35% of production and are owned by large, public corporations which are in the chemical and timber products industries. Approximately 40% of the value of shipments is represented by wood costs. Prices of wood have increased sharply over the last four years; the value added by preserving has been approximately constant.

The impact on this industry sector is as follows:

- The abatement impact will be felt from 1977 standards, with no additional impact from the 1983 standards. The costs for existing and new plants are the same.

- The cost for control for 1977 averages 0.5% of sales.

- The industry, in toto, will have no difficulty passing on costs of this magnitude as price increases.

- Profitability in the industry has remained fairly stable -- 6-7% on sales before taxes -- during periods of strong price increases. Industry profitability will not be materially affected by pollution control costs.

- Because of the sharply rising cost of control per unit of production for very small plants, because their competitive profit position will be eroded, and because they will not be able to

finance pollution control facilities either out of cash flow or by recourse to debt, there is a high probability that smaller plants in the industry will be forced to close. The industry is operating at about 75% of capacity. Pollution control requirements are not expected to affect production or growth rate.

- Plants in the high-probability-of-closure category are located primarily in the rural regions of the mid-South and Southeast. They treat wood with oil-based preservatives, using pressure processes and steam conditioning of the wood.

- Plants in danger of closing could change preservatives -- from oil-based to non-oil-based systems. Because of local market and specific economic conditions, however, this option will not be available to all of the affected facilities.

- Plant closures could cause as many as 2100 persons (17% of total employment) to become unemployed. However, the most likely employment impact will be approximately 1,050 persons (9% of total employment) unable to find comparable jobs.

- Plant closures will be scattered throughout the rural Southeast and mid-South, with no specific communities impacted. Employment impact is ameliorated by the fact that many employees in wood preserving plants are part-time workers, e.g., full-time farmers, who do not rely solely on this industry for income.

3. Softwood Plywood and Veneer

The softwood and hardwood plywood and veneer sectors must be considered separately. The industries are distinct. Products within each sector are generally not competitive. Softwood plywood is used for structural applications, e.g., exterior sheathing and residential homes; hardwood plywood is used for its decorative qualities, e.g., in furniture. Moreover, while both industries have approximately the same number of plants, the total output of hardwood plywood and veneer is approximately 12% of the total output of plants in the softwood sector. Softwood plants tend to be much larger economic units with significantly higher asset bases. For example, representative plants in each sector would be of the following sizes:

- Softwood -- 75-150 MMSF/year, 3/8" basis;

- Hardwood -- 5-10 MMSF/year, 3/8" basis.

A simply arithmetic average shows that softwood plywood mills produced an average of 96 MMSF in 1972, versus less than 12 MMSF for hardwood plywood mills.

The 192 softwood plywood mills in operation in 1972 produced 18.3 billion square feet (3/8" basis). The industry employed approximately 40,000 workers. Geographically, the industry is concentrated in the Pacific Northwest (Douglas fir based products) and in the Southeast (Southern pine based products). Prices have been at record highs in the last year, peaking during the first quarter of 1973, largely because of strong demand in residential construction sectors. Prices are highly variable and tend to follow residential construction activity.

The softwood plywood industry actually faces more expensive pollution control problems than those associated with water pollution. We do not anticipate a major impact on prices, production or employment from water pollution costs. In combination with air and solid waste disposal expenditures, however, the impact on the industry will be significant.

The industry sector will be impacted by water pollution abatement costs and technology as follows:

- Annual costs to the industry will be 0.75% of sales. It will not be necessary to pass on a cost of this magnitude.
- Profitability will not be materially affected by the absorption of abatement costs.
- A maximum of three mills can be characterized as high-probability-of-closure facilities because of abatement costs. Even if all three plants were to close, the industry's production would not be materially affected.
- Unemployment caused by water abatement will be negligible. Thus, no communities will be severely impacted.
- Neither softwood plywood nor veneer is a significant international trade item. The effects on balance of payment from pollution abatement costs is negligible.

4. Hardwood Plywood and Veneer

This industry sector is characterized by the small operation, owned and operated by an independent businessman. The industry's 2 billion square feet of production in 1972 was produced by 190 firms employing a total of 20,000 persons. The industry is concentrated in the eastern United States, primarily in the mid-South and Southeast, but also in the North Central and Northeast states.

Although profit margins in the industry are tight and price increases over the past decade have lagged cost increases, an increase in annual operating cost due to pollution control equipment is not really the key issue. Rather, the issue here is related to the ability and

willingness of the ownership/management of small firms in these sectors to raise necessary capital. With an asset base of $0.2-1 million for a typical plant, capital costs for abatement equipment represent a significant percentage of total assets.

The economic impact on this industry is as follows:

- Prices will not increase significantly in this sector. The necessary price increases to cover costs fully under the most severe abatement alternative would be a 2% increase.

- The financial statements of most companies in the industry will not be affected by abatement costs. However, many small firms, operating at low levels of profitability, will be impacted.

- A maximum of 30 plants can be characterized as in the high-probability-of-closure category. These plants represent 16% of the total number of plants, but only 4% of industry capacity, and 4% of total employment.

- Plant closures will cause approximately 750 persons to become unemployed. These workers will include a substantial number of older persons, persons with skills unable to be translated to other industries, and persons located in rural areas with no available employment options.

- Approximately 20 communities will be impacted by the resulting unemployment. These communities will be located mainly in the mid-South and Southeast.

- There will be no substantive balance of payments effects.

II. INDUSTRY STRUCTURE

The following three sections (III.A-III.C) contain the analyses of the basic patterns of the industry sectors under consideration. Each sector discussion contains as a prelude a description of the supply/demand dynamics of the sector, to add perspective to the analysis. These analyses, in turn, serve to give basic understanding to the economic impact analysis sections (III.B-III.E).

A. HARDBOARD

The manufacture of hardboard is primarily concerned with the reconstitution of wood via a fiber forming and pressing process using natural wood binders (lignins) supplemented by synthetic resins. In the industry, the terms wet-wet, wet-dry, dry-wet, and dry-dry describe the processing steps. The terms S1S and S2S describe the finish of the board as developed in pressing, and tempering refers to oil treating.

The following definitions will clarify these terms:

1. Wet-Wet processing involves forming the board with excess moisture on an endless wire (or fourdrinier) removing water via drainage and vacuum, then sending the high moisture content board to pressing. In pressing, the board is pressed between steel plates with wire on one side to allow for water/steam to escape during the pressing/heating cycle. The board pressed between plate and wire is referred to as S1S (screen back) due to one smooth side and one rough side (marking caused by the wire).

2. Wet-Dry processing entails forming the board as in wet-wet, followed by drying before pressing. The wire is not needed and the board can be pressed between smooth plates to produce S2S product. The pressing can also be accomplished via S1S if this kind of board is desired.

3. Dry-Dry processing involves the felting of dry fiber on a steel plate without water for feed to the press for either S1S or S2S production.

4. Dry-Wet processing is used by one plant and entails dry forming followed by wetting and pressing.

1. Industry Structure

a. Product Definition

Hardboard is manufactured from vegetable fiber, principally from wood, and used primarily as panels, siding, furniture, and millwork. Waste or secondary quality wood are the major raw material ingredients.

In practice, densities are generally in the 40 lb/cubic foot to 70 lb/cubic foot range and the product is manufactured in thicknesses of 1/8 inch to more than 1/2 inch and in sheets as large as 4 x 16 feet. End uses define the particular thickness required. For example, 1/8 inch board is most commonly used for the manufacture of tileboard, 1/4 inch is either pre-finished for interior wall paneling or sold to a myriad of industrial and furniture applications, and 7/16 inch finds most frequent application as an exterior residential siding. Hardboard is dense, uniform, usually smooth surfaced, can be worked with ordinary woodworking tools, takes finishes well, can be bent to single curvature, and can be punched or die-cut. The material can also be embossed or scored during the pressing operation to simulate various surface finishes.

The manufacturing process can result in products of different finishes. The boards are marketed with either one smooth face and one face with a screen impression (known as S1S or screen-back) or with 2 smooth faces (S2S). The latter finish is required for certain applications and is achieved by first drying the mat before hot pressing. Hardboard can also be tempered by impregnating the pressed boards, either during or after the manufacturing process, in oils and/or resins and then heat treating. This treatment increases the strength and water resistance above that of untempered hardboard and generally increases the density. An S2S finish can also be achieved by laminating thin S1S boards or by sanding high-quality S1S products. Another finishing operation that can and is usually carried out at the manufacturing location is to perforate the board to produce pegboard for store display and do-it-yourself applications.

Plants manufacturing a lower density hardboard, often known as a medium density fiberboard, are included in this study as the product is made by the same company and in plants using similar technologies to the higher density hardboard. The density range is theoretically 25 to 50 lbs/cubic foot, but the majority of current production is over 40 lbs. density. The boards are thicker than standard hardboard, most frequently at 1/2 inch, and are higher in quality than particleboard for furniture applications where they most frequently compete. Fiberboard can be used as corestock in furniture as it can be fabricated and worked easily.

Insulation board, manufactured at six plants that are also engaged in hardboard production, is also made from wood fiber but is normally 1/2" to 1 1/2" in thickness. It does not compete with hardboard, being a softer product with density of 10-25 lbs/cubic foot, and is used primarily

as a sheathing, as a rigid roof insulation in mobile homes and as ceiling tiles. The capacity, production, shipments, and other data identified in this sector discussion refers entirely to hardboard, being the principal output of the plants identified. However, the analysis is confused by the ability to produce two such different products at the same location, although on separate lines, as the effluent that results is not separate.

b. Production

The hardboard industry has experienced rapid growth over the past decade and shipments from plants have doubled since 1965. At the same time, capacity utilization has improved from the mid-1960's and currently stands at about 90%. In Table II.A.1 we show total industry capacity and estimated production for the number of plants operating in each year from 1967 to 1972 and the estimates of capacity utilization. A typical plant schedules operations at 24 hours per day for 361 days a year, taking 4 days for boiler repairs and other necessary maintenance. Thus, a utilization rate of about 90% of rated capacity is close to the maximum possible under normal operating conditions. From the mid-1960's to 1972, however, the number of plants in operation has remained fairly constant and capacity additions have been mostly through expansion of existing facilities. A number of new mills were added to existing ones in 1971 and 1972 and by the end of 1972 the total number of plants in operation was 33, with an aggregate industry capacity of 7.8 billion square feet, 1/8 inch basis. Industry sources indicate this has now reached 8.0 billion and that a 28% increase in capacity can be anticipated by the end of 1975, including the addition of four new medium density plants and three new companies.

Shipments from domestic plants, as Table II.A.2 indicates, have also grown rapidly and totalled 5.8 billion square feet in 1972. While shipments have grown at an annual rate of over 9% since 1962 (from 2.4 billion square feet), apparent consumption in the U.S. has experienced a slightly faster rate of growth. This is mainly because the level of imports, which remained relatively stable up to 1971, increased by nearly 70% in 1972, as domestic producers were unable to meet the extraordinary increase in demand from customers. Much of these imports come from Scandinavia and Brazil, with other European and Latin American countries of secondary importance. It is important to note that much of the increase in imports in 1972 was credited to the account of domestic producers, either from their own overseas manufacturing plants or from those of other producers, in order to meet the requirements of their regular U.S. customers.

Imports were valued at $29.9 million in 1972, up from $16 million in 1971 (87%) and $11.9 million in 1970 (151%). In contrast, exports have been at such a low level that the relevant data is not shown separately in U.S. Government statistics but included with that for other products.

TABLE II.A.1

CAPACITY UTILIZATION BY HARDBOARD INDUSTRY, 1967-1972

(Million Square Feet - 1/8" Basis)

	No. Plants	Annual Capacity	Estimated Production	Capacity Utilization (%)
1967	28	4555	3562	78
1968	27	4648	4163	90
1969	27	5019	4297	86
1970	28	5335	4928	92
1971	28	6000	5338	89
1972	33	7791 (end of year)		

SOURCE: 1967 - 1971 : Forest Industries

1972 : American Hardboard Association

TABLE II.A.2

SHIPMENTS, IMPORTS AND APPARENT CONSUMPTION, 1962-1972

(million square feet - 1/8" basis)

	U.S. Shipments	Imports	Apparent Consumption[1]	Inputs as % of Consumption
1962	2426	342	2768	12.4
1963	2432	432	2864	15.1
1964	2689	471	3160	14.9
1965	2921	572	3493	16.4
1966	3083	443	3526	12.6
1967	3038	426	3464	12.3
1968	3710	648	4358	14.9
1969	4247	708	4953	14.3
1970	4384	457	4841	9.4
1971	5225	634	5869	10.8
1972	5798	1070	6868	15.6

[1]Shipments plus Imports; Exports are negligible and are not reported by the U.S. Government.

SOURCE: American Hardboard Association

c. Markets

Three broadly defined hardboard markets exist today:

- Exterior siding
- Interior paneling
- Industrial board

Exterior siding hardboard is generally 7/16 inch in thickness. It is marketed either in panel form or as narrow width sheets for lap siding and is usually pre-finished for residential applications. The product is a relatively late entry to the siding market and competes with brick, stucco, plywood, and natural wood sidings. Metal sidings, especially aluminum, are gaining favor in the single family and low-rise multi-family sectors, but hardboard and other materials are also used in commercial, industrial, and institutional applications.

Consumer acceptance of interior paneling as a decorative medium for residential use, especially remodeling, has helped to create a significant interior paneling market for various materials. The most common such material is imported lauan hardwood plywood imported from the Philippines and Southeast Asia for pre-finishing in the U.S. Lauan paneling is relatively low in price and attracts the home owner and "do-it-yourselfer." It represents at least 60% of total interior paneling sold in the U.S.

Hardboard paneling, either woodgrain or with a tileboard finish, has been growing significantly in its market share and presently holds about 15% of total paneling markets on a surface area basis. Woodgrain hardboard paneling is generally 3/16 inch or 1/4 inch in thickness while tileboard is usually 1/8 inch thick. Hardboard paneling is a medium-priced product, competing to some extent with the full-thickness lauans (but not with the lower cost 4 mm lauans) and with the lower-priced domestic hardwood plywoods but considerably below the price of high quality plywoods and natural wood paneling.

The third major category is industrial hardboard. This is largely an OEM (original equipment manufacturer) market serving a myriad of end uses and industries. These industries include furniture, tv/radio/stereo, store displays, kitchen cabinets, automotive and miscellaneous applications. A significant proportion of the total industrial hardboard market goes through retail dealer channels to the home owner and "do-it-yourselfer." Hardboards have many of the same uses that thin plywood has in these industrial markets. It can be used as insert or surface panels in doors; countertops, backs and dividers for cabinets; bottoms in drawers; facing materials for poured-in-place concrete; templates and assembly jigs; signs and store displays; and many other applications. Hardboard has taken many of the markets previously held by plywood and lumber, but is, in turn, being challenged by plastics and, to a lesser extent, metals.

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In evaluating the overall growth rate, it should be remembered that at least 60% of hardboard is used directly in construction or is affected by construction demand; most of the remainder is used in industrial applications. Both primary industries are expected to grow at about the same rate as the Gross National Product, or 4.3% per year. Thus, a growth rate of from 7% annually implies increased market penetration by hardboard and still represents a conservative viewpoint when compared to its historic performance.

Almost all combinations of distribution patterns are employed in getting the hardboard products to the marketplace. Industrial board is generally sold direct to the OEM, although a certain portion does go via the distributor-retail route to smaller OEM customers. Most paneling and siding is distributed through wholesale distributors to retail outlets for purchase by the builder or by the do-it-yourselfer. An unknown amount of commodity board also goes this route to virtually all customer categories and miscellaneous end uses.

2. Industry Segments

a. Plant Characteristics

The 33 plants comprising the U.S. hardboard industry are, as the map (Figure II.A.1) indicates, mainly clustered in four groupings -- northwest, southwest, north central, and mid-Atlantic. Table II.A.3 summarizes the principal characteristics of these units.

Prior to 1945, only two plants were in operation in the U.S., both in Mississippi, operated by the U.S. Gypsum Company and Masonite. In each succeeding decade at least 10 new locations have been added and some of the existing capacities increased. The older plants utilize mainly the wet process. Of the 12 plants built prior to 1955, five were wet type, five were wet-dry, and the remaining two employed the dry process. In fact, only one wet process plant has been brought on-stream since 1966, while seven of the 15 dry process plants (5 producing medium density board) were built since that year. Plants expanding did not necessarily retain the same process already in use at that location and three plants now use combinations.

Although the largest plant in the industry is also the oldest (startup, 1926), the Masonite facility at Laurel, Mississippi, has attained its present size after many expansions and as recently as 1969 was only two-thirds of its present capacity. In general, however, the older plants tend to be smaller. Against an average capacity of 235 million square feet and a median capacity of 180 million square feet, four of the 12 facilities built before 1955 are less than 100 million square feet capacity, another three are less than 200 million square feet, and three more are between 200 and 300 million square feet. In contrast, of the ten plants built since 1966, only one has less than 100 million square feet and three are between 300 and 400 million square feet.

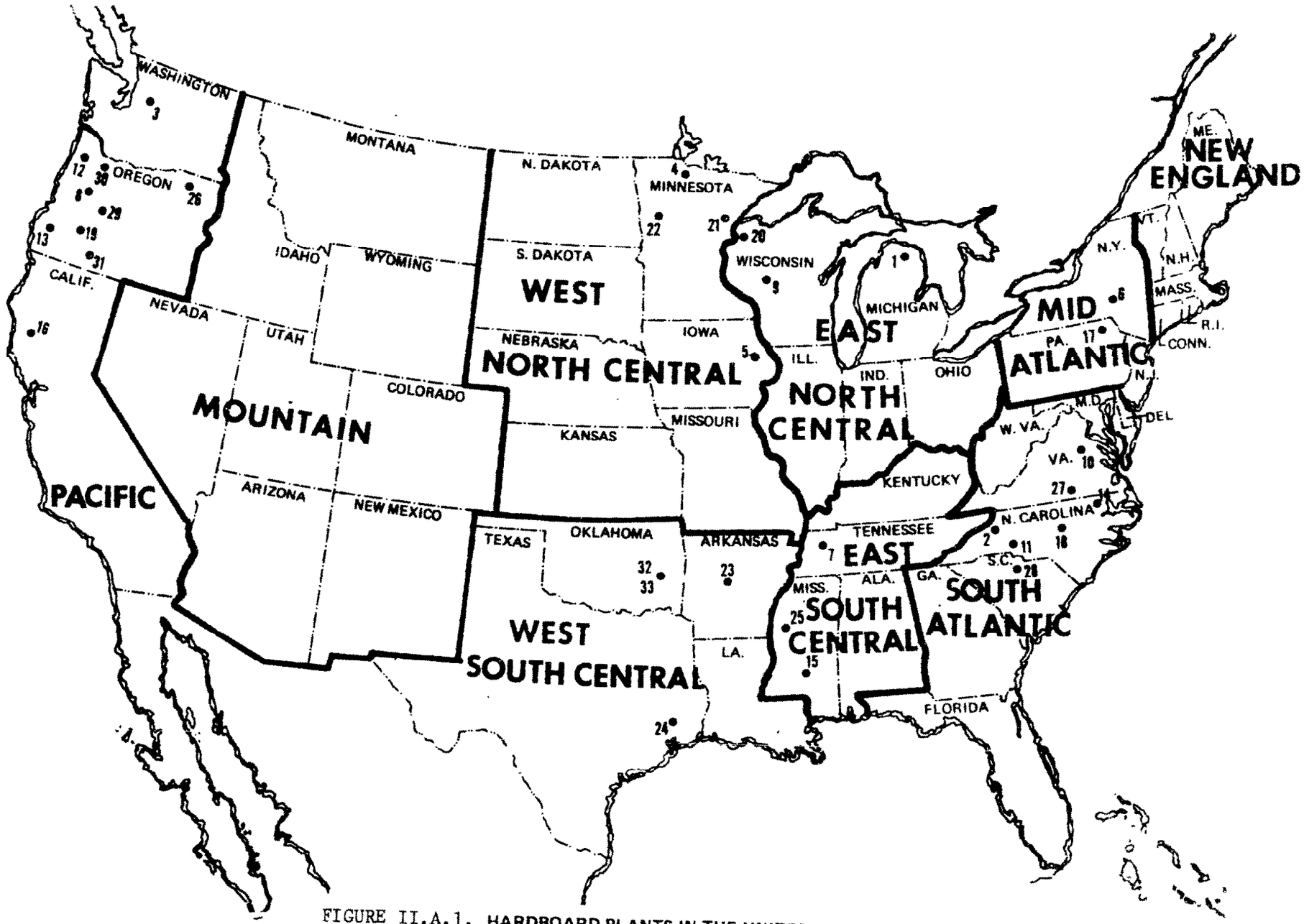

FIGURE II.A.1. HARDBOARD PLANTS IN THE UNITED STATES

TABLE II.A.3

HARDBOARD PLANTS - SUMMARY OF CHARACTERISTICS

(Total - 33)

By Year of Start-Up:		
Up to 1945	2	
1946-1955	10	
1956-1965	11	
1966-present	10	
By Process:		
Wet	7	
Wet-Dry (& insulation board)	6	
Dry-Wet	1	
Dry	16	(5 producing medium density board)
Combination	3	
By Size:		
Up to 100 MMSF/year	8	
101-200	11	
201-300	7	
301-400	4	
401 and above	3	
By Region:		
Pacific	9	
West North Central	4	
West South Central	3	
East North Central	3	
East South Central	3	
Mid-Atlantic	2	
South Atlantic	8	

Table II.A.4 identifies the location of each plant (also shown in Figure II.A.1), its owner company, capacity, process, year built, and product characteristics. The capacities shown are for hardboard only and do not include the capacity of insulation board production at six of the plants.

A true S2S hardboard product can be manufactured by only three companies at eight locations, but a further 16 plants have a screen-backed product of sufficient quality so that it can be sanded to approximate an S2S board sufficient to satisfy customer requirements. Product tempering, either in process or after the basic manufacture, can be carried out at 21 of the 33 locations. A number of plants, in addition to producing standard commodity industrial board, add value through fabrication or pre-finishing. The board can be pre-finished to meet siding or paneling requirements by grooving, etching and/or staining; it can be cut-to-size, perforated, shaped or otherwise fabricated to meet industrial customer requirements. One plant, that of Caradco, produces a moulded product largely used in that company's millwork operations.

Finally, five plants produce a hardboard of medium density (40-45 lbs. per cubic foot) serving applications basically dissimilar to those served by the higher density (greater than 50 lbs. per cubic foot) board that predominates output. The lower density product is also known as medium density fiberboard and more closely resembles particle board in its appearance, color, thickness, and end use. These five locations are included in this portion of the study, however, as the manufacturing process and the effluents involved are similar to that of standard hardboard plants.

Total direct employment at these 33 locations was estimated at 8,000 in 1972. Secondary employment, such as of forestry workers, etc., is estimated at 20,000, but the majority of the latter are employed by independent suppliers to the hardboard industry.

b. Firm Characteristics

Unlike other timber processing industry sectors (e.g., hardwood plywood), the hardboard sector is comprised of a small number of large corporations, generally publicly owned and with a high degree of integration. Ten of the sixteen producers (82% of total capacity) listed in Table II.A.4 have these characteristics in common. The industry is quite concentrated, consisting of 16 companies operating 33 plants. The four largest companies control 60% of available capacity while the eight largest control 82% and the ten largest, 93%.

The firms are integrated to raw materials through the ownership of woodlands. While each of the firms does not own enough wood to cut totally from their own lands, they typically supply 30-40% of their needs from captive sources. Similarly, most of the firms are integrated forward beyond hardboard production into various finishing steps, including end product manufacturing (e.g., siding or paneling).

TABLE II.A.4

COMPANIES AND PLANTS IN THE HARDBOARD INDUSTRY

	COMPANY	CAPACITY, 1972 MMSF(1/8")	YEAR BUILT	PROCESS	PRODUCTS MANUFACTURED					
					S1S	S2S	Insul.	Temp.	Ext.	Int.
	Abitibi									
1	Alpena, Mich.	435	1959 1960	wet wet-dry	✓	✓		✓		✓
2	Roaring River, N.C.	159	1971	wet	✓				✓	
	Anacortes Veneer									
3	Anacortes, Wash.	40	1953	dry	✓			✓		✓
	Boise Cascade									
4	Int'l. Falls, Minn.	455	1958	wet-dry		✓	✓		✓	
	Caradco, Div. of Scovill									
5	Dubuque, Iowa	25	1964 1970	dry (Moulded)		✓				✓
	Celotex Corp., Div. of Jim Walter									
6	Deposit, N.Y.	180	1966	dry (M.D.)		✓				✓
7	Paris, Tenn.	240	1970	dry		✓			✓	
	Evans Products									
8	Corvallis, Ore.	110	1947	wet	✓			✓	✓	✓
9	Phillips, Wisc.	80	1958	dry		✓		✓		✓
10	Doswell, Va.	250	1971	dry		✓		✓	✓	✓
11	Moncure, N.C.	360	1972	dry (M.D.)		✓				✓
	Forest Fiber Products, Div. of Stimpson Lumber									
12	Forest Grove, Ore.	79	1946	wet	✓			✓	✓	✓
	Georgia-Pacific									
13	Coos Bay, Ore.	220	1953	dry		✓		✓	✓	✓
14	Conway, N.C.	185	1959	dry		✓				✓
	Masonite									
15	Laurel, Miss.	1,643	1926	wet wet-dry	✓	✓		✓	✓	✓
16	Ukiah, Calif.	380	1951	wet wet-dry	✓	✓		✓	✓	✓
17	Towanda, Pa.	260	1965	dry	✓	✓		✓	✓	✓
18	Spring Hope, N.C.	328	1972	dry (M.D.)		✓				✓

TABLE II.A.4

COMPANIES AND PLANTS IN THE HARDBOARD INDUSTRY

(Continued)

	COMPANY	CAPACITY, 1972 MMSF(1/8")	YEAR BUILT	PROCESS	PRODUCTS MANUFACTURED					
					S1S	S2S	Insul.	Temp.	Ext.	Int.
	Pope & Talbut									
19	Oakridge, Ore.	120	1965	dry (M.D.)		✓			✓	✓
	Superior Fiber Products									
20	Superior, Wisc.	120	1965	wet	✓			✓		✓
	Superwood									
21	Duluth, Minn.	225	1949	wet	✓			✓		✓
22	Bemidji, Minn.	100	1957	dry		✓		✓		✓
23	N.Little Rock, Ark.	150	1956	wet	✓					✓
	Temple Industries									
24	Diboll, Texas	175	1971	wet-dry		✓	✓	✓	✓	
	U.S. Gypsum									
25	Greenville, Miss.	140	1934	wet-dry		✓	✓	✓		✓
26	Pilot Rock, Ore.	75	1954	wet-dry		✓	✓	✓		✓
27	Danville, Va.	180	1967	wet-dry		✓	✓	✓		✓
	U.S. Plywood; Div. of Champion International									
28	Catawba, S.C.	215	1960	dry		✓		✓	✓	✓
29	Lebanon, Ore.	120	1955	dry		✓		✓		✓
30	Hood River, Ore.	90	1952	wet	✓			✓	✓	✓
	Weyerheuser									
31	Klamath Falls, Ore.	214	1954	dry-wet	✓			✓	✓	✓
32	Craig 1, Okla.	78	1963	wet-dry		✓	✓		✓	
33	Craig 2, Okla.	360	1972	dry (M.D.)		✓				✓

NOTE: (1) Plant numbers key to Map - Figure II.A.1.

(2) M.D. - Medium Density Board

SOURCE: American Hardboard Association

In terms of marketing-distribution, only five of the firms operate captive distribution systems. The others sell through independent, frequently non-exclusive, distributors.

A second group of companies are considerably smaller in total sales and in their involvement in hardboard manufacture. They generally operate only one plant in this sector, although one company does represent a significant proportion of total industry capacity from three locations. Most of the companies are producing hardboard for further processing at their own facilities into paneling or siding, as well as marketing less specialized commodity boards for industrial applications. For example, companies such as Masonite, Abitibi, and Georgia-Pacific pre-finish hardboard for paneling and siding applications, as well as sell it to competing pre-finishers. In addition, these same companies promote to OEM categories through direct sales.

Table II.A.5 lists the producers in order of estimated 1972 shipments. To illustrate the significance of hardboard in their operations, we have calculated the dollar volume of hardboard sales assuming an average sales price of $75/MSF (1/8" equivalent) and based on estimated 1972 production, recognizing that the actual revenue attributable to hardboard will depend on the product (industrial, paneling, or siding), degree of finish (sold as a commodity board or as a pre-finished product, siding, etc.) and the actual level of production. However, our review and analysis of the operations of each company suggests that for all of the major companies (sales exceeding $50 million) except Masonite, hardboard accounts for less than 15% of total sales, and usually less than 5%. The hardboard sales of the smaller independents are a greater proportion of corporate sales.

c. Industry Segmentation

We proposed originally to segment the plants in this industry in the following manner to pinpoint the most critical areas of potential economic impact brought about by water pollution abatement requirements. The actual segmentation used was modified based on the guidelines and abatement costs established by the Guidelines Contractor and the sensitivity shown to the various manufacturing processes, products produced, age of plant, etc.

It is possible to identify the following representative plants that could be modeled to provide the EPA with a realistic range of facilities and range of economic impacts:

1. Wet process; start-up prior to 1955; capacity between 100 million square feet and 200 million square feet.

2. Dry process; plant built since 1966; capacity over 300 million square feet.

TABLE II.A.5

ESTIMATED SHIPMENTS OF HARDBOARD PRODUCERS, 1972

	Million Square Feet
Masonite	2130
Abitibi	555
Georgia-Pacific	443
U.S. Plywood (Champion International)	428
Superwood	420
U.S. Gypsum	366
Celotex (Jim Walter)	300
Evans Products	275
Pope & Talbot	208
Weyerhaeuser	191
Temple Industries	158
Superior Fiber Products	120
Boise Cascade	76
Forest Fiber Products	70
Anacortes, Veneer	35
Caradco (Scovill Manufacturing)	23
	5798

SOURCE: Annual Reports, Company Data, and Contractor's Estimates

3. Wet process; built prior to 1955; capacity less than 100 million square feet.

4. Dry process; built between 1956 and 1965; capacity between 100 and 200 million square feet.

The plants most likely to have pollution problems are those:

- utilizing a wet-forming process as considerable water is used in the fiber preparation stage to remove semi-celluloses and related compounds;
- which have a proportion of their production in a wet process S1S board;
- that temper the board in oil;
- built prior to 1965 and have not had pollution control equipment added.

The final approach used to accomplish the economic impact analysis is presented in Section III.B.

3. Financial Profile

The financial performance of a plant is more sensitive to the age of the plant and its size than it is to the product mix or even the type of process. Plants in this industry average about $60 per thousand square feet on net sales for standard board. This amount excludes all freight and discounts and will vary from $40 to $85 per thousand depending on the location (for freight equalization) and other normal factors. The following summarizes the range of financial elements existing in this industry sector:

1. The fixed and variable cost proportions of total manufacturing costs are approximately 40-60%, respectively.

2. Total manufacturing costs range from 55% of net plant sales to 70%, with an average of about 65%.

3. Gross profits as a percentage of net sales range from 15-45%, with an average of about 25%.

4. Net profit before tax ranges from 10-30%, with an average of about 18%.

5. The return on current investment after tax ranges from 6-20%, with an average of approximately 15%. This would equal or exceed the return on investment to targets set by most companies in the industry.

6. The net current asset value for individual facilities will vary depending on age of construction, dates of expansions and current size, and thus will have little significance on an industry basis. However, these asset values could be as low as $3.0 million per facilities and range to well over $50 million for the larger or newer plants.

Table II.A.6 incorporates these factors into a pro forma income statement for plants in the industry.

4. Price Effects

Although a few companies dominate the industry capacity, little price leadership is evident and intra-industry price competition cannot be considered severe. To a great extent this is because the industry has been operating at high capacity utilization rates; a contributory factor is that the industry serves a very wide range of end uses and an individual firm can usually obtain the price it requires without head-on competition. However, a reasonable amount of inter-industry competition does occur. Hardboard has traditionally gained its major markets by competing against more entrenched products such as lumber and plywood and now is itself being challenged by plastics and metal for some applications. Consequently, substitution competition by or for hardboard does occur, and helps to determine prices.

Prices are quoted on a dollars per thousand square foot basis and are usually based on standard units and sizes. Prices are FOB shipping point with full rail freight allowed to destination on a zone basis. Because of the wide range of end uses and resulting customer categories, hardboard prices are set at a number of levels depending on the class of trade of the purchaser and frequently involve a complicated schedule of discounts and extras. The customer categories and their relationships to the suppliers have been previously described; discounts and extras will additionally vary depending on the size of the load, packaging, style of product, degree of fabrication, quality, etc. The average net sales value varies from $50 per thousand square feet to $85 per thousand square feet for most standard 1/8 inch products, depending on the customer category, but averages about $65-70.

The wholesale price index of 1/8" hardboard, as reported by the Bureau of Labor Statistics, is as follows for the past six years:

1967	100.0	
1968	98.0	-2.0%
1969	98.7	+0.7%
1970	101.1	+2.4%
1971	102.7	+1.6%
1972	108.0	+5.2%

TABLE II.A.6

PLANT INCOME STATEMENT

Net Sales		100.0
Manufacturing Costs		
Fixed	26.0	
Variable	39.0	
		65.0
Subtotal		35.0
Other Operating Expenses		10.0
Gross Profit		25.0
Interest, Other Charges		7.0
Profit Before Tax		18.0

The ability of hardboard manufacturers to pass on additional costs, such as those arising from pollution abatement expenditures, obviously depends on the amounts involved. The industry is operating currently at high levels of capacity utilization and is expected to continue doing so into the foreseeable future. We believe that relative price increases of up to 8% over the next five years, and 15% over 10 years, would have little or no effect on market demand, and capacity utilizations and profitability will continue to be maintained. Relative cost increases higher than these would make individual facilities uncompetitive and thus economically marginal and will certainly result in a more cautious approach to the commitment of capital for capacity expansions, although total demand on an industry basis will still be maintained.

Above 15%, relative price increases will begin to affect demand for domestic hardboard as imported products will look relatively attractive and as purchasers will examine alternative materials. For industrial board applications, however, substitutions are unlikely to occur in the short term as products must be re-designed, contracts negotiated, and purchases made. For construction uses, the change in allegiance can and will occur more rapidly than for industrial applications. We believe that the initial result of this loss of support would be a slower rate of growth and rate of capacity additions rather than under-utilized facilities or unprofitable operations. Some plants will, because of age, location, energy availability, markets served, or other factors, become marginal.

No direct government influence on supply or demand has been experienced or is anticipated by the hardboard industry. However, indirect influences to exist.

Hardboard competes to some extent with lumber and plywood; both commodities have been under severe demand and price pressure over these past twelve months. In addition, exports of lumber from the U.S. to Japan have aggrevated the domestic availability and have stimulated industrial and some construction users to consider alternate materials in more ready supply. Hardboard has thus been considered as a substitute material by users who have not necessarily purchased it before, but the relative unavailability of hardboard, especially to new customers, has made such substitution difficult in the short term.

Long-term substitution will depend to some extent on government actions to limit the amount of lumber exports and to increase the availability of lumber and plywood in the domestic market. The Federal Government did take some steps -- by negotiating with Japan to decrease that country's imports and by increasing the amount of federal forest lands that could be cut -- in the spring of 1973. These actions, together with a downturn in the demand for lumber and plywood caused by a slower rate of residential construction in the second half of 1973 and into 1974, will certainly relieve pressures on lumber and plywood demand and, indirectly, on hardboard.

B. WOOD PRESERVING

1. Industry Structure

a. Products

The wood preserving industry in the United States has developed based on the need for prolonging the life of wooden structural members. Historically railroad ties, telephone poles, and piling treated with creosote have been the major products of the industry. In recent years, lumber and plywood treated for fire retardancy have experienced the fastest growth.

As defined in Standard Industrial Classification (SIC) 2491, the wood preserving industry "comprises establishments primarily engaged in treating wood, sawed or planed in other establishments, with creosote or other preservatives to prevent decay and to protect against fire and insects. This industry also includes the cutting, treating, and selling of poles, posts, and piping, but establishments primarily engaged in manufacturing other wood products, which may also treat with preservatives, are not included."* The industry's products include:

Bridges and trestles of wood, treated
Creosoting of wood
Crossties, treated
Flooring, wood block, treated
Mine props, treated
Millwork, treated
Piles, foundation and marine construction, treated
Piling of wood, treated
Poles, cutting and preserving
Poles and pole crossarms, treated
Posts of wood, treated
Railroad cross bridge and switch ties, treated
Structural lumber and timber, treated
Vehicle lumber, treated
Wood products, creosoted

The industry can be segmented in several different dimensions corresponding to size, product, technology, and location. Roughly speaking, the firms are located in the South, treating Southern Pine, and in the West, treating Douglas Fir. Most treating is performed in pressurized cylinders, although about 10% of the firms use nonpressure processes. The pressure processing uses oil-borne or water-borne preservatives. The products made with oil, such as piling and railroad ties, have a distinct odor and "oiliness," which makes them unsuitable for use where odor is objectionable. The water-borne preservatives are used in these cases, such as for preserving plywood and lumber, including treating with fire retardants.

*Standard Industrial Classification 2491.

b. Production

From 1960 to 1972 the volume of wood treated with preservatives increased from 216.1 million cubic feet to 272.6 million cubic feet (+26%), with a peak production of 286.4 million cubic feet in 1967 resulting from shipments to Vietnam. Table II.B.1 shows the historical production data by product category. The industry has experienced substantial swings in its production levels over a long period of time with a peak level of 356.6 million cubic feet in 1947. Production of fence posts, piling, poles, and switch ties has fluctuated around a stable level in recent years while cross ties, lumber and timber have experienced strong growth.

Table II.B.2 shows the regional breakdown of production by product in 1971. There are no statistics available on the geographical distribution of final sales. In terms of volume, the major production components are poles and cross ties, and these would follow the railroad and telephone pole distribution pattern. The third major component is lumber and timber, which would have its heaviest demand in humid areas, such as the South and the Northwest.

In addition to plants in the wood preserving industry, a number of railroads and utility companies operate their own wood preserving plants. The Forest Service of the U.S. Department of Agriculture reported statistics for 1972 on 384 commercial wood preserving plants and 18 plants operated by railroads and others.* However, these 18 captive plants are not considered part of the industry under SIC 2491 and are not evaluated in this report.

The value of shipments rose from $240 million (1963) to $415 million (1971) (+73%). The price of preserved wood has increased substantially since 1967 due in large part to the increase in raw wood prices. The value of shipments has followed these price increases. Table II.B.3 lists the value of shipments by products for 1963 and 1967; Table II.B.4 lists the total value of shipments for 1967 through 1971.

The levels of exports and imports of preserved wood are ambiguous since, for the most part, wood products are not classified as preserved or not. The value of exports and imports are very small and are mostly transactions with Canada; for example, the 1963 input/output table listed a net export of $1.2 million for the industry. Table II.B.5 lists the available data which at least sets an upper limit on the preserved wood values in 1967.

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*Wood Preservation Statistics--1972, Forest Service, U.S. Department of Agriculture.

TABLE II.B.1

WOOD TREATED WITH PRESERVATIVES

By Product

(millions of cubic feet)

	Crossarms	Crossties	Fence Posts	Lumber & Timbers	Piling	Poles	Switch Ties	Miscellaneous	Total
1955	4.3	85.9	16.2	39.4	13.9	74.8	7.3	3.8	248.4
1956	4.7	83.2	12.8	41.0	16.8	85.8	8.1	3.6	257.9
1957	4.6	101.5	13.4	41.9	16.3	84.0	8.1	4.8	274.5
1958	3.4	73.9	14.9	38.4	16.2	73.8	6.7	5.6	232.8
1959	3.6	52.1	15.7	39.9	14.7	78.3	4.5	5.7	214.5
1960	3.7	57.2	13.5	39.5	16.1	75.1	4.9	6.0	216.1
1961	3.6	55.8	15.0	38.8	14.3	76.4	4.7	6.6	215.4
1962	3.5	42.9	17.1	42.6	17.8	78.7	4.3	6.9	213.9
1963	3.4	47.4	18.2	43.5	15.9	77.0	5.3	6.7	217.4
1964	3.6	55.7	18.6	47.3	16.5	80.6	6.8	8.0	237.0
1965	4.9	63.7	18.4	50.3	17.8	83.9	7.5	9.2	255.7
1966	5.5	70.4	19.7	60.4	21.1	87.1	7.8	8.6	280.6
1967	4.6	80.4	21.0	62.2	16.6	84.3	8.3	8.9	286.4
1968	3.3	78.5	16.5	62.6	17.4	76.2	7.9	9.4	271.9
1969	3.2	71.3	15.7	59.6	14.7	74.4	6.4	8.2	253.5
1970	3.5	79.4	15.1	55.7	15.1	76.8	7.9	6.9	260.3
1971	3.1	87.0	16.7	59.9	13.7	74.4	6.2	7.7	268.6
1972	2.4	85.9	18.2	64.0	14.3	74.5	6.0	7.2	272.6

(1) Data for 1966-1971 are not comparable with previous years because they include wood treated with fire-retardant chemicals under each category rather than under MISCELLANEOUS.

(2) WOOD BLOCKS: Data for 1957-1969 are included in MISCELLANEOUS.

(3) MISCELLANEOUS: Includes all wood products treated with fire-retardant chemicals in 1955-1965. In 1965, 2.8 million cubic feet of wood were treated with fire retardants.

SOURCE: WOOD PRESERVATION STATISTICS, U.S. Department of Agriculture, Forest Service, and American Wood-Preservers' Association.

TABLE II.B.2

MATERIAL TREATED IN 1971 BY REGION, AND UNITED STATES TOTAL 1970-71

(THOUSAND UNITS)

		NORTHEAST	NORTH CENTRAL	SOUTHEAST	SOUTH CENTRAL	ROCKY MOUNTAIN	PACIFIC	TOTAL 1970	TOTAL 1971	PLANTS REPORTING
					USUAL UNITS OF MEASURE					
POLES	NUMBER	18	548	1686	2025	212	365	5290	4854	173
CROSSTIES	NUMBER	1794	7918	4867	9181	1219	1505	25143	26484	103
LUMBER AND TIMBERS	BOARD FEET	49516	64770	272029	263014	18967	177954	776322	846651	288
FENCE POSTS	NUMBER	217	3454	7496	15456	632	125	25451	27422	169
PILING	LINEAR FEET	1926	1386	6069	10082	48	3077	24923	22589	101
SWITCH TIES	BOARD FEET	6048	23173	13122	25996	3320	2174	78858	73834	83
CROSSARMS	NUMBER	(D)	310	497	317	(D)	1695	3092	2953	34
PLYWOOD	SQUARE FEET	(D)	2303	6224	4169	(D)	20582	32535	37440	52
OTHER	CUBIC FEET	545	2529	856	1058	308	840	5530	6136	71
					CUBIC FEET					
POLES		108	7969	22836	29720	3342	10400	76760	74374	
CROSSTIES		5973	26135	16063	30037	4047	4773	79384	87029	
LUMBER AND TIMBERS		3471	5263	18925	18469	1437	12286	55699	59851	
FENCE POSTS		236	2537	3810	9371	563	152	15106	16669	
PILING		1031	877	3727	5802	71	2191	15128	13699	
SWITCH TIES		504	2001	1065	2180	277	183	7874	6208	
CROSSARMS		(D)	323	471	322	(D)	1832	3454	3075	
PLYWOOD		(D)	131	175	241	(D)	821	1344	1578	
OTHER		545	2529	856	1058	308	840	5538	6136	
TOTAL		12111	47764	67529	97199	10138	33479	260288	268619	

(D) WITHHELD TO AVOID POSSIBLE DISCLOSURE OF INDIVIDUAL COMPANY OPERATIONS.

NOTE- COMPONENTS MAY NOT ADD TO TOTALS DUE TO ROUNDING.

SOURCE: Wood Preservation Statistics, 1971, Forest Service, U.S. Dept. of Agriculture

TABLE II.B.3

VALUE OF SHIPMENTS OF PRESERVED WOOD PRODUCTS FOR 1963 AND 1967

SIC Code	Product	Unit of Measure	Total shipments including interplant transfers			
			1967		1963	
			Quantity	Value (MM$)	Quantity	Value (MM$)
2491	WOOD PRESERVING, TOTAL		(X)	327.5	(X)	240.3
24911	Wood owned & treated by same establishment: Receipts from sales & transfers of wood owned & treated by same establishment		(X)	284.5	(X)	209.1
24911 12	Poles & piling		(X)	175.1	(X)	164.0
24911 18	Crossarms & sawn lumber, except railway ties	MM bd.ft.	327.0	55.7		
24911 15	Railway crossties & switch ties	MM ties	10.3	37.6	7.4	22.3
24911 19	Other wood products owned & treated by same establishment		(X)	15.2	(X)	19.4
24911 00	Wood owned & treated by same establishment, n.s.k.		(X)	0.9	(X)	3.4
24919 11	Receipts for treating wood owned by other establishments		(X)	28.7	(X)	25.9
24910 00	Wood preserving, n.s.k. (for companies with 10 or more employees)		(X)	6.6	(X)	5.3
24910 02	Wood preserving, n.s.k. (for companies with less than 10 employees)		(X)	7.7		

(X) Not applicable.

n.s.k. Not specified by kind.

SOURCE: U.S. Census of Manufactures, 1967.

TABLE II.B.4

TOTAL SHIPMENTS OF WOOD PRESERVING INDUSTRY--1967 TO 1971

Year	Shipments ($ Million)
1967	327.5
1968	356.3
1969	372.6
1970	397.1
1971	416.9

SOURCE: Annual Survey of Manufacturers, 1967, 1968, 1969, 1970, 1971; Arthur D. Little, Inc.

TABLE II.B.5

U.S. EXPORTS AND IMPORTS OF PRESERVED WOOD

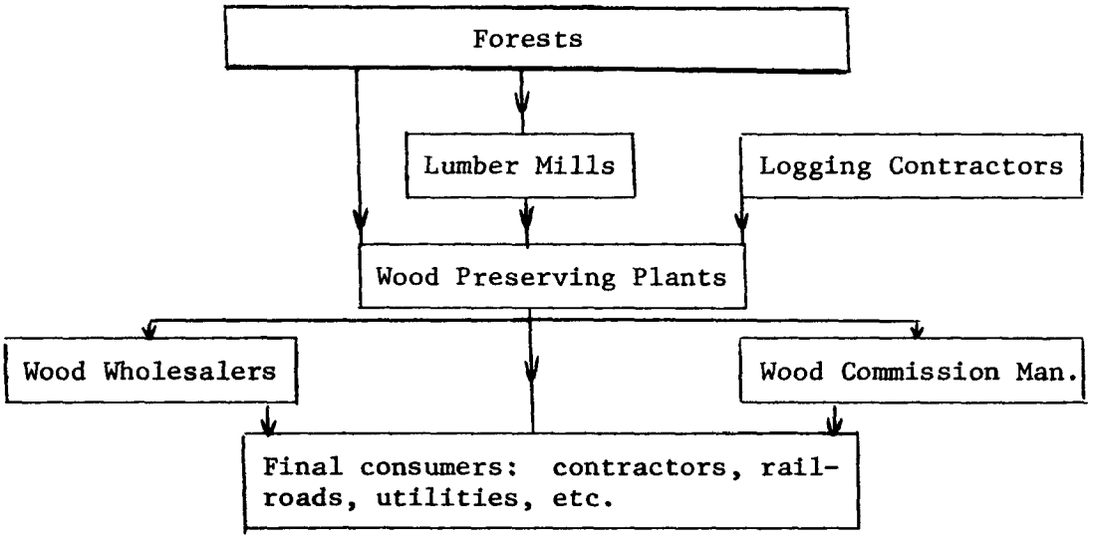
Exports (1967)	
Poles and piling (treated & untreated)	$9,032,650
Ties and mine timbers (treated & untreated)	1,702,316
Imports (1967)	
Poles and piling (treated & untreated)	5,513,554
Ties (treated & untreated)	255,736
Lumber and siding (drilled and/or treated)	3,071,312

c. Marketing System

The marketing system for preserved wood differs somewhat among products. Figure II.B.1 illustrates the general marketing system.

FIGURE II.B.1

MARKETING SYSTEMS IN THE WOOD PRESERVING INDUSTRY



Preserved wood is largely a commodity market modified by transportation costs which give regional advantages to some producers. For some products, wholesalers and commission firms conduct continuous pricing and bidding between the preserving plants and the final customers on the telephone. Much of the preserved lumber is sold from price lists. On the other hand, most piling and railroad ties are sold through formal bids for specific projects. Some large consumers deal directly with the wood preservers. Purchase decisions are made on the basis of price and delivery of future production, since most preservers only keep small inventories and make the products only on order.

A few wood preservers own forests. These companies will not sell preserved wood when it is more profitable to sell the wood in other forms. Therefore, the range of possible prices for preserved wood is limited to some extent by the prevailing prices of other wood products.

d. Substitute Products

Preserved wood products face continuing competition from non-wood products. As in most such situations, there are advantages and disadvantages to each product in addition to price differentials. However, prices of wood products are strongly influenced by the prices of substitute products and tend to be set slightly below the substitute if there is strong competition.

Table II.B.6 lists some of the preserved wood products and their potential substitutes. There is more competition for some uses than in others. Wood piling, for example, is only used for loads up to 50 tons. In some applications, such as building shingles, the aesthetic quality of the wood makes it a premium product which can be sold above the price of competitive products.

e. Future Demand

Total production in the wood preserving industry is the sum of products variously experiencing growth and decline. It would appear that production for the whole industry will continue to have long-term growth on the order of 2% per year. Growth in railroad ties will continue to be strong because of the tightened federal railroad safety regulations. Treated lumber and plywood will also experience growth higher than 2%, but will be subject to the fluctuations in non-residential construction.

2. Industry Segments

The wood preserving industry is composed of a large number of small, privately-owned plants and a few larger establishments owned by corporations not primarily in the wood preserving industry. The Koppers Corporation has the largest share of the market, followed by Mass-American, Inc., J.H. Baxter & Co., and American Creosote Works, Inc.

TABLE II.B.6

PRESERVED WOOD PRODUCTS AND THEIR SUBSTITUTES

Preserved Wood Product	Substitute
Piling	In-place concrete
	Driven concrete
	Steel piling
	Hollow I beams
Marine piling	In-place concrete
	Driven concrete
	Interlocking iron sheets
2 x 4's, etc.	Metal tubing
Plywood	Concrete
	Cinder block
Fire-retardant lumber, plywood, etc.	Asbestos
	Gibson
	Metal sheets
Poles	Metal tubing
	Precast concrete

Each of these firms operates at numerous locations.

The industry is located primarily in the South and the Northwest. According to the Department of Agriculture's Forest Service, there were in 1972 407 known wood treating plants. Of these, 18 were operated by railroads and other wood-using organizations and did not treat wood for sale or contract. Three of the plants were reported to be inactive. Of the remaining plants, about 320 (83%) used exclusively pressure processing equipment; 50 used non-pressure equipment, and 30 used both types.

Table II.B.8 shows the geographical distribution of wood preserving plants in the U.S. The largest number of plants are in the South Central region (127; 34%), followed by the Southeast (99; 26%). Table II.B.9 shows the regional distribution of plant size and production for 1967. The regions in Tables II.B.8 and II.B.9 are not exactly the same, but the important states are broken out separately. Table II.B.10 describes the total industry according to the number of employees in an establishment.

Of the 375 establishments reported by the Census of Manufactures (1967), 177 had 20 or more employees; 198 had less than 20 employees. The 177 plants with more than 20 employees produced $122.6 million (91%) of the $135.6 million of value added by the industry. These larger firms also employ 11,000 (90%) of the 12,200 employees in the whole industry. Table II.B.11 is a time series of the employment breakdown and the number of establishments from 1967 to 1971 taken from the Annual Census of Manufactures. The number of establishments reported for 1967 is 388 rather than the 375 reported by the Census of Manufactures. The differences may result from slightly different definitions of what is in the industry category. The time series from the Forest Service is also included in the table. Their estimate of the number of plants is even higher--394 for 1967--which may be due to different definitions. However, the Forest Service does not recontact each plant each year, and they may not be as likely to pick up plant closings as the Census of Manufactures. The Forest Service conducted a new survey in 1972 which located several previously unreported plants.

While the wood preserving industry has a large number of small firms, it is fairly concentrated in terms of the market share held by the largest firms. Table II.B.12 shows the concentration in the industry for 1963, 1967 and 1970.

There are basically two different patterns of ownership and management in the industry. Plants in the first category are one of a number of plants owned by a corporation which may or may not be primarily in the wood preserving industry. These plants are managed by individuals with little or no equity in the corporation. Plants following the second pattern are owner managed. They may have even been owned by the same family for several generations. The operation is probably incorporated, but the corporation is privately-held. There are no

TABLE II.B.8

WOOD-PRESERVING PLANTS IN THE UNITED STATES BY STATE AND TYPE, 1971

	COMMERCIAL			RAILROAD AND OTHER		TOTAL		
	PRESSURE	NON-PRESSURE	PRESSURE AND NON-PRESSURE	PRESSURE	NON-PRESSURE	NUMBER PLANTS	NOT REPORTING	REPORTED INACTIVE
NORTHEAST								
CONNECTICUT	0	0	0	0	0	0	0	0
DELAWARE	1	0	0	0	0	1	1	0
DIST. OF COLUMBIA	0	0	0	0	0	0	0	0
MAINE	0	0	0	0	0	0	0	0
MARYLAND	6	0	0	0	0	6	2	0
MASSACHUSETTS	1	0	0	0	0	1	0	0
NEW HAMPSHIRE	1	0	0	0	0	1	0	0
NEW JERSEY	4	2	0	0	0	6	1	1
NEW YORK	5	0	0	0	1	6	1	0
PENNSYLVANIA	6	0	0	1	0	7	0	0
RHODE ISLAND	1	0	0	0	0	1	0	0
VERMONT	0	0	0	0	0	0	0	0
WEST VIRGINIA	3	0	1	0	1	5	1	1
TOTAL	28	2	1	1	2	34	6	2
NORTH CENTRAL								
ILLINOIS	6	0	0	0	1	7	1	0
INDIANA	6	0	0	0	0	6	0	1
IOWA	0	0	0	0	1	1	0	0
KANSAS	0	0	0	0	0	0	0	0
KENTUCKY	6	0	0	0	0	6	1	0
MICHIGAN	4	2	0	0	0	6	1	0
MINNESOTA	3	5	2	1	0	11	1	0
MISSOURI	7	5	0	0	0	12	2	0
NEBRASKA	0	0	1	0	0	1	0	0
NORTH DAKOTA	0	0	0	0	0	0	0	0
OHIO	7	0	0	0	0	7	1	0
WISCONSIN	3	0	1	1	1	6	0	0
TOTAL	42	12	4	2	3	63	7	1
SOUTHEAST								
FLORIDA	23	1	1	0	0	25	5	0
GEORGIA	24	1	2	0	0	27	6	0
NORTH CAROLINA	18	0	0	0	1	19	1	0
SOUTH CAROLINA	11	0	0	0	0	11	1	0
VIRGINIA	15	1	1	0	0	17	0	0
TOTAL	91	3	4	0	1	99	13	0
SOUTH CENTRAL								
ALABAMA	22	1	0	0	0	23	2	0
ARKANSAS	11	0	1	0	0	12	1	0
LOUISIANA	21	0	1	0	0	22	0	0
MISSISSIPPI	18	1	3	0	0	22	5	1
OKLAHOMA	6	0	0	0	0	6	1	0
TENNESSEE	6	1	0	1	0	8	3	0
TEXAS	27	3	2	2	0	34	4	0
TOTAL	111	6	7	3	0	127	24	1
ROCKY MOUNTAIN								
ARIZONA	1	0	0	0	0	1	0	0
COLORADO	2	0	0	0	0	2	0	0
IDAHO	3	3	0	0	1	7	1	0
MONTANA	2	3	1	2	0	8	1	0
NEVADA	0	0	0	0	0	0	0	0
NEW MEXICO	1	0	0	1	0	2	0	0
SOUTH DAKOTA	0	0	1	0	0	1	1	0
UTAH	0	1	1	0	0	2	0	0
WYOMING	1	0	1	0	0	2	1	0
TOTAL	10	7	4	3	1	25	4	0
PACIFIC								
ALASKA	0	0	0	0	0	0	0	0
CALIFORNIA	8	0	2	0	2	12	0	0
HAWAII	3	0	0	0	0	3	0	0
OREGON	6	0	4	0	0	10	1	0
WASHINGTON	7	5	4	0	1	17	1	0
TOTAL	24	5	10	0	3	42	2	0
UNITED STATES TOTAL	306	35	30	9	10	390	56	4

SOURCE: Wood Preservation Statistics, 1971, Forest Services, U.S. Department of Agriculture.

TABLE II.B.9

REGIONAL DISTRIBUTION OF PLANT SIZE AND PRODUCTION FOR 1967

Industry and geographic area[1]	Establishments		All employees-Number (1,000)	Value added by manufacture ($MM)	Value of shipments ($MM)
	Total (number)	With 20 employees or more (number)			
United States	375	177	12.2	135.6	344.2
Northeast Region	21	8	.4	4.9	13.0
Middle Atlantic Div.	16	6	.3	4.0	10.3
Pennsylvania	10	4	.2	2.5	6.7
North Central Region	57	32	1.9	24.0	54.5
East N.Central Div.	30	18	1.2	15.9	33.8
Ohio	10	6	.4	5.3	11.4
Indiana	3	2	AA	(D)	(D)
Illinois	10	7	.5	7.2	16.4
West N.Central Div.	27	14	.8	8.1	20.7
Minnesota	11	6	.3	4.0	12.2
Missouri	10	7	BB	(D)	(D)
South Region	231	101	7.7	78.9	203.8
South Atlantic Div.	97	40	3.3	36.2	89.6
Maryland	4	2	AA	(D)	(D)
Virginia	12	7	.4	5.9	13.3
West Virginia	6	3	BB	(D)	(D)
North Carolina	21	4	.4	3.2	8.5
South Carolina	11	5	.5	5.7	17.4
Georgia	22	12	.9	11.5	24.6
Florida	20	6	.5	4.6	14.3
East S.Central Div.	55	24	2.0	19.1	53.2
Tennessee	6	3	.2	2.3	6.9
Alabama	17	7	.6	5.8	17.0
Mississippi	24	11	1.0	9.3	25.7
West S.Central Div.	79	37	2.4	23.6	61.0
Arkansas	18	7	.6	5.6	13.6
Louisiana	25	11	.7	7.6	19.9
Oklahoma	9	6	.2	2.8	6.4
Texas	27	13	.9	7.6	21.2
West Region	66	36	2.2	27.7	72.9
Mountain Div.	28	9	.6	5.7	14.5
Wyoming	4	2	AA	(D)	(D)
Pacific Div.	38	27	1.6	22.0	58.4
Washington	13	11	.6	8.0	22.0
Oregon	10	9	CC	(D)	(D)
California	13	6	.4	7.2	19.0

[1]General statistics for some producing States have to be withheld to avoid disclosing figures for individual companies. However, for such States, the number of establishments is shown and the employment size range is indicated by one of the following symbols: AA - less than 250 employees; BB - 250-499 employees; CC - 500-999 employees; ...

(D) Withheld to avoid disclosing figures for individual companies.

SOURCE: U.S. Bureau of the Census, Annual Survey of Manufacturers: 1967.

TABLE II.B.10

EMPLOYMENT AND PRODUCTION BY SIZE OF ESTABLISHMENT

Item	Establishments (number)	All Employees Number (1,000)	All Employees Payroll ($MM)	Value added by manufacture ($MM)	Value of shipments ($MM)
2491--Wood Preserving					
Establishments, Total	375	12.2	61.9	135.6	344.2
Establishments with an average of:					
1 to 4 employees	102	.2	.8	2.2	5.1
5 to 9 employees	39	.3	1.3	2.8	7.6
10 to 19 employees	57	.8	3.6	7.9	21.1
20 to 49 employees	89	2.8	14.8	34.9	86.2
50 to 99 employees	60	4.3	21.7	46.4	118.8
100 to 249 employees	27	3.9	19.7	41.3	105.4
250 to 499 employees	1	(D)	(D)	(D)	(D)
500 to 999 employees	-	-	-	-	-
1,000 to 2,499 employees	-	-	-	-	-
2,500 employees or more	-	-	-	-	-
Establishments covered by admin. records[1]	108	.3	1.4	3.0	7.7

[1]Estimated using administrative records of other public agencies.

(D) Withheld to avoid disclosure of individual firms.

SOURCE: U.S. Bureau of the Census, Annual Survey of Manufacturers: 1967.

TABLE II.B.11

TIME SERIES ON SIZE DISTRIBUTION OF WOOD PRESERVING INDUSTRY

	U.S. County Business Patterns - Summary number of reporting units, by employment-size class										U.S. Forest Service
	1 to 3	4 to 7	8 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 or more	Total units reporting	Number of employees	Total units reporting[1]
1972											389
1971	86	63	97	93	56	24	1	1	421	12,605	367
1970	82	58	107	96	56	22	2	-	423	12,523	368
1969	78	57	108	91	53	23	2	-	412	12,268	371
1968	71	57	88	95	51	27	2	-	391	12,099	387
1967	64	46	95	99	57	26	1	-	388	12,524	394

[1]Forest Service, U.S. Department of Agriculture. Data includes all plants in operation for at least part of the year, and excludes plants owned by railroads and others which do not produce preserved wood for sale.

SOURCE: Arthur D. Little, Inc.

TABLE II.B.12

CONCENTRATION IN WOOD PRESERVING INDUSTRY FOR 1963, 1967, AND 1970

SIC Code	Industry and Year		Value of shipments: Percent accounted for by-- 4 largest companies	8 largest companies	20 largest companies	50 largest companies
		-1970	34	NA	NA	NA
2491	Wood Preserving	-1967	35	44	63	84
		-1963	34	44	64	84

SOURCE: U.S. Bureau of Census, Annual Survey of Manufacturers, 1970 and 1967.

publicly-held companies primarily engaged in wood preserving. Table II.B.13 lists the organizational breakdown of companies in the industry.

The ownership and management patterns in an industry are important for an assessment of how the industry will be impacted by pollution control costs. Profitability requirements are very different between an owner-manager who is receiving a good salary and a corporation which more critically views the return on equity from one of many plants. There are 120 multiunit companies in the industry with 20 or more employees; all but one are corporately held. The 120 produce $99.4 million (73%) of the $135.6 million of value added by the entire industry. The remaining 255 will tend to have older technology, less financial resources, and higher unit costs of production. Also, on the basis of per unit of production, the costs of pollution control tend to fall more heavily on smaller plants. These competitive disadvantages, combined with the different behavior of the firms' owners, will produce whatever differences there are in the way firms within the wood preserving industry react to the addition of pollution control costs to the costs of production.

The impact analysis will focus on plants using pressure processes in the Southeast and South Central sections of the U.S. In these areas there were a total of 231 plants in 1971. The pressure plants totaled 202, nine plants were nonpressure, and eleven plants use both pressure and nonpressure.

Of the 202 plants using pressure processes, 163 use oil-based or creosote preservatives. Twenty-three of the 163 plants are primarily lumber companies or firms with other activities besides wood preserving. Of the 52 plants using nonoil-based preservative, 24 are operated by lumber companies. The nonoil-based operations are all very small with a large concentration of plants in Georgia and Florida.

The primary business activity of the company operating the preserving facility can be important to economic impact analysis from three perspectives. If the treating operation is small but part of a company with larger financial capabilities, the company as a whole will be better able to make capital expenditures necessary to put the preserving facility into compliance with the pollution control requirements. Secondly, if preserving is an important service, e.g., one that a lumber company provides to its customers, the company will not usually judge the profitability of the treating operation as if it were an independent plant. The treating operation will tend to be viewed as part of the entire process of logging, cutting, treating, and selling which must stay profitable. Finally, if a treating facility operated by a lumber company is closed, there will be substantially less employment loss than if it were independent. Most of the employees are involved with handling the wood, and they can be absorbed in other plant activities.

TABLE II.B.13

OWNERSHIP ORGANIZATION OF THE WOOD PRESERVING INDUSTRY

Item	Establishments		Employees (number) (1,000)	Value added by manufacture ($ Million)	Value of shipments ($ Million)
	Total (number)	With 20 employees or more (number)			
Wood Preserving, Total	375	177	12.2	135.6	344.2
Type of operation					
Multi-unit companies, total	145	120	8.5	99.4	253.4
Corporate ownership	143	119	(D)	(D)	(D)
Non-corporate ownership	2	1	(D)	(D)	(D)
Single unit companies, total	122	57	3.4	33.1	83.1
Corporate ownership	95	50	(D)	(D)	(D)
Non-corporate ownership	27	7	(D)	(D)	(D)
Adminis. records[1]	108	0	0.3	3.0	7.7
Legal form of organization					
Corporate	238	169	11.5	128.9	328.6
Non-corporate, total	29	8	0.4	3.6	7.8
Adminis. records[1]	108	0	0.3	3.0	7.7

(D) Information withheld to avoid disclosures of individual firms.

[1]Administrative records - information received from the records of other public agencies.

SOURCE: U.S. Bureau of Census, Annual Survey of Manufacturers, 1967.

3. Financial Profile

An industry such as this with a large number of mainly small firms, frequently privately held, utilizing a variety of production technologies and producing several different end products, is not ready profiled in a financial sense. Thus, financial data presented here is a blend of total industry (macro) and individual firm (micro) data.

The Southern Pressure Treaters Association, which covers the plants which are likely to have the most difficulty meeting the pollution standards, conducts surveys of plant operations including profitability. Over the last several years profits for the Association members have varied between six and seven percent of net sales before taxes. The industries' profits on sales are lower than the average for all manufacturing industries and the average for lumber and wood products generally. (See Table II.B.14.)

TABLE II.B.14

U.S. CORPORATE PROFITS (AFTER TAXES)

AS A PERCENT OF SALES

Year	All Manufacturing (%)	Lumber and Wood Products
1965	5.6	3.9
1966	5.6	3.8
1967	5.0	3.4
1968	5.1	5.3
1969	4.8	4.8
1970	4.0	2.5
1971	4.2	4.4

Note: Before tax profits are approximately double after tax profits.

Source: Quarterly Financial Report for Manufacturing Corporations, Federal Trade Commission--Securities and Exchange Commission.

While the average profitability of firms in the Southern Pressure Treaters Association has remained fairly constant over a period of sharp changes in prices and production, the range of profits has been very large. Table II.B.15 lists the profits for the first quarters of 1972 and 1973.

TABLE II.B.15

PROFITS ON SALES OF THE SOUTHERN PRESSURE TREATERS ASSOCIATION MEMBERSHIP, QUARTER ENDED MARCH 31, 1972 AND 1973

	1972	1973
• Upper 25%	12.4%	19.8%
• Middle 50%	7.0	9.7
• Lower 25%	2.2	4.7
Average	3.4	7.4

Source: Southern Pressure Treaters Association survey for quarters ending March 31, 1972 and 1973.

It is important to remember that the costs to the treater of wood accounts for 50% of the sales price. The cost of preservatives accounts for another 15%. When profitability is measured against net worth or stockholders' equity, the profits are much stronger. The firms interviewed generally had little or no long-term debt. They have made substantial capital expenditures in the last two or three years generally made out of cash flow. While it is not entirely true, we have the impression that the most profitable firms are the ones which have made the capital expenditures. The bottom quartile of firms in Table II.B.15 with before tax profits of 2% to 4% do not have much leeway for existing with increased costs due to abatement, especially if industry demand slackens.

Tables II.B.16 through II.B.18 describe this industry on the macro scale. Key factors characterizing this industry include:

- Cost of materials: 60%+ of value of shipments; primarily cost of raw wood. (Tables II.B.16; II.B.17.)
- Increasing productivity. (Table II.B.16.)
- Low amount of new capital committed to the industry; e.g., $10.7 MM (1967) = 3.3% value of shipments, $10.4 MM (1971) = 2.5% (Tables II.B.17 and II.B.18).

In short, the industry adds a small amount of value (39.4%, 1967, Table II.B.16) to the raw wood. Further, it is a mature industry which warrants and attracts relatively little new investment.

TABLE II.B.16

COST OF PRODUCTION FACTORS: 1967

Items		Wood Preserving (SIC 2491)	
			%[1]
Establishments, total	Number	375	
With 1 to 19 employees	do	198	
With 20 to 99 employees	do	149	
With 100 employees or more	do	28	
All employees, average for year	1,000	12.2	
Payroll for year, all employees	million dollars	61.9	18.0
Production workers:			
Average for year	1,000	10.3	
Wages	million dollars	47.1	13.7
Cost of Materials, etc., total	do	214.5	62.3
Materials, parts, containers, etc.consumed	do	198.4	57.6
Cost of resales	do	8.7	2.5
Fuels consumed	do	4.3	1.2
Purchased electric energy	do	1.7	0.5
Contract work	do	1.5	0.4
Value of shipments, including resales	do	344.2	
Value of resales	do	10.9	3.2
Value added by manufacture	do	135.6	39.4
Manufacturers' inventories:			
Beginning of year, total	do	71.3	
Finished products	do	37.4	
Work in process	do	9.1	
Materials, supplies, fuel, etc.	do	24.8	
End of year, total	do	77.0	
Finished products	do	41.7	
Work in process	do	10.7	
Materials, supplies, fuel, etc.	do	24.5	
Expenditures for plant and equipment, total	do	11.3	3.3
New plant and equipment, total	do	10.7	3.1
New structures and additions to plant	do	1.4	0.4
New machinery and equipment	do	9.3	2.7
Used plant and equipment	do	.5	0.1

SOURCE: Census of Manufactures, 1967.

[1]% of value of shipments.

TABLE II.B.17

SELECTED OPERATING RATIOS FOR THE WOOD PRESERVING INDUSTRY: 1958 TO 1967

Year	Payroll per employee (dollars)	Production worker as percent of total employment (percent)	Annual man-hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials per dollar of shipments (dollars)	Cost of materials & payrolls per dollar shipments (dollars)	Value added per employee (dollars)	Payrolls as percent of value added (percent)	Value added per man-hour of production worker (dollars)
1967 Census	5,068	84	2,105	2.17	.62	.80	11,103	46	6.25
1966 ASM	4,712	85	2,141	1.99	.63	.80	10,479	45	5.74
1965 ASM	4,330	84	2,107	1.86	.64	.81	9,050	48	5.10
1964 ASM	4,336	84	2,064	1.86	.63	.81	8,788	49	5.08
1963 Census	4,049	85	2,046	1.79	.63	.81	8,344	49	4.81
1962 ASM	3,920	85	2,050	1.70	.62	.80	7,859	50	4.50
1961 ASM	3,802	84	2,047	1.67	.61	.79	7,439	51	4.32
1960 ASM	3,713	84	2,080	1.61	.62	.80	8,194	45	4.70
1959 ASM	3,555	85	2,074	1.55	.62	.79	7,775	46	4.41
1958 Census	3,350	84	1,949	1.57	.63	.81	6,632	51	4.06

SOURCE: Census of Manufactures, 1967.

TABLE II.B.18

EXPENDITURES FOR NEW PLANT AND EQUIPMENT BY THE WOOD PRESERVING INDUSTRY

	Total New Expenditures	New Structures and Additions to Plants	New Machinery and Equipment
1967	10.7	1.4	9.3
1968	9.3	(1.4)	(7.9)
1970	8.4	1.4	7.0
1971	10.4	.5	9.9

( ) Standard error is greater than 15%.

SOURCE: U.S. Bureau of the Census, Annual Survey of Manufacturers--1967, 1968, 1970, 1971.

4. Price Effects

A critical issue to resolve in determining how an industry will be affected by pollution control costs is how the industry establishes its prices and, following from that, whether the industry will be able to raise prices sufficiently to cover the costs of pollution control. It is important to remember that the pattern for the industry as a whole may not be representative of many individual firms. The data presented in this section covers price histories for preserved and unpreserved wood, comparisons between histories and national production levels, and histories of some of the important cost components of the treating process.

The two major factors affecting the price of preserved wood are the price of untreated wood and the price of substitute products. The price range for treated wood is set on the upper end by the price of substitute materials. If the cost of raw materials or the cost of production forced the cost of the product beyond the competitive range, then the user would switch to substitute products. Clearly, the pressure for substitution is more important for some preserved products than for others. The lower limit on the price range is set by the prices for other uses of the wood. If prices fall below this point, preserved wood is not produced. Both ends of the price range move in an absolute and a relative sense.

Table II.B.19 lists the materials consumed by the wood preserving industry in 1967 and 1963. Of the $344.2 million in products shipped by the industry in 1967, $136 million (40%) went for the purchase of the wood treated by the industry. Another $35.7 million (10%) went for creosote oil, a treating chemical. Table II.B.20 shows the price history of wood preserving chemicals. The price of preservatives has remained constant over a long period of time with the exception of a 12% increase in creosote prices in 1971 and a 14% decline in pentachlorophenol prices in 1969. This data comes from the County Business Patterns and, as was noted earlier, may differ slightly from the Census of Manufactures' count of firms in the industry. The payroll figures in the County Business Patterns are January through March. For 1967, one quarter of the full year's wages reported by the Census of Manufactures was $15.5 million, as compared with the County Business Patterns' first quarter payroll of $15.1 million. The Business Patterns payrolls can, therefore, be used as a good approximation of the total wages paid within SIC 2491.

The rising labor costs are an important phenomenon in the wood preserving industry. Wages per employee rose by 19% between 1967 and 1971. The passage of a new minimum wage bill by the Congress (which seems likely) will have a substantial added impact on the industry. Most of its employees are classified as laborers and would either directly or indirectly have their wages raised by the new bill.

TABLE II.B.19

MATERIALS CONSUMED BY THE WOOD PRESERVING INDUSTRY: 1967 AND 1963

Code	Material	Unit of measure	1967 Quantity	1967 Delivered cost ($MM)	1963 Quantity	1963 Delivered cost ($MM)
	Materials, parts, & supplies, total		(X)	198.4	(X)	143.6
	Treated in same establishment:					
241109	Poles, piling, & other round or hewn wood pdks		(X)	81.7	(X)	55.3
	Rough lumber including sawn ties:					
242110	Hardwood	MM bd.ft.	241.4[e]	20.6	158.7	12.0
242118	Softwood	MM bd.ft.	383.1[e]	33.7	276.6	23.0
	Consumed in same establishment:					
281551	Creosote oil	MM gallons	149.8[e]	35.7	124.6	29.4
970099	All other materials, components, parts, containers, and supplies consumed		(X)	17.1	(X)	12.5
976000	All other materials, components, parts, containers, and supplies consumed, n.s.k.		(X)	9.5	(X)	11.4

NOTES: (X) Not applicable.
n.s.k. Not specified by kind.
[e]From 10 to 30 percent of this figure was estimated.

SOURCE: Census of Manufactures, 1967

TABLE II.B.20

WOOD PRESERVATIVES - PRICE HISTORY

	creosote oil, tanks (cents per gallon)	pentachlorophenol, drums (cents per pound)
1960	24.0	22
1961	24.0	22
1962	24.0	22
1963	24.0	22
1964	24.0	22
1965	24.0	21
1966	24.0	21
1967	24.0	21
1968	24.0	21
1969	24.0	18
1970	24.0	18
1971	27.0	18
1972	27.0	-

(1) Prices are list prices taken on or near July 1 of each year. Whenever a range of prices was given in the source, the lowest was used.

(2) CREOSOTE OIL, TANKS: Prices are for crude, coaltar creosote. Price bases are:

1951-1962	Works, freight adjusted
1963-1972	Works, freight equalized

(3) PENTACHLOROPHENOL, DRUMS: Price bases are:

1955-1963	Carlots, truckloads, freight equalized, works
1964	Carlots, truckloads, delivered
1965-1966	Carlots, truckloads, works
1967-1971	Carlots, truckloads, freight equalized

SOURCE: Chemical Marketing Reporter (formerly Oil, Paint, and Drug Reporter).

In recent years the industries' capital expenditures have either gone to pollution control or equipment to reduce labor costs--particularly wood handling equipment. Firms which have not been making the expenditures to reduce labor costs are becoming progressively less profitable. Their lower earnings will make it most difficult for them as opposed to other firms to finance major capital expenditures for pollution control or any other requirement.

Tables II.B.21 and II.B.22 and Figures II.B.2-3-4-5 show the price and production histories for piles, ties, and lumber. We do not have a price history for poles but we believe it would be similar to that for piles. Two relationships are important when examining these histories. The first is the ability of the industry to change its prices when the cost of producing the product is changed. (Can the industry raise prices to pass on the added costs of pollution control?). The second relationship is the degree to which production levels are affected by changes in price levels. (Will increased prices reduce total industry production?)

Table II.B.21 demonstrates that the price of preserved ties follows very closely the price of unpreserved ties. The difference in price between treated and untreated ties of $1.50 in October, 1968, is typical of the differences for earlier months as well. Thus, the $1.50 difference in 1973 is the same as in 1968, even though the cost of labor has increased substantially during this period. Figure II.4 shows that the price increases have occurred at a time of strong growth in the production. The evidence suggests that the industry as a whole is able to easily pass on even large price increases. But, the data also suggests that there is strong price competition. In this situation it is very difficult for less profitable (less efficient) plants to increase prices more than their more profitable (more efficient) competitors. Small plants with a higher per unit cost of pollution abatement than larger firms may have to absorb part of the higher cost of control. The same analysis is also true of lumber as seen in Table II.B.21.

Piles on the other hand do not exhibit this same strong price competition. While price increases in treated piles can be broadly related to increase in untreated wood price, they do not exactly correspond, and the difference between the prices has increased almost 100% since 1968. One would conclude that as a whole firms treating piles would be able to increase prices if the costs of production are increased by pollution abatement. It may also be possible for individual firms to have some degree of price independence if their costs are slightly different than their competitors'.

Figures II.B.2-5 compare the price histories with total production for the industry. Since the prices are for particular plants or products, they should be viewed as representative of prices in that product category. The volume of pile production has fallen as prices have increased, but we must wonder why prices would have continued to

TABLE II.B.21

PRICE OF TREATED AND UNTREATED PILES AND TIES

Date	Piles			Ties		
	Untreated ($/ft.)	Treated ($/ft.)	Difference ($/ft.)	Untreated ($ each)	Treated ($ each)	Difference ($ each)
April 1973	.98	2.00	1.02	4.25	5.75	1.50
Feb. 1973	.94	1.80	.86	4.25	5.75	1.50
Oct. 1973	.89/.90	1.80	.89/.90	4.25	5.75	1.50
July 1972	.89/.90	1.70	.79/.80	4.25	5.75	1.50
April 1972	.85	1.70	.85	4.25	5.75	1.50
Nov. 1971	.78	1.64	.86	4.25	5.75	1.50
July 1971	.78	1.64	.86	4.25	5.75	1.50
April 1971	.72	1.64	.92	4.25	5.75	1.50
Jan. 1971	.72	1.56	.84	4.25	5.75	1.50
Sept. 1970	.72	1.56	.84	3.40	4.75	1.35
June 1970	.72	1.56	.84	3.40	4.75	1.35
March 1970	.72	1.56	.84	3.40	4.75	1.35
Jan. 1970	.72	1.56	.84	3.40	4.75	1.35
Oct. 1969	.72	1.49	.77	3.40	4.75	1.35
July 1969	.72	1.38	.66	3.40	4.75	1.35
April 1969	.72	1.38	.66	3.40	4.75	1.35
Jan. 1969	.67	1.38	.71	3.40	4.75	1.35
Oct. 1968	.67	1.20	.53	3.10	4.60	1.50

Piles: 12-13 ft. from butt. 7 in. 40 to 50 ft.
Ties : St. Louis ... Mixed Oak, 6" x 8" x 8'6"

SOURCE: Engineering News Record, and Contractor estimates.

TABLE II.B.22

PRICE OF TREATED AND UNTREATED LUMBER

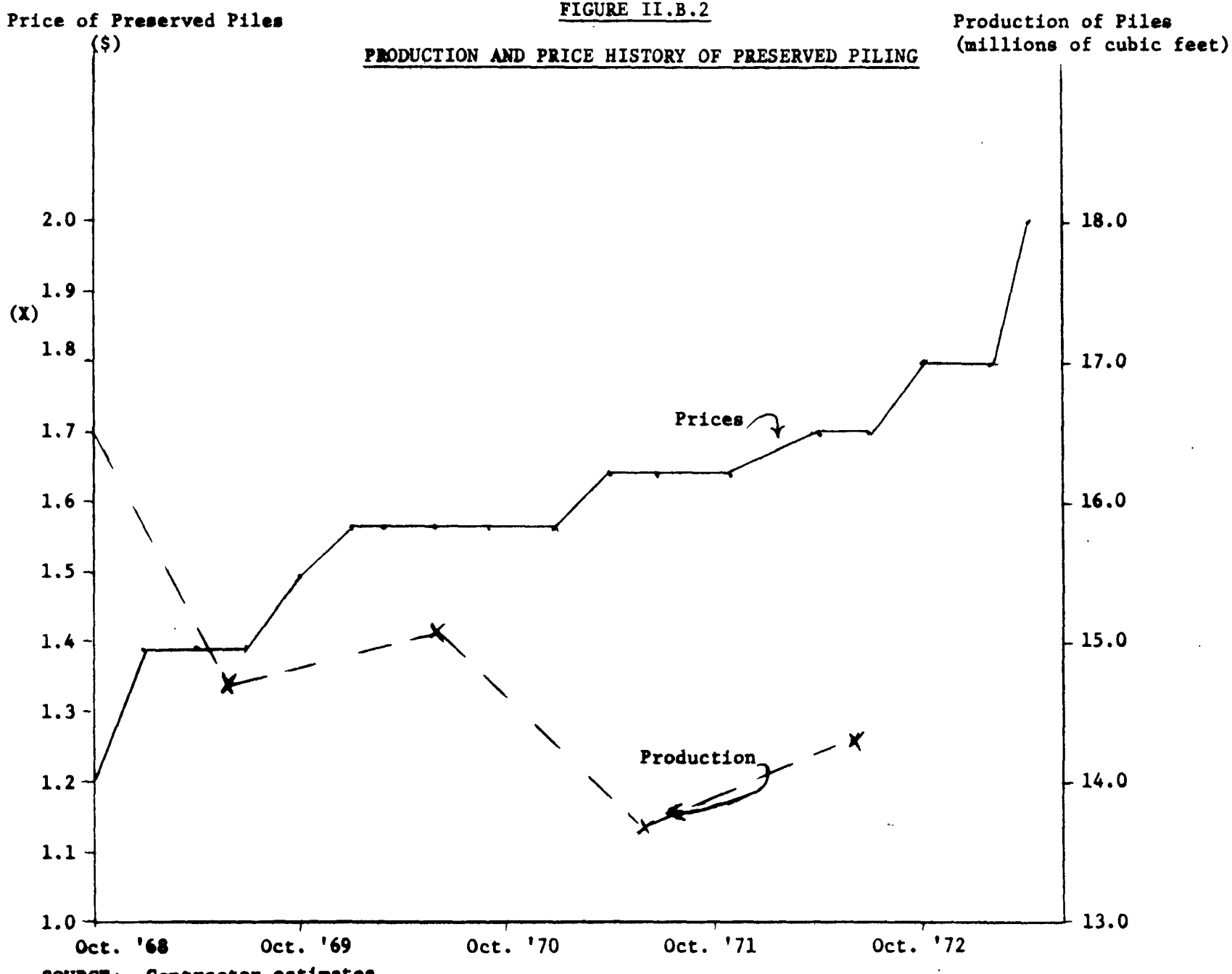
Date	Untreated	Treated	Difference
March 1973	174	210	36
October 1972	145	180	35
May 1972	137	172	35
January 1972	126	161	35
August 1971	116	151	35
April 1971	106	141	35
October 1970	101	136	35
February 1970	97	132	35
October 1969	97	135	38
June 1969	110	148	38
January 1969	130	165	35
October 1968	118	153	35
May 1968	101	138	37
February 1968	99	136	37

NOTE: Prices were supplied confidentially by a pressure treating plant in the South. The prices are for 1000 board feet (wholesale, FOB plant) of Southern pine 2 x 4 x 12 pressure treated for above-ground exposure (0.23 pcf. retention) with water-borne salts preservation.

SOURCE: Statement by the American Wood Preservers Institute to the Cost of Living Council, April 6, 1973.

FIGURE II.B.2

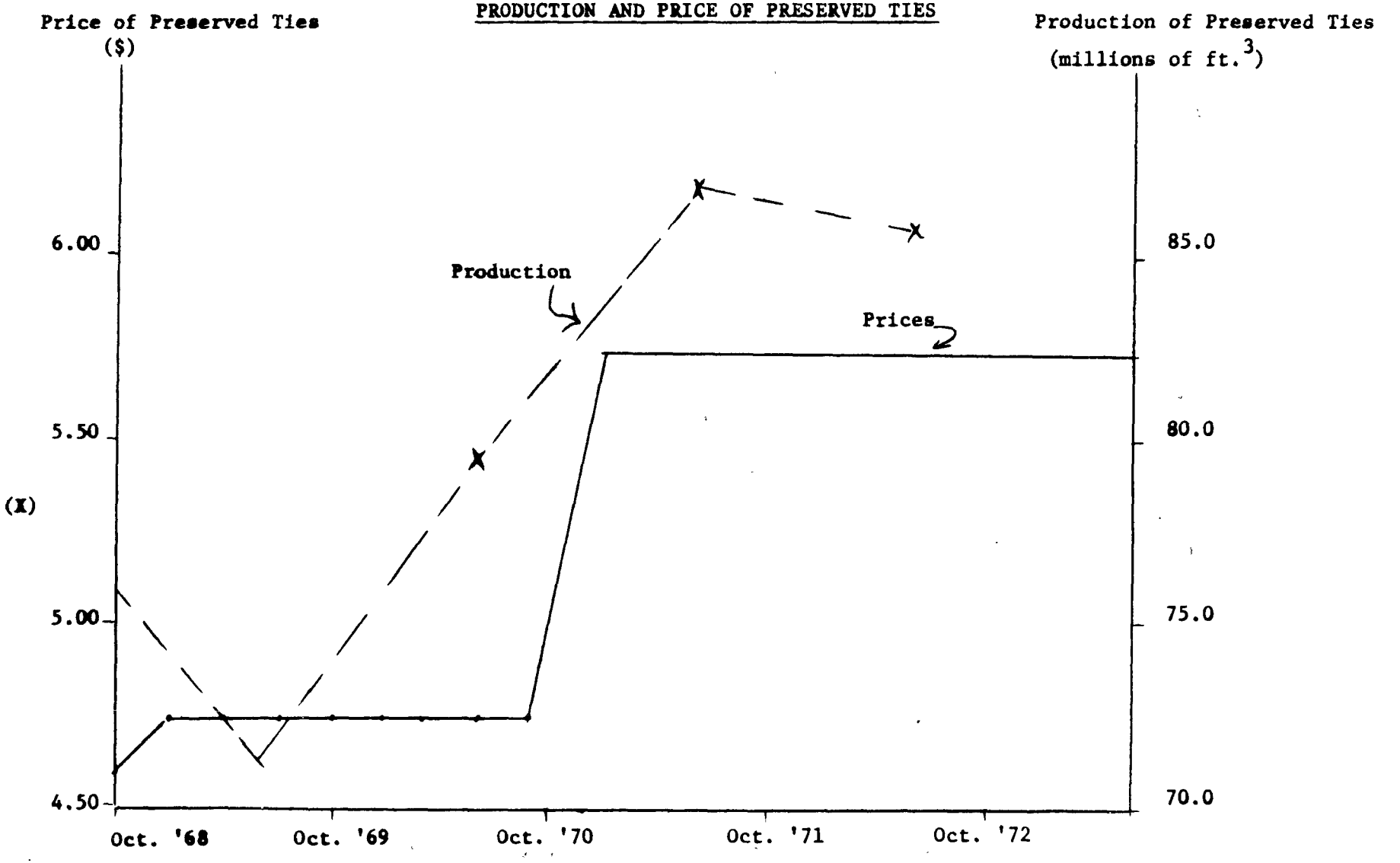
PRODUCTION AND PRICE HISTORY OF PRESERVED PILING



SOURCE: Contractor estimates.

FIGURE II.B.3

PRODUCTION AND PRICE OF PRESERVED TIES



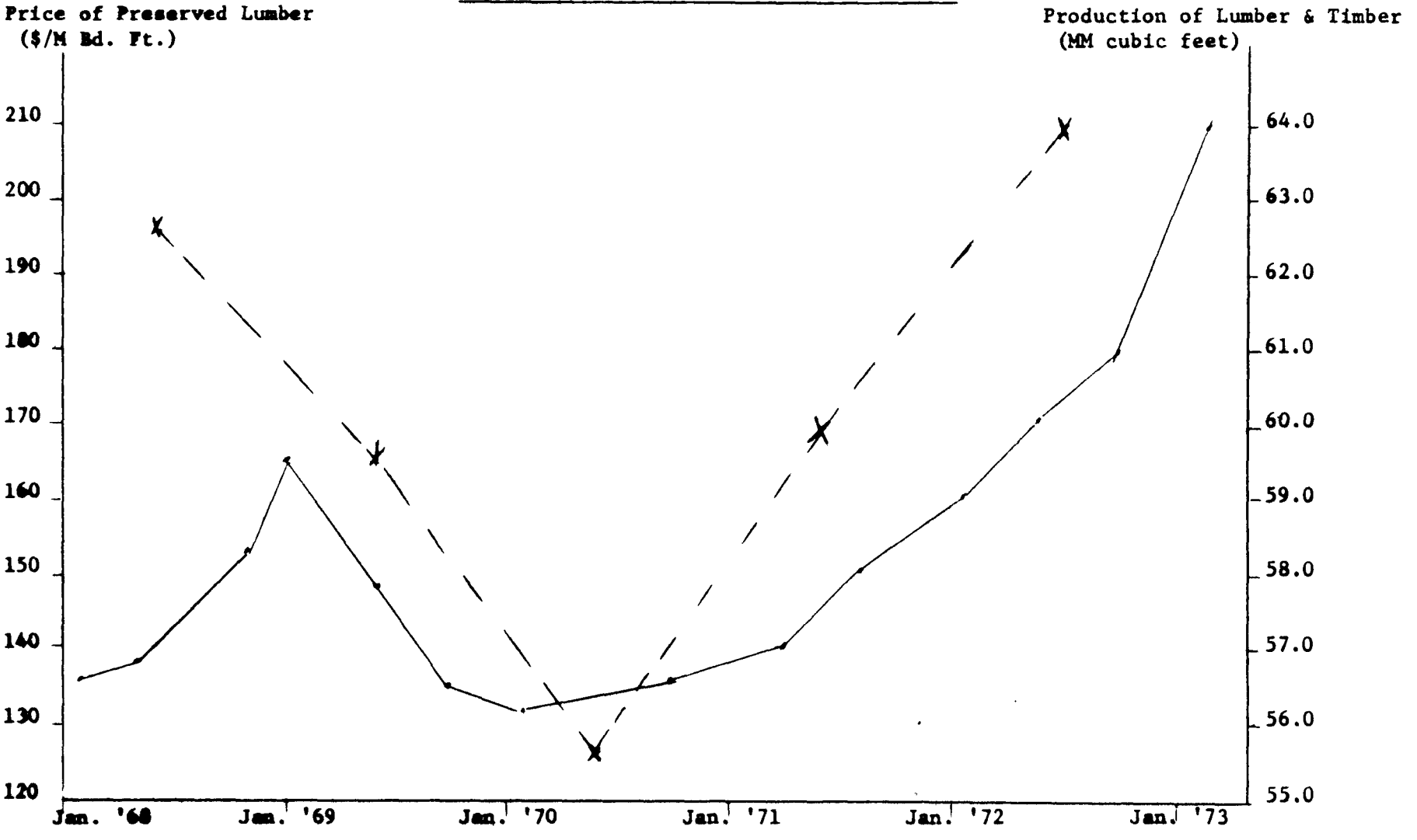
56

(X)

SOURCE: Contractor estimates.

FIGURE II.B.4

PRODUCTION AND PRICE OF PRESERVED LUMBER



SOURCE: Contractor estimates.

rise in excess of wood price increases if the prices were really responsible for a decline in production. The figure for lumber and timber are moving in the opposite direction. Production is increasing as prices are increasing. It is possible that production would have increased more in the absence of price increases, but there is no evidence to support that conclusion.

The wood preserving firms generally view treating as a service rather than treated wood as a product independent of untreated wood. They establish prices by adding a fixed charge to the raw wood. It is this fixed charge which has remained fairly constant over a long period of time. For this reason, many firms view the present period of high wood prices as a period of low preserved wood prices because the cost of treating as a percent of the untreated wood has declined.

We do not have industry-wide production figures for 1973, but interviews with wood preservers have shown a clear decline in production resulting from a shortage of untreated wood. Firms are operating in terms of rationing the products they are able to produce. If this phenomenon continues during the time that plants are facing abatement costs, it will be fairly easy for them to charge the prices necessary to fully pass on the cost of abatement.

Table II.B.23 shows the distribution of prices of poles and piles sold during the first quarter of 1972 and 1973. In 1973, only 2% of sales were made at prices averaging 15% above the average sales price, though 24% of the volume of sales were made at prices averaging 20% below the average selling price. In 1972. the distribution between companies in the middle 50%, and the top 25% were almost equal.

In addition to government influences which affect all industry, such as OSHA, the demand for preserved wood is influenced in the five major areas as follows:

- Federal requirements for upgrading railroad tracks.
- Building codes allowing the use of wood treated with fire retardants where noncombustibles are required.
- Federal government induced changes in the level of nonresidential construction.
- Government influences on the availability (and thus price) of wood, e.g., export restrictions.
- Government price control regulations.

The first two points are recent developments which have produced the increased demand for railroad ties and lumber and plywood. The very large increases in wood prices resulting from a fall in wood supply can reduce preserved wood's competitive position with respect to substitute products.

TABLE II.B.23

SPREAD IN SELLING PRICE OF POLES AND PILING

	Total Quantity Sold ($ft.^3$)	Average Company Net Selling Price ($/$ft.^3$)	Total Quantity Sold ($ft.^3$)	Average Company Net Selling Price ($/$ft.^3$)
• By the 25% of the reporting companies realizing the highest per cubic foot net selling price.	3,441,194	1.900	119,687	2.154
• By the 50% of the reporting companies realizing the highest per cubic foot net selling price.	3,747,750	1.677*	4,299,408	1.999
• By the 25% of the reporting companies realizing the highest per cubic foot net selling price.	1,215,727	1.708*	1,405,401	1.794
By All Companies	8,404,671	1.708*	5,824,496	1.987

NOTE: The averages shown above are the average company selling prices and are not weighted averages to give the effect of company volume.

*Unknown error in the data.

SOURCE: Southern Pressure Treaters Association survey for quarter ended March 31, 1972, 1973.

In addition to the government influences affecting all industry, the wood preserving industry is or could be affected in at least two important ways:

1) government influences on the price of wood, such as export restrictions and the level of construction;

2) pollution control requirements for air, water, and solid waste abatement.

Higher wood prices and the resulting higher prices for preserved wood will tend to reduce the demand for preserved wood. Pollution control costs can both raise preserved wood prices, and the requirements to finance pollution control equipment costs can be a major problem for small, marginal firms.

In summary, the history of cost changes in this industry suggests that increased costs, of all types, will be passed on in the form of increased prices to users. For example, raw wood prices are commonly passed on; many annual contracts have clauses to permit price escalation based on wood cost increases. Therefore, increased costs, industry-wide, due to effluent control, will probably be passed on to the user.

C. PLYWOOD AND VENEER

Plants incorporated into SIC-2432 (now SIC 2435-hardwood and 2436-softwood) include plants manufacturing plywood and veneer, or just plywood or veneer, of interior and/or exterior grades, and of softwood or hardwood species.

The description of the plywood and veneer industry sector in this section considers both hardwood and softwood products and markets. One objective of this analysis is to demonstrate the distinctness of hardwood and softwood plywood, by contrasting the two sectors. In recognition of this distinctness, these two sectors are analyzed separately in the economic impact analysis sections (Section III.D-softwood and Section III.E-hardwood).

For the past 15 years plywood has been an unusually rapidly growing forest products commodity. For example, in the period from 1960 through 1972, major forest products commodities exhibited the following growth rates:

- Pulp and paper production: 4-1/2 - 5% per year
- Total lumber production: 1-1/2 - 2% per year
- Softwood plywood production: 7 - 8% per year

A key issue which typically arises in any consideration of the future of the forest products industry is the question of wood availability. Our underlying assumption throughout the study is that while the cost of wood is expected to rise, in some specific areas quite precipitously, we do not expect that a lack of wood will exist to the extent that the industry growth rate will be reduced. There are still many good sites for new plywood plants and plywood plant expansion. Other issues, such as market demand, will be more controlling factors than wood availability.

1. Industry Structure

a. Products

Hardwood and softwood products are basically non-substitutable. Hardwood is used primarily in decorative applications, while softwood is used in structural applications.

Hardwood plywood is used for interior grade products. The product is considered a hardwood plywood product as long as it has a hardwood veneer (surface); however, the core can be either hardwood or a softwood laminate or lumber or particleboard. Hardwood plywood is finished to different degrees depending upon its end use. Sanded and stained hardwood plywood can be used as tongue and groove flooring or can be made

into interior wall paneling, and moldings. These are relatively high-quality uses. Hardwood veneer and finished hardwood plywood is used in moderate-high quality furniture. Lower grades of hardwood plywood are used in industrial applications, for container and packaging products.

Softwood plywood is manufactured in both interior and exterior grades, the primary differentiation being the composition of the adhesives used to bind the laminates and, to some extent, finishing techniques, both of which serve to increase moisture resistance levels. Interior grades are used for such products as flooring underlayment, sub-flooring, and paneling. Exterior grades are used for siding, sheathing, and roof decking.

b. Markets

Markets for hardwood plywood products are furniture uses, interior wall paneling, other decorative applications, and flooring. These markets utilize the hardwood plywood primarily as a decorative material, less than softwood plywood as a structural, load-bearing material. In most cases, hardwood plywood is a well-established product in these markets, having gained access to the markets via substitution for solid wood products many years ago. The substitution effect is nearly complete. Thus, the growth of hardwood plywood consumption will parallel or be slightly less than the overall market growth within these sectors.

The hardwood plywood markets are less subject to wide cyclical economic swings and represent a broader base of industries than is the case for softwood plywood. This broader base makes the demand for hardwood plywood more stable (less subject to the substantial year-to-year variations that affect softwood plywood).

Softwood plywood markets can be defined as follows:

- Residential construction: 52%--sheathing, siding, underlayment;
- General construction: 14%--concrete footing;
- Industrial uses: 20%--shipping containers, packaging uses;
- Agricultural and other: 14%--furniture, boats, paneling.

Perhaps 10% out of the 14% in the agricultural and other category is for products frequently purchased by a consumer and utilized for residential repairs and remodeling uses. Thus, the residential construction uses account for, in total, more than 60% of total uses, and total construction uses account for about three-quarters of the total consumption.

Agricultural, industrial and non-construction markets normally do not fluctuate widely on a year-to-year or on a seasonal basis. Residential repair and remodeling activity also tends to be relatively stable, although

less so than the previous categories. However, new residential construction is an extremely volatile industry in the United States. With its substantial dependence on construction activity, softwood plywood demand, and prices, are heavily exposed to the vagaries of wide demand swings. Table II.C.1 demonstrates graphically this volatility. For example, new housing starts dropped by more than 20% in 1966 vs. 1965, and rose by more than 40% in 1971 vs. 1970, and another 14% in 1972 vs. 1971.

c. Marketing

Softwood plywood is basically a commodity product. With the exception of redwood plywood, which has particular attributes such as workability, weather resistance, and appearance, the softwood plywood species are largely interchangeable products. The major product categories relate to the type of adhesive used (designed for interior or exterior conditions), the finish of the sheet (rough for construction and industrial use, smooth for interior, cabinetry and finish work), and the appearance of the face (such as the number and size of knots and cracks, and the thickness of the sheets). The products are graded at the mill by the producer. Independent inspectors visit mills on a spot basis to ensure that grading standards are maintained.

A demonstration of the commodity nature of plywood is the recent acceptance of trading in plywood future's contracts on the Chicago Commodities Exchange. Other forest products commodities, such as pulp, are also traded on the Exchange. Specialty products, such as specialty papers and pre-finished plywood panels, are not traded as futures.

Figure II.C.1 depicts plywood distribution channels. A captive warehouse is a warehouse owned by the producing mill. Georgia-Pacific, Champion International (U.S. Plywood), and Weyerhaeuser are examples of three firms which own captive warehouses. An independent warehouse refers to a wholesaler which is an independently-owned firm, performing the same activities as a captive warehouse, but handling a number of producers' products. An office wholesaler is generally a small, independently-owned firm which operates as a middleman between the mill and retailers or other large end users, such as contractors. An office wholesaler maintains no inventory, and serves to facilitate the match between user and mill. Even more than the other sectors, an office wholesaler sells relatively large unit volumes at relatively low margins.

The distribution pattern is in practice considerably more complicated than that depicted in Figure II.C.1. For example, some retailers have joined together to form cooperatives which are then able to buy in carload quantities at volume discounts from the producing mill. In such cases, the mill will ship directly to the cooperative and/or its individual members, bypassing the captive warehouse entirely. Similarly, large contractors, either acting in concert or independently, can also buy directly from the producing mill.

TABLE II.C.1

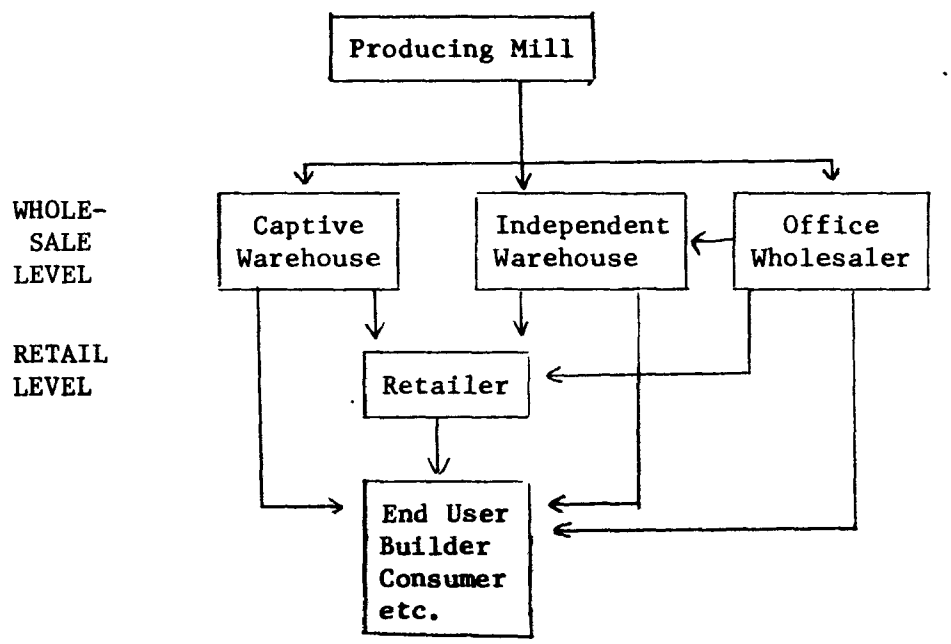
NEW HOUSING STARTS

Year	Starts (1,000)	Change (%)
1960	1,300	
1961	1,360	+ 5.3
1962	1,500	+ 9.3
1963	1,640	+10.0
1964	1,560	- 4.9
1965	1,510	- 3.3
1966	1,200	-20.8
1967	1,320	+10.5
1968	1,540	+16.9
1969	1,500	- 2.9
1970	1,470	- 2.2
1971	2,080	+42.1
1972	2,400	+14.2

SOURCE: U.S. Department of Commerce

FIGURE II.C.1

PLYWOOD DISTRIBUTION PATTERNS



SOURCE: American Plywood Association

Our latest data indicates the following importance of the three primary wholesale members in the distribution chain:

- Captive: 45-50% of total shipments
- Independents: 20%
- Office: 15%

Approximately 15-20% of the total value of shipments went directly from the producing mill to the retailer and end user. The primary trend which is developing in terms of distribution patterns is the increasing importance of captive warehouses, the lessening of importance of office wholesalers, and the increasing capability of the producing mill to service the retailer or end user directly.

d. Substitute Products

In a general sense, the following sort of substitution chain applies: plywood substitutes for lumber, and composition wood products (particleboard, hardboard, and softboard) replace plywood. However, the residential construction industry is particularly traditional in its use of materials and adopts substitutes only gradually. More specifically, hardwood plywood used in furniture faces competition from solid wood in high-quality markets, from plastics and plastic laminates in low-moderate quality markets, and from composition board products with a hardwood or printed veneer. In other decorative uses, hardwood plywood faces generally the same competitive mix.

In all uses hardwood plywood, domestically produced, faces its real competition from relatively low-cost imports. While total hardwood consumption has risen considerably during the period of the last 20 years, domestic production has remained relatively constant. Imports have absorbed the major portion of the increase.

Softwood plywood does not face the same import substitution threat. However, softwood plywood used in siding faces substantial competition from plastics (vinyls and vinyl-clad products), aluminum, steel and hardboard, and solid wood (clapboard) siding, the product plywood has replaced. In sheathing applications, softwood plywood can be substituted by softboard (insulation board), gypsum board; in certain areas of the country sheathing is being eliminated entirely. Softwood plywood faces relatively little competition in general construction markets where it is used as concrete footing and should not in the near future, barring a major change in building technology. In industrial applications, which include shipping and packaging containers, the competition is plastics and solid wood products, on purely price-based factors.

e. Future Demand

Hardwood plywood faces a relatively stable market demand, due to its position as a relatively mature product in generally mature market sectors. Thus, a stable 1-2% per year growth rate can be projected.

The growth rate of domestic hardwood plywood production could rise substantially above this level if imports would plateau. Such a development is possible due to rapidly rising prices for imported plywood. This price rise is due largely to the siphoning of the output of Southeast Asia/Oceania producers to Japan rather than into United States markets. If this trend continues and if productive capacity is not increased to meet the added Japanese demand, then imports will taper off and the market growth rate could rise above the 1-2% per year we project at present.

Softwood plywood market demand and prices fluctuate widely on an annual, seasonal, and daily basis. Certainly, month-to-month or quarter-to-quarter graphs of these prices show wide variation. As noted in Section III.C.1.b above, this is largely due to the heavy dependence on residential construction activity. Thus, our projection is for a 4-6% per year annual increase in demand for softwood plywood, but the pattern will be one of wide swings, around a 4-6% per year trend line.

Although this growth rate represents a decrease from the 9% per year of the 1950's through the mid-1960's, it represents only a modest decrease of the 6-7% per year average during the late 60's and early 70's. We project increasing usage of softwood plywood in residential construction in all categories, including single family homes, mobile and modular housing, and multi-family homes. These increases in consumption of plywood will enhance the ability for softwood plywood to grow at a rate greater than the residential construction activity growth rate for the period.

2. Industry Segments

The hardwood plywood and veneer industry is best characterized as a small company business. There are more than 400 firms active in the hardwood industry sector versus less than half that many softwood plywood producers. After the largest company in this sector, Georgia-Pacific, is considered, the size of the firms falls off rapidly. (For the purposes of this discussion, we have not separated the plants that Georgia-Pacific was forced to spin off to Louisiana-Pacific.) Hardwood plywood producers frequently service narrow, regional markets, e.g., a cluster of firms in the mid-South servicing the furniture industry. These firms tend to be located in the Eastern section of the United States, both North and South, which is where the hardwood wood species predominate.

Table II.C.2 illustrates the concentration in this industry. While 152 firms have less than 20 employees, these 152 firms represent only 3% of the total value of shipments. Similarly, while 246 establishments (37% of the total number) have 100 or more employees, they account for 63% of the total value of shipments.

TABLE II.C.2

PLYWOOD INDUSTRY (SIC 2432)

CONCENTRATION PATTERNS

Plant Size Patterns--1967

Number of Employees	Number of Establishments	Value of Ship. in %
1 - 19	152	3
20 - 99	269	34
100 +	246	63
	667	100

Concentration Ratios--% Total Shipments

	1967	1966	1963
4 largest firms	26	24	23
8 largest firms	37	33	31
20 largest firms	50	-	42
50 largest firms	65	-	58

SOURCE: 1967 Census of Manufacturers

As the concentration ratios show, the four largest firms account for about one quarter of total production; the 20 largest firms account for half of total production. The trend has clearly been toward greater concentration in the industry, which will continue.

The concentration patterns within the hardwood plywood industry sector indicate a considerably less concentrated industry than for softwood plywood. Table II.C.3 indicates market shares for the major firms in each industry. Georgia-Pacific, which accounted for 20% of the domestic hardwood plywood production in 1972, is clearly the leader in this segment. The companies that follow trail by substantial market shares. The companies beneath Boise-Cascade, which is the fifth largest in the industry with only a 2% market share, exhibit market shares of 1-1/2% and less.

The picture is different than this for softwood plywood. Again, Georgia-Pacific is the leader with a 16% market share, but the top eight firms account for a 50% market share, the top 10, 54%. There are eight firms here with a 2% market share or more, double the number present in the hardwood plywood industry.

Another factor is that four out of the five major hardwood plywood producers (excepting Roseburg) have their own marketing distribution (captive warehouse) outlets. All five of the leading hardwood manufacturers are integrated to wood fiber. Similarly, the four leading softwood plywood producers all have captive marketing outlets, and all of the top nine producers are integrated to woodlands. This degree of integration affords the majors greater control over volume produced and sold. For example, having captive woodlands insulates a firm from wood availability problems more so than a firm which must buy on the open market. Similarly, in a weak market, a firm's captive distributor can emphasize its own product. The ability to gain market access and to control or moderate wood price effects is an extremely important advantage to a firm operating in this industry.

The typical hardwood plywood plant is a small, privately-owned mill producing 5-10 million square feet of product per year. This is in contrast to the production pattern in the softwood plywood section, which is typified by a mill of 100-125 million square feet output per year.* Further, softwood plywood plants tend to be multi-plant operations owned by a broad-based forest products company.

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* Based on an arithmetic average of 1972 production, the "typical" plant produced:

- hardwood plywood: 11.6 MM sq. ft. 3/8"
- softwood plywood: 95.3 MM sq. ft. 3/8"

TABLE II.C.3

PLYWOOD INDUSTRY

MARKET SHARES--1972

Hardwood Plywood	%
Georgia-Pacific	22
Champion International	6
Weyerhaeuser	5
Roseburg	2
Boise-Cascade	2
	37

Softwood Plywood	
Georgia-Pacific	16
Boise-Cascade	8
Weyerhaeuser	7
Champion International	6
Willamette	5
Roseburg	4
International Paper	3
Vanply	3
Potlach	2
	54%

SOURCE: Contractor Estimates

Domestic production of hardwood plywood, as depicted in Table II.C.4, has not increased dramatically in the past 20 years. Domestic production has increased by 60% in the 20-year period 1951-71, a 2.5%/year annual rate. However, total consumption of hardwood plywood has risen substantially, by 360% in the same period, a 6-1/2% per year annual rate of growth. Imports, rising from 49 million square feet in 1951 to 2.6 billion square feet in 1971, have accounted for the major portion of the increase.

Softwood plywood production is outlined in Table II.C.5. As this table indicates, softwood plywood production over the period 1958-72 has risen by 190%, or a 9% per year annual rate of growth. Where data was available, a percent utilization ratio was indicated. The comparison of operating rates to year-end prices is a further description of the commodity nature of these products. For example, an 84% operating rate in 1970 relates to a $57/MSF price for standard, exterior grade Douglas Fir plywood, 3/8" basis. The same product sold for $102 in 1968 at a 95% operating rate, and at $105 at a 100% operating rate in 1972. By February/March of 1973, the same product sold in the range of $145-$155, and the industry's operating rate was well in excess of rated capacity.

3. Financial Profile

The task of developing a financial profile in this industry is complicated by the large number of mills of varying sizes and technological sophistication, and a substantial variation in product line. The individual firm can produce only veneer, or only plywood, for both products. Similarly, part of a plant's operations can be the production of semi-finished or pre-finished products, such as tongue and groove hardwood flooring. It is difficult to separate the costs of the production of the finished product from the cost of manufacture of the basic product.

Table II.C.6 presents the financial profile of a softwood plywood and veneer mill if constructed at the end of 1972. The mill's capacity was put at 125 million square feet, 3/8" basis. A price level was assumed to be $100/MSF. As the income statement indicates, at that price level, net profits, after tax, were $800,000 on a total revenue base of $12.6 million, or 6.1% of net sales.

Profitability is extremely sensitive to the assumed price level. For example, at a price of $155/MSF, a price level which was achieved in February/March of 1973, total revenues would have been $19,375,000. Assuming the same costs, net profits after tax would have been $4.4 million, or 22% of net sales. Conversely, the mill would be only breaking even at a price level of $90/MSF.

That these profitability figures are representatives of the softwood industry is attested to by a study done by the National Forest Products Association of Washington, D.C., in March 1971. Their study, commenting on softwood lumber and plywood prices, indicated that, "The majority of plywood producing units operated at a loss during most of 1970." Prevailing price levels for softwood plywood products during 1970 were below $100/MSF.

TABLE II.C.4

DOMESTIC PRODUCTION & IMPORTS OF HARDWOOD PLYWOOD

Year	Domestic Production (MMSF-3/8")	Net Imports (MMSF-3/8")
1951	1,197	49
1955	1,355	442
1960	1,102	715
1965	2,049	1,047
1966	2,076	1,254
1967	1,916	1,244
1968	2,009	1,896
1969	1,869	2,107
1970	1,758	2,047
1971	1,930	2,545
per cent change	+60%	51-71: +5,200% 65-71: + 240%

SOURCE: U.S. Department of Commerce

TABLE II.C.5

DOMESTIC PRODUCTION OF SOFTWOOD PLYWOOD

Year	Domestic Production (MMSF, 3/8")	% Total Capacity	Year End Price ($/MSF)
1958	6,340	83	
1965	11,680	-	
1966	13,140	-	49
1967	12,960	80	60
1968	14,810	95	102
1969	14,205	88	60
1970	14,960	84	57
1971	16,408	98	80
1972	18,303	100	105

per cent change +190% = +9%/yr.

[1]Based on Standard Douglas Fir, Exterior Grade Plywood, 3/8" Basis

SOURCE: American Plywood Association; Crow's Plywood Guide, 1973

TABLE II.C.6

FINANCIAL PROFILE

SOFTWOOD PLYWOOD AND VENEER MILL - 1972

Characteristics:

- Products: rough sanded and S2S
- Annual Production: 125 MM sq. ft., 3/8" basis
- Annual Sales: $12.6 MM
- Employees: 275
- Net Assets: $10 MM

Income Statement - 1972:

		%		$MM
Net Sales		100.0		12.6
Cost of Sales				
Operating Expenses				
Cost of Goods Sold	76.7		9.7	
GS&A	11.6		1.3	
		88.3		11.0
Operating Profit		11.7		1.6
Other Charges		-		-
Profit Before Income Tax		11.7		1.6
Provision for Income Tax		5.6		0.8
Net Profit		6.1		0.8
Return on Net Assets		6.0%		

Table II.C.7 contains a similar profitability analysis for a hardwood plywood and veneer mill. The mill represents the investment required to build a 6.0 MM square foot mill at the end of 1972. If the analysis were performed on an older mill, the assets would be amortized to a greater extent, yielding a higher return on net assets figure. However, with older equipment operating costs would be correspondingly higher. As is, the analysis indicates a rate of profit generation of only 2.6% after tax.

Table II.C.8 presents comparable financial data on veneer and plywood mills during the year 1971, as compiled by Robert Morris Associates. In this case, profits before taxes were 2.9% for mills with assets of $1-10 million, and 3.6% for mills in all size categories.

4. Price Effects

Softwood plywood prices exhibit almost classic supply/demand commodity market responses. Softwood plywood prices at a given time are determined by the following considerations:

- Distribution channels are not controlled by producers. Prices to retailers, consumers, contractors, etc. cannot be maintained or set by even the largest manufacturers.

- Plywood is a commodity product. Users are generally unconcerned with the identity of the producer. There is little brand loyalty. Price competition is severe.

- Residential construction, the dominant end use market for softwood plywood, fluctuates sharply both annually and seasonally. Since efficient production must be carried out at a relatively level amount, and since large inventories are costly, it is difficult for producers to compensate for short-term demand changes.

As a result, softwood plywood prices have historically varied considerably in response to supply/demand conditions. Prices change daily in what is essentially an auction market. Most sales are made by telephone with buyers shopping among suppliers for the lowest price. Producers seek to maintain "order books," which will allow the mill to ship as rapidly as it produces. If the "order book" gets thin, i.e., the backlog of orders is small, then producers lower prices. Conversely, if demand is strong, prices rise.

The ceiling on prices is reached as alternate materials become economic and plywood markets erode. Particleboard, hardboard, lumber, and other wood fiber building boards can displace plywood in certain uses. Further, alternative construction techniques or building designs can be employed using stone, metal, stucco, and asbestos products. Or, of course, some construction projects may be deferred until building and building material costs recede to more "palatable" levels.

TABLE II.C.7

FINANCIAL PROFILE

HARDWOOD PLYWOOD AND VENEER MILL - 1972

Characteristics:

- Products: stock and cut-to-size panels
- Annual Production: 6 MM sq. ft., 3/8" basis
- Annual Sales: $1.0 MM
- Employees: 50
- Net Assets: $500,000

Income Statement - 1972:

		%		$1,000
Net Sales		100.0		1,000
Cost of Goods Sold	84.9		850	
GS&A	10.0		100	
		94.9		950
Operating Profit		5.1		50
Other Charges		(.1)		(1)
Gross Profit		5.0		49
Provision for Income Tax		2.4		24
Net Income		2.6		25
Return on Net Assets		5.2%		

TABLE II.C.8

FINANCIAL PROFILE

VENEER & PLYWOOD MILL, 1971

	Assets	
	$1MM-$10MM	All Sizes
Income Statement		
Net Sales	100.0	100.0
Cost of Sales	89.0	87.6
Gross Profit	11.0	12.4
Other Expenses, Net	8.1	8.8
Profit Before Income Taxes	2.9	3.6

SOURCE: Robert Morris Associates, 1972

Nonetheless, there are many advantages to plywood which continue to make it an attractive building material. Plywood is easily workable, is a versatile material, and pound-for-pound, due to its alternative grain laminating construction, exhibits great strength.

Hardwood plywood prices exhibit far less volatility than do softwood plywood prices. Markets for these products are more mature and more stable. Pressure from low cost imports has also acted to inhibit price increases.

The cost of manufacture is not the primary determinant of hardwood or softwood plywood prices. Rather, manufacturing costs determine that point at which a mill will shut down, thereby reducing supply, or a "mothballed" mill will start up. As prices have risen in recent years, mills have begun to peel smaller and smaller logs, a step which would not be possible without new machinery and prices high enough to make peeling smaller logs economical. Similarly, many mills ceased production during the price trough of 1970. Interestingly enough, many of the same mills came back on-stream during the strong demand market of 1972.

Thus, the effect of cost increases due to water pollution abatement, if a significant proportion of total manufacturing costs, will manifest itself in plant closings, not price increases.

III. ECONOMIC IMPACT ANALYSIS

A. METHODOLOGY

Economic impact, in fact, implies consideration of two primary issues:

- Price effects;
- Plant closures--community effects.

We have dealt with these two issues by using the costs generated for each of the pollution abatement technology alternatives. Specifically, to determine price and plant closure effects we have determined the economic impact of these costs on plants within each of the industry segments in terms of:

- Price effects
  - -- Price increases
  - -- Secondary effects
- Financial effects
  - -- Profitability
  - -- Capital availability
- Production effects
  - -- Production curtailment
  - -- Absolute plant closings
  - -- Total industry growth
- Employment effects
  - -- From production curtailments
  - -- From plant closings
  - -- From changes in industry growth rate
- Resultant regional effects
  - -- Location of plant closings or production curtailments
  - -- Number and location of seriously impacted regions
  - -- Probability of new plants being built in seriously impacted areas
  - -- Probability of dislocated employees being absorbed into local work force
  - -- Secondary effects resulting in further unemployment

1. Price Effects

The ability for firms operating in these industries to pass cost increases on in terms of increased prices is largely a macro issue, very much based on total market supply/demand. In a strong market, such as pertained in the last half of 1972 and the first quarter of 1973, demand was strong enough to absorb substantial price increases. Conversely, in a weak market firms would absorb abatement costs.

Thus, determination of price effects was heavily influenced by the consideration of market influences on these industry sectors in total; subfactors to be studied included:

- Capacity utilization--if due to capacity increases and/or demand slackening, the industry begins to operate at lower utilization rates, the ability to increase prices will be reduced.

- Availability of substitute products--for example, the willingness of builders to shift toward more plastic materials in construction would hinder the ability to pass on costs.

- Individual product price elasticity--for those product areas which are extremely price sensitive, increased prices could result in reduced demand, lower operating rates, less profitable operations, and plant closures.

- Specific geographic market effects--for example, a marginal producer for special reasons could have a protected market position in a local market; or, demand could be strong nationally but weak in a specific local market making it difficult for a local producer to pass on cost increases.

- Importance of the product in its secondary markets--if certain of these products represent a significant cost component in the manufacturing of derivative products, e.g., plywood utilized in prefinished paneling, and if the users have relatively more market leverage (are much larger and/or consume a significant portion of the primary producers' output), then price increases will be more difficult to pass on.

- Industry growth rate--price increases are most likely in rapidly growing markets as opposed to static or declining markets.

Of course, a primary factor regarding whether or not cost increases can be passed on to users concerns the magnitude of the abatement costs. Where abatement costs represent a relatively small proportion of the total cost of manufacture or selling price (as is the case for these sectors), price increases will be more likely and more palatable. In situations where abatement costs are substantial, the previously described items determine whether or not a price increase is likely.

2. Plant Closure Effects

To determine the numbers of plants which will be shut down and the resultant employment effects, we have characterized industry plants based on their operating characteristics and the financial effects to be incurred by abatement cost increases. We have developed a financial profile for plants in our various operating characteristic categories.

Individual facilities have been reviewed and categorized as high, moderate, or low probability of closure. It is impossible to determine with certainty which will close. Our intent has been to isolate the "most likely." Plants were categorized as high probabilities of closure if their financial performance was less than the industry target performance measure or less than the performance achieved (overall industry average) during the worst of the five previous years. Financial performance was determined primarily on these two parameters: meters:

- Profit margin, net income/net sales;
- Profitability--e.g., return on net assets or other available profitability criterion.

Further, plants were categorized as highly probable to close if their financial position is such that they will be unable to raise capital costs required to meet abatement guidelines. It is this latter factor which has the most impact in these sectors, particularly on the smaller firms in hardwood plywood and wood preserving.

The analysis of these issues was tempered based on the specific characteristics of the individual industry sectors. For example, as is typical of hardwood plywood, a small, privately-held firm usually has quite a different set of profitability criteria than a larger, publicly-held corporation. The sheer magnitude of net cash flow is the important issue to privately-held firms, whereas a publicly-held corporation generally defines successful performance and makes a closure decision based on profitability ratios, such as return on net assets. Further, for historical/emotional reasons, a founder-owned and managed firm is likely to have a stronger commitment to continued operations of a given plant than would absentee ownership/professional management firms.

The following characteristics were analyzed to determine the likelihood of plant closure:

- Salvage value of assets--an old, technically obsolete plant could have a high salvage/sell off value, e.g., valuable woodlands useful for the operations of a contiguous plant.

- Specific plant capacity utilization--e.g., some firms in a locally poor market region may be unable to sell products in other geographic markets, and therefore be severely impacted.

- Degree of integration--both forward integration into marketing channels, and backward integrations into raw materials (woodlands).

- Multiplant operations--apparently unprofitable plants may be kept onstream if its products are essential to the marketing strategy of the corporation as a whole.

- Technological obsoletions--if technology has changed substantially since the equipment was installed, a shut-down would be likely.

- Prior air pollution equipment installation--if the firm has already committed funds to control air pollution, it is more likely to commit water pollution funds; however, if a company faces substantial costs on both water and air abatement problems, the dual effect could be a powerful incentive to shutdown.

- Corporate commitment--the emotional commitment of the firm to manufacture a specific product (e.g., to maintain a competitive position), or to a particular plant (e.g., a given plant being the company's first facility) or commitment to the community (e.g., corporate commitment to continue a marginal plant to maintain employment in a "one-industry" region, particularly if tax incentives are offered).

The effect of plant closure was translated into regional community effects. That is, the number of people unemployed by the plant closure/curtailment were considered in the context of other employment options available for those employees in that region. In addition, the possibility of other plants taking up the production/employment slack was considered. These effects were, to the extent possible, traced through to the impact on the secondary industries.

With the large number of firms in the two plywood sectors, and in the wood preserving sector, it was necessary to sample firms and key personnel. Thus, we met with the trade associations in these sectors, as well as representatives of major firms and key smaller (high probability of impact) firms to discuss key issues. Our analysis was therefore based on considerations of representative firms and plants rather than a complete survey. We generalized, knowing the dynamics of the industry, to accomplish the total industry impact analysis.

In the hardboard sector, only nine firms (wet process) were involved. Thus, we interviewed each of these firms to gather data for the analysis, in addition to certain dry process firms.

B. HARDBOARD

1. Overview

a. Industry Subcategorization

In carrying out the Economic Impact Analysis on the Hardboard Industry, we were obliged to make a number of simplifying assumptions that arose both from the technical guideline recommendations and the general market and economic conditions. In addition, the hardboard industry and its constituent companies commented specifically on the subcategorization adopted by the Guidelines Contractor, Environmental Science and Engineering, and on some technical aspects of the guideline proposals.

Of the latter, the following points were emphasized:

- There is little historic evidence of success to support the recommendations and, in fact, mills that already have the suggested technology in use do not consistently obtain the level of effluent quality promised.
- "Zero discharge" is not defined.
- Caul water is not the only effluent of a dry process plant and investments to treat other sources will greatly exceed guideline estimates.

Potential elements of subcategorization that were considered by the contractor but not used as an element of categorization include:

Size of Plant--The contractor did conclude that the "plant size will only affect costs of treatment as treatment costs for larger plants will generally be less per unit basis than for small plants." Such a simplifying assumption may be reasonable for those facilities that approximate the typical plant in daily capacity (assumed to be 140 tons per day for the wet process and 250 tons per day for the dry process),

but it should be noted that the current capacities of wet process plants range from 80 to 1,650 tons per day and those of the dry process from 25 to 360 tons per day. The simplifying assumption is thus on the pessimistic side (i.e., unit cost estimates are too high) for those plants larger than the typical plant capacity, and is optimistic for those facilities with lesser capacities. However, a straight line cost-capacity relationship, as we were forced to assume in this analysis, is probably only valid for a narrow range of capacities and becomes unrealistic for those that deviate greatly from the typical plant size. We were not in the position to estimate the effect of this deviation on unit costs and have thus accepted (on EPA's counsel) the straight line relationship to accomplish this analysis.

Product Mix--While the in-plant processes have a greater effect on the waste water characteristics than do the specific products resulting from the processes, the product mix has a substantial effect on the financial profile of an individual facility. Typically, the smaller plants, especially those operated by small independent companies, are producing and marketing a low value industrial board that may average from $35 to $50 per thousand square feet, f.o.b. the mill. The larger facilities, frequently owned by major forest products companies, are typically integrated in their product output and add value to the basic board by finishing it in some way. This added value increases the average f.o.b. price to at least $45 and perhaps to as much as $70 per thousand square feet and thus makes these facilities relatively better able to absorb increased costs or to effect price increases.

b. Simplifying Assumptions

In the analysis that follows, we have made three simplifying assumptions.

- Phase IV price controls that went into effect on August 12 indicate that future price increases will be permitted on a dollar-for-dollar basis to match increased costs. We assume an economic environment where increased costs can be recaptured through increases in prices, assuming that market conditions permit, to the extent that current rates of profitability are maintained. Although this assumption is slightly less stringent than Phase IV Guidelines, we believe it to be more realistic for the purpose of this analysis over the next decade.

- The base conditions we have assumed for current pollution control technology in place at each facility is that indicated to us by the Guidelines Contractor. The steps required to reach 1977 and 1983 control and treatment technology is thus on an incremental plant-by-plant basis.

- The Guidelines Contractor has given cost data for August 1971 and May 1973. We have assumed an average of these two cost levels to represent the cost that would be applicable in 1972. We have also used 1972 plant financial data and have assumed constant 1972 dollars for 1977 and 1983.

c. EPA Approach

In our analysis, we have followed the EPA policy of separating the evaluation of control technology and effluent guidelines for air, solid waste, and water pollution. However, one pollution source can, and does, negatively influence the other. For example, it is apparent that the dry process hardboard mills produce relatively little water pollution but can be faced by significant air pollution control costs. The converse is true for wet process plants. Any economic analysis that considers water pollution costs independently magnifies the wet process mill's disadvantages relative to dry and can reach unreasonable conclusions relative to the economic competitiveness of the dry process vis-a-vis the wet. There are indications that dry process plants will have proportionately greater air pollution control costs than water pollution costs for wet process plants.

d. Guideline Assumptions

In characterizing the hardboard industry, the Guidelines Contractor categorized the 33 mills into four sectors and reviewed the technology for two of these sectors in making recommendations. The two sectors include the dry process mills (17 in number with an aggregate capacity of 3.05 billion square feet per year) and wet process mills (with 9 mills at 2.9 billion square feet). Two mills were considered unique in their respective processes and were thus not considered. These are the Weyerhaeuser dry-wet process mill at Klamath Falls, Oregon, and the Abitibi wet-dry mill at Alpena, Michigan. The fourth sector includes six wet-dry hardboard plants that are operated in conjunction with insulation board production; guideline recommendations for these mills will be considered under Phase II of the EPA guideline study series.

For the wet process, the best practicable control technology currently available and recommended in the contractor guidelines calls for screening and primary settling (Alternative A) followed by an activated sludge process (B-1) and an aerated lagoon system (C). Additional treatment and control technology to meet the best available technology economically achievable by 1983 calls for a pre-press between the cyclone and the stock chest (D) and also the treatment of the condensate in an activated sludge process prior to discharge (D-2). In subsequent pages of this section we refer to the 1977 Guidelines as Alternative C and the 1983 Guidelines as Alternative D-2.

For the dry process, 1977 Guideline recommendations call for the installation of a holding tank to retain caul washwater for a minimum of one week so that it can be neutralized and hauled to land disposal. (Alternative B.) No additional control and treatment technology is required beyond 1977 for dry process mills.

The Guidelines Contractor developed investment and operating cost data for each alternative, each process, and each year for typical plants sized at 140 tons per day, wet process, and 250 tons per day, dry process. Total yearly costs were based on an 8% cost of capital; a salvage value of zero at the end of 20 years for physical facilities and equipment; and straight line depreciation.

We have restated and summarized these alternative costs in 1972 dollars in Table III-B-1. (The use of 1972 dollars naturally implies no change in the cost mix between labor, materials, energy, etc.) The investment and total yearly costs are shown on a dollar per thousand square feet basis for the two processes, based on a straight line relationship between costs and plant capacities.

Table III-B-2 indicates for each wet process plant the current level of control and treatment technology and the 1977 and 1983 investment and operating costs. It also shows the average cost per thousand square feet of capacity for each year.

2. Price Effects

Water pollution control for the dry process hardboard industry has a minimal cost impact and thus will not in itself cause a major price increase. It is estimated that the implementation of Alternative B guidelines will result in an annual yearly cost of 2¢ per thousand square feet.

Implementation of 1977 guidelines for the wet process, Alternative C, is equivalent to an aggregate yearly operating cost of $1.38 million, averaging $0.47 per thousand square feet of capacity. Some wet process plants will have to increase prices by a maximum of $3 per thousand square feet by 1977, equivalent to 6% to 8% of 1972 prices, in order to maintain current profitability. We believe that pollution control costs can and will be passed on by wet process mills and that market size and rate of growth will be affected only marginally, if at all.

Aggregate yearly operating costs to meet 1983 guidelines are equivalent to $5.9 million, averaging $2.02 per thousand square feet of capacity. Price increases ranging from $2.0 to $8.0 per thousand square feet over 1972, equivalent to a maximum of 21% of 1972 selling prices, will be needed to maintain current profit margins. Although the median of these increases will average only 1.5% per year to 1983, the amounts are significant in absolute terms. We do not believe that every

TABLE III.B.1

SUMMARY OF ALTERNATIVE COSTS [1]

(1972 dollars)

Process & Year	Alternative	Investment	Total Yearly Cost
Wet - 1977 [2]	C	5.66	2.61
Wet - 1983	D-2	11.23	6.50
Dry - 1977	B	0.09	0.02

NOTES:

(1) $/MSF based on typical wet process plant of 140 tons per day and dry process plant of 250 tons per day.

(2) Costs assume that all wet process plants currently have Alternative A technology in operation; Table III.B.2 examines individual plant conditions.

SOURCE: Contractor Estimates based on Environmental Science and Engineering, Inc. data.

TABLE III.B.2

WET PROCESS HARDBOARD PLANTS - APPROXIMATE INVESTMENT REQUIREMENTS AND ANNUAL OPERATING COSTS

($ 000's)

	Current Level of Technology	Capacity (MMSF)	Investment	Annual Operating Costs	Cost/MSF of Capacity($)	Investment	Annual Operating Costs	Cost/MSF of Capacity($)
Abitibi;Roaring River, N.C.	B-1	159	367	70	0.44	1,251	685	4.31
Evans Products; Corvallis, Ore.	B-2	110	623	287	2.61	1,235	714	6.49
Forest Fiber; Forest Grove, Ore.	B-1	79	182	35	0.44	622	340	4.21
Masonite; Laurel, Miss.	C	1,643	0	0	0	9,142	6,372	3.88
Masonite; Ukiah, Calif.	D-1	380	0	0	0	457	649	1.71
Superior Fiber; Superior, Wisc.	A	120	679	313	2.61	1,347	779	6.49
Superwood; Duluth, Minn.	B-1	216	499	95	0.44	1,700	931	4.31
Superwood; North Little Rock, Ark.	B-2	132	747	345	2.61	1,482	857	6.49
U.S. Plywood; Dee, Ore.	B-2	90	509	235	2.61	1,010	584	6.49
TOTAL		2,929	3,606	1,380	0.47	18,246	5,911	2.02

SOURCE: Contractor Estimates, based on Environmental Science & Engineering, Inc., data.

mill will be able to pass on these price increases in full and we estimate that at least three wet process mills will be forced to absorb up to 6% of these incremental costs, if they wish to remain price-competitive. The industry as a whole will also experience a lower rate of growth than what might other wise be anticipated, although the reduced growth due to water pollution control costs alone is not expected to be significant.

3. Financial Effects

a. Effects on Profitability

Although we conclude that 1977 costs will be recaptured thrcugh price increases, thus maintaining current rates of profitability, we have calculated the effects on profits under the assumption that no price increases are implemented either due to adverse market conditions or because of more stringent price controls than is anticipated under Phase IV. Effects on the profitability of dry process mills, of course, is negligible and does not require any detailed analysis under the currently proposed guidelines (although the industry believes that estimated costs are understated).

Thus, assuming no price increases, the effects of increased costs on the profitability of wet process mills would be to decrease individual plant profits after tax as a percentage of net sales by up to 75% by 1977 for one mill and by up to 55% for others. Some mills will, of course, be affected less than others as they are currently operating at higher profit levels; all facilities will maintain profitable operations.

At least five of the nine wet process mills will be able to recover cost increases sufficiently to maintain their current profit margins through 1983. The remaining four mills will be able to pass on most of their incremental costs, since they are currently operating at lower rates of profitability and lower average selling prices, and the incremental costs will represent significant increases. These mills will be forced to accept lower profit rates.

b. Availability of Capital

Capital requirements by the hardboard industry total $3.6 million for the wet process plants by 1977, and an additional $14.6 million by 1983; but only $284,000 for dry process mills by 1977. Conversations with manufacturers indicate that cspital availability for implementing 1977 guidelines should present no problems. However, it was pointed out that while most of the major forest products companies would probably raise the capital from internal cash flow, the smaller companies would have to seek loans in the financial market and banks may show some reluctance to finance "nonproducing" investments such as pollution control. We believe this to be a pessimistic opinion and conclude that 1977 capital requirements will be met with little or no difficulty.

The additional $14.6 million required by the wet process mills by 1983 is disputed by the industry as being too low an estimate. In any event, the amount may be less available and will depend to a great extent on the industry's overall rate of growth, the long-term profitability of individual mills, and the capital needs by these mills for other applications. It also depends on the cumulative effects of other factors independent of water pollution abatement costs, such as energy and wood availability, labor costs, etc., on operations. Keeping these other factors in mind and assuming pollution cost recoveries referred to earlier, at least one, and perhaps two, mills may have difficulty in raising the capital required at a reasonable cost and could either be acquired or go out of business.

4. Production Effects

a. Curtailment of Production

The industry has been operating at a high level of capacity utilization (90%+; Table II-1*) over the past decade and we expect this to continue through 1977. Pollution abatement costs could affect aggregate market demand to the extent that by 1983 average capacity utilization will be lowered to 5%.

b. Plant Closures

We anticipate no plant closures by 1977. However, pollution abatement costs may make several facilities economically marginal by 1983. Our current best estimates indicate that one facility has a high probability of closure by that date; three others have medium probabilities of closure. On a weighted basis, we estimate that about 235 million square feet of wet process capacity could be withdrawn by 1983 as a direct result of water pollution abatement costs, equivalent to 8% of 1972 available wet process capacity. These mills represent about 3% of total 1972 hardboard capacity.

c. Industry Growth

Industry growth is unlikely to be affected by the 1977 guideline implementation but could be reduced to some extent by 1983. Quantification of this is difficult as reliable data on the supply/demand of competing materials is not available that far into the future.

One conclusion on industry growth is worth discussing. Assuming that wet process mills are at the disadvantage relative to dry process plants as indicated by the water pollution abatement costs, it is evident that the hardboard industry will not add additional wet process capacity in the future. The likelihood would then be that additional

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*Contractor's Phase I Report

capacity would be entirely dry process, resulting in less screen-backed board available than at present. Although dry process mills could be modified to produce such a product, they are currently not doing so to any great extent. The likelihood is that they would continue not to do so and thus customers would have to change to the S2S board at a higher cost if insufficient S1S board was available from the remaining wet process capacity. This could cause them to seek substitute materials and further affect hardboard growth.

Such a scenario, while theoretically possible if water pollution is considered independently, appears unlikely since the industry indicates that the investment and operating costs associated with air pollution abatement for dry process mills will be at least equal to the water pollution costs for wet process facilities, if not in excess of them. Thus, the relative change in costs between dry and wet process mills will be small, and may be negligible or even in favor of the dry process mills.

5. Employment Effects

We anticipate no direct employment effects to result from implementation of these guidelines except with regard to the marginal plants referred to earlier. Direct hourly employment by these four facilities totals approximately 475 people, with an additional 100 salaried personnel. On a weighted average basis, approximately 275 hourly and 30 salaried personnel would be put out of work by 1983 as a direct result of these water pollution guidelines.

6. Resultant Regional Effects

The four marginal facilities are located in three geographic regions--the Northwest, North Central and South. All three of these regions are significant forest products producing areas and all three have considerable hardboard production capacity already onstream. The probability is very high that new forest products plants will be built in these impacted areas; chances are also good that new hardboard facilities will be added. Thus, it is unlikely that those employees discharged at the respective facilities would have difficulty in being absorbed in the regional work force, although possibly not in the same locality. It is also our belief that the secondary effects resulting in further unemployment will be minimal, as those employed indirectly by the industry (for example, forestry workers) presently derive a small proportion of their total income from these mills.

7. Balance of Trade Effects

Analysis of balance of trade effects is made difficult by the economic situation that has faced the hardboard industry for the past two years. Before price controls, imported products were 10-15% lower in price than domestic production for essentially the same S1S board

serving the same end uses. With the exceptionally strong demand for hardboard the U.S. has experienced over the same period (which domestic producers have found impossible to supply), import prices have risen to match or even exceed domestic prices. The proportion of total apparent consumption in square feet represented by imports rose in 1972 (and probably in 1973) from 9.4% in 1970 to the 12-15% levels that were typical in the 1960's. At the same time, these imports were averaging higher unit prices.

The long-term economic impact of pollution control costs on the trade balance is difficult to assess. Without these costs, without price controls, with a slower short-term rate of demand growth (to 1975) than we have experience in the past few years, and with considerable additions to domestic capacity, imports would probably stabilize at their current market share and drop relatively in price. Allowing for pollution control costs but holding the other factors constant, the balance of trade is likely to remain unchanged to 1977 but to change negatively beyond that date. We estimate the net effect to be an increase to 17% of the ratio of imports to apparent U.S. consumption.

C. WOOD PRESERVING

1. Overview

The analysis of the economic impact of pollution control costs on the wood preserving industry rests on an understanding of the industry and the costs it will face. Appendix A to this analysis has been prepared which discusses the costs in some detail, and takes the cost data prepared by ~~Dr. Thompson~~ (the Guidelines Contractor) and puts it into a form which can be used here. The cost data puts limitations on this analysis which are important to understand at the outset.

For the purposes of the Effluent Limitations Guidelines Standards, the industry was segmented into four subcategories:

1. Pressure processes employing oily preservatives in which the predominant method of conditioning green stock is by steaming or vapor drying;

2. Pressure processes employing oily preservatives in which the predominant method of conditioning green stock is by Boultonizing;

3. Pressure processes employing water-borne salts;

4. Nonpressure processes.

The standards for subcategories 2, 3, and 4 call for complete recycling of waste water and no discharge. There are no treatment costs and, thus, for the purposes of this analysis, there are no economic impacts.

Plants in these categories which do not currently meet the standards will have to make expenditures for process changes, but these costs have not been estimated and their impact cannot be evaluated. The process changes, if necessary, would include building a sump in which to collect preservatives spilled from the tanks and dropped onto the aprons near the tanks. The apron itself may have to be built along with improved tanks or lagoons for storing the preservatives until it is reused.

According to the 1972 U.S. Forest Service listing of wood preserving plants, there were 407 known plants, of whom 18 were noncommercial captives of railroads and utilities. About 320 use exclusively pressure processes, 50 nonpressure, and 30 are equipped with both.

There are 103 pressure plants that use exclusively processes employing water-borne salts (subcategory 3). The remaining pressure processes are geographically divided between the Northwest and the Southern United States. Subcategory 1 plants are located in the Southeast and South Central parts of the country. These plants are the focus of the remainder of this analysis.

In the South Central and Southeast, there are 202 pressure plants, nine nonpressure, and 11 plants using both. Of the pressure plants, 163 use oil-based preservatives and 53 do not.

In terms of segmenting the industry for the purposes of the economic analysis (after the technology segmentation), size is the first important breakdown.

For the industry as a whole, more than half of the plants have less than 20 employees and a quarter have less than 10 employees. It is these very small plants which will be most heavily impacted by the pollution control costs. The medium-sized plants would fall in the range of 30 to 100 employees and the large plants would have greater than 100 employees.

In evaluating the impact of pollution control costs, it is important to realize that all of the larger and many of the medium-sized plants have already been scrutinized by the state environmental protection agencies. The basic decision as to whether these plants will close because of abatement regulations has already been made.

In parallel, it is important to note that most plants in the medium and large categories made investments in recent years to upgrade plant and equipment in such areas as materials handling equipment, as well as pollution control equipment. The plants which have not made

these investments now find themselves at a competitive disadvantage with an old plant and typically lower profits. If these plants are to continue in operation, they must both invest in new production facilities as well as pollution control facilities. Yet these are the plants with the greatest limitations on their ability to finance themselves. Less than 25% of the medium-sized plants may be in this category.

Of the 163 pressure plants using oil-based preservatives in the South, 7 can be categorized as large with little or no probability of closing. About 50 can be identified as being very small with a potentially high probability of closure. For the remaining 100 plants, it is impossible to draw the line more closely without a better definition of abatement costs for small plants than is currently available. The smaller plants in the group could be closed because the size of the investment required to be in compliance puts them at a severe competitive disadvantage with larger plants. The 25% of the plants which are already marginal may simply be unwilling to make the necessary investment in nonproductive equipment (which could represent 30% to 40% of the capital assets of the plants). These plants have been closing without the additional abatement costs. The addition of abatement costs will accelerate the process.

The impact of pollution control costs come almost entirely as plant closings. Price increases and production level changes will be very small. In the area of plant closings there is one final unquantifiable factor which can substantially reduce the number of plant closings. Technically a wood preserver who is using oil-based preservatives can change to water-based preservatives and eliminate the need for installing a treatment facility. There will be some costs involved, but they will be substantially less than that for the treatment facility.

The change is difficult from a business point of view because most of the plants would also have to change their products and customers. However, there is incentive to change since the largest growth in the industry is in nonoil-based preserved products, e.g.:

% Change in Production 1968-1972	Preservative	% of 1972 Production
-11%	creosote and creosote-coal tar (oil)	46%
+16%	petroleum-pentachlorophenol (oil)	28%
-10%	creosote-petroleum (oil)	11%
+232%	chromated copper arsenate	10%
+20%	fire retardants	2%
-51%	all other	4%

The opportunity exists for a number of firms presently treating with oil-based preservatives to change to nonoil-based. In fact, some will have to change or go out of business because of the declining market independent of the cost of pollution control.

How many plants facing pollution abatement costs could or would change their processes is unclear. Some may not be able to because of supply or market or capital constraints. Such a change would in many respects be a new business venture, and older plant owners may not be willing to go through the strain and risks of undertaking such a change. For the medium-sized plant which has been poorly maintained and as low profits (in effect, has been poorly managed), there is the question of whether the management could make such a change.

In terms of plant closures, the worst case would be the closing of all of the small (perhaps under 20 employees) plants using oil-based preservatives and steam treating. There are about 50 such plants. Added to this group would be a portion of the medium-sized plants (20 to 100 employees) with the same process. This portion would be made up of the plants with old technology which have not modernized, particularly in the area of reducing labor costs and are presently showing very low profits on sales (less than 3%). There may be 10 to 20 such firms.

This worst case would be ameliorated by the movement of threatened plants into nonoil-based processing and strong demand for preserved products through 1976.

This analysis of economic impact focuses on the 1977 standards * for existing plants. The costs for new plants are the same and the added costs for compliance with the 1983 standards are very small and will have no effect beyond those for the 1977 standards.

2. Price Effects

a. Primary Price Increases

The calculation of the impact of abatement costs on prices in the wood preserving industry is presented in Appendix A. For the hypothetical plant, the yearly costs of components B, C_1, and E is 0.47% of sales. This value is not product specific and does not include an increased margin to cover a desired return on assets. Of primary importance is that the effect on prices is quite small.

In the industry description section of this report (II.B), it is shown that the substantial increases in wood prices have been passed on with little difficulty, and we do not anticipate the industry as a whole whole having difficulty passing on abatement costs as prices increase. In practice, prices are established by a fixed dollar add-on to wood prices. Of course, all preserved wood prices would not be increased by the same 0.47%; the increase would be distributed over the different products.

To say that prices will be easily increased by the industry as a whole is not to say that the costs will be fully recovered by each plant immediately. Differences in the timing of expenditures and local

*Best Practicable Control Technology Currently Available.
**Best Available Technology Economically Achievable by 1983.

competitive situations will require some firms to temporarily absorb some or all of the costs. But, their viability should not be threatened unless they are already in serious trouble, such as the small plants discussed in Appendix A.

b. Secondary Price Effects

Preserved wood is a small component of the final product in which it is used with only a few exceptions, and the increase in preserved wood prices will have no perceptible secondary impact. Even in the few instances where the preserved wood prices are an important component of the product, such as piers and recreational construction, movements in construction costs in general by far dominate the projected preserved wood price increases.

3. Financial Effects

a. Effects on Profitability

From the perspective of the industry as a whole, or at least that portion of it affected by the standards, profitability will be unaffected. The price increases necessary to cover costs plus a return on assets should be well within the capabilities of the industry. The important profitability impact will be the differential impact on firms within the industry segment.

Since we do not know what the minimum treatment plant size is for which our costs are representative, we cannot draw the line at the plant size below which the capital requirements remain constant. However, the example worked out in Appendix A indicates that the capital requirements per unit of production could rise by 100%, going from a plant with 40 employees to one with 20 employees. The total yearly cost of the capital and the annual operating costs will follow in about the same proportion. If the plant with 40 employees can raise its prices by 0.6% to cover its increased costs, the smaller plant may only be able to raise its prices by the same 0.6% and have to absorb another 0.6%.

Income surveys conducted for the Southern Pressure Treaters Association have shown before tax profits of 6% to 7% on sales over the last several years. This has been a period of strongly rising prices. We do not expect this average to be affected by pollution control costs. However, the distribution of profits shows a very wide range among firms. For the quarter ending March 31, 1972, the top 25%, the middle 50%, and the bottom 25% of the companies had profits (% sales) of 12.4%, 7.0%, and 2.2% respectively. The companies in the survey tend to be the stronger rather than the weaker companies. 1972 was a good year for the industry, and 1973 is a better year.

If the small company which must absorb part of its cost of abatement is in the 2.2% before tax profitability category, the magnitude of cost can be critical. It is not possible to be specific about the

impact of the costs on the profitability of small plants without knowing more closely what the costs are; but impacts will be felt here.

Many wood preserving companies have high profitability on net worth, even though their profits on sales may be low. This is a reflection of low capitalization as compared with sales, and also a reflection of the substantially depreciated state of plant and equipment. The pollution control facilities can thus be a substantial portion of the capital assets of the plant. And, they do not contribute to productivity. Having high profits on net worth may make the plant owner wait longer before closing down, if profits are reduced, but will not help him with securing financing which he needs to build the facility.

b. Effects on Capital Availability

Capital availability again differs for the industry segment as a whole and the individual firms. The effect on the industry depends on the capital demands of growth and modernization as compared with the demands for pollution abatement.

The Census of Manufactures reported that capital expenditures in 1970 and 1971 were $8.4 and $10.4 million respectively for the entire wood preserving industry. The Contractor's interviews showed on average as much as 50% of what the firms believed would be the expenditures necessary to meet the 1977 standards had already been made.

As a rough estimate of the total capital requirements, the capital costs per unit of production can be multiplied times the production in Southeast and South Central United States. Using 1971 figures, the total capital requirements for compliance with the 1977 standards is $3,597,770. This value includes some plants not in subcategory 1 and excludes some that are. But, it is a good approximation for the industry as a whole, since most of the subcategory 1 plants are in these regions of the country. The regions represent about 61% of the country's production (volume basis), and if capital expenditures are in proportion to production, the capital expenditure value for the region for 1971 would have been $6.3 million. Of this value, a significant, though unknown, portion has been going to pollution control.

The value of $3.6 million for total industry expenditures does not seem unmanageable since projected growth in sales volume is about 2% per year while the industry is now operating at about 75% of capacity. The industry does not need to make capital expenditures to expand capacity, but rather to modernize. The industries are not being closely pressed by competitive imports or substitute products. If there is a short-term reduction in modernization expenditures, the whole industry's long-term competitive position will not be threatened.

This view is strengthened by consideration of the financial condition of firms in the industry and their past ability to make capital expenditures. In the Contractor's survey, most firms had low long-term debt and a healthy ratio of current assets to current liabilities. Table III.C.1 lists the current ratios and ratios of long-term debt to total assets.

The firms interviewed had in recent years made capital expenditures in excess of their to-date and planned pollution control expenditures and almost without exception had made the expenditures without bank financing. (The expenditures are typically made from cash flow.) The industry seems to be in the position of being able to obtain bank financing if necessary but generally having to get it for capital expenditures such as that anticipated for pollution control equipment.

The earlier analysis showed that small plants making a substantial capital investment may have the effect of continuing the plant in operation at a lower level of profitability. This new level may or may not be acceptable, depending on the level itself and the needs of the owners. A multiplant corporation will typically have a higher acceptable profitability level than will the owner-managed plant where the profits are largely as the owner's salary.

For medium-sized as well as small plants, the necessity for meeting the standards forces the owners to consider whether they want to commit that level of expenditure to a facility which even after the expenditure may continue to have low profits on sales and now reduced profits on net worth. They may simply decide to sell the land, which is often valuable, and invest their money in a more profitable or more secure area.

Wood preserving plants have been closing at a rate of 12 per year. Some of the plants have been of substantial size, and some closings have been attributed to pollution control regulations. The pollution control regulations will result in the closure of a number of small plants and some proportion (less than 25%) of the medium-sized plants for a combination of financial and competitive reasons which result in the owner's perceiving better opportunities in other areas.

4. Production Effects

Production levels can be changed due to reduced demand for preserved wood, due to price increases, and/or due to production losses via plant closings. Further, there is a current reduction in pole and piling production because of a lack of wood supply.

As was discussed under price effects (III.C.2), the large increases in wood prices have resulted in large increases in preserved wood prices in recent years. It does not seem in most product categories that production levels have been significantly affected by these

TABLE III.C.1

SAMPLE OF RATIOS FOR WOOD PRESERVING COMPANIES

Number	Current Ratio	Long-Term Debt Total Assets (%)	Profits*/ Net Worth
1.	2.61	4.2	-4.8
2.	1.52	7.3	58
3.	4.28	0.0	74
4.	30.00	0.0	NA
5.	2.43	19.0	12.6
6.	9.45	0.0	17.6
7.	1.59	0.0	48.7
8.	1.44	17.7	NA
9.	2.79	17.4	NA
10.	3.28	3.8	NA
11.	7.19	0.0	NA
12.	4.22	26.1	0.1
13.	2.14	3.6	NA

* Before tax profits

price increases. Therefore, we do not expect production levels to be affected by a 0.47% increase in prices resulting from the abatement costs.

Plant closings which can only be approximately estimated at this point will also probably have no effect on total industry production since there is excess capacity which would be able to compensate for the capacity of plants which are closed. Using the 1967 statistics, if all of the plants employing 19 or less persons were to close, 10% of that year's production would be lost. With 25% unused capacity in the industry, this 10% of production could be made up by other firms.

The assumption that all plants with 19 or less employees will close may be a good estimate, but we really do not know now where to draw the line. The picture becomes even less clear for firms with more than 20 employees, since many of the larger plants have already undergone the scrutiny of state environmental control officials and the most vulnerable have closed or are about to close. If one assumed that all of the plants with 49 or less employees closed, this would reduce 1967 production by 35%, 10% more than excess capacity. This is an unlikely occurrence but it does indicate that the closings which are realistically possible will not use up all of the current excess capacity in the industry.

Firms that do not close will see their demand grow more than the industry's 2% per year, and in fact this may be the dominant source of growth for many of these firms. But, the low growth rate of the whole industry should not be difficult to meet, especially when one considers that the firms staying in business will be the most profitable ones and the ones most able to expand capacity if necessary.

5. Employment Effects

If all plants employing 19 or less people closed, there would be a loss of about 1,500 jobs. These would mostly be scattered throughout the rural South.

There is one important factor to be noted. Many of the preserving plants are really large farmers and lumber mills, who operate the plant as an adjunct to their primary operation. It is often a part-time operation. In 1967, average yearly wage of "production workers" reported for the 102 plants with four or less employees was $3,000, as opposed to $4,000 for the industry as a whole.

A simple examination of the names of the companies with treating plants reveals that 23 or the 163 Southern pressure treaters using oil-based preservatives are primarily lumber companies or in some other activity than wood preserving. Twenty-four of the 53 nonoil-based pressure treaters are lumber companies. These numbers do not include firms whose names do not reveal their primary activity.

Closing the treating facilities of lumber companies will have less of an employment impact on the community than the closing of an independent treater, since there will probably be some opportunity for reemployment in other parts of the business.

The skill level of treating plant employees has both an exacerbating and mitigating effect on the community impact of a plant closing. Most treating plant employees are low-skilled workers. These employees tend to have the hardest time finding new work. On the other hand, treating plants are generally located in the center of lumbering areas and the employees' experience in working with the logs and lumber is transferable to other timber products activities as well as other wood preserving plants.

In regard to future employment growth in the industry, one would not expect total employment growth to be affected. This is because we are not expecting to see total production affected or production growth to be affected.

6. Resultant Regional Effects

a. Regional Economic Impacts

The 1,500 jobs which would be lost if all of the plants with less than 20 employees were to close are scattered throughout the Southern United States. Many of these are part-time or seasonal jobs and there are no large concentrations which could have substantial community or regional impacts. The closing of a larger plant in a rural area can have a local impact. This impact can be somewhat lessened by transferability of employees to other timber product firms, as was discussed above. The entire timber products industry is projected to have continued strong activity during the period when wood preserving plant closures would be most likely.

b. Probability of New Plants

New plants have been opening in the industry because of local opportunities for small operations and changing patterns of wood supply. The profitability of a larger plant is very sensitive to its proximity to its supply of wood. The optimum locations from a supply standpoint change somewhat over time and thus provide opportunities for building new plants even though the industry as a whole is only operating at 75% of capacity. It is also true that plants become less profitable over time because of a worsening supply situation in their locations.

c. Secondary Effects Yielding Further Unemployment

The small plants are so scattered that their closure will at most have small, short-term, secondary unemployment effects. There will be no effect on wood suppliers since the demand is so strong. There will

be small unemployment effects in rural areas resulting from a lower payroll. But, this should be very short term.

If a larger plant closes in a small community, the impact can be significant and sustained. At this time, we cannot identify the specific larger plants which are threatened and, thus, cannot be any more specific about the community or secondary impacts.

7. Balance of Trade

Very little preserved wood is handled in international trade, and there is no reason to believe this would change as a result of pollution control regulations.

D. SOFTWOOD PLYWOOD AND VENEER

1. Overview

a. Methodology

During July 1973, the Contractor participated in seminars with representatives of the softwood plywood industry to determine the economic impact of meeting suggested water pollution abatement standards. The meetings were organized by the American Plywood Association (APA) for the dual purpose of: (1) gathering the industry's reaction to the technical aspects of the Guidelines Contractor's report, and (2) gathering representatives of the industry together to respond to the Contractor's inquiries.

Invitations were extended to 150 softwood plywood mills and 12 softwood veneer mills. Attendance at the meetings totalled 28 plywood companies and five veneer companies. In 1972 the plywood companies operated 93 plywood mills and seven veneer mills, and produced 10 billion feet (3/8" basis) of softwood plywood. This represents 48% of the mills operating that year and 55% of total industry production. The five independent veneer companies operated five mills and produced an estimated 500 million feet (3/8" basis), or an additional 3% of total industry production.

Three of the meetings were held in Oregon, one in Louisiana, and one in Alabama. Mills represented were distributed between the Southern Pine and Douglas Fir regions approximately according to the industry pattern.

A telephone and personal survey was conducted on specific aspects of the issue with companies operating 64 plywood mills and eight veneer mills. The plywood mills produced in excess of seven billion feet of plywood in 1972 and the veneer mills produced about 600 million

feet per year. We believe the plywood mill sample is adequate to base an economic analysis on, although every mill would have to be surveyed individually to determine whether it could physically comply with the Guidelines Contractor's recommendations.

b. Base Case

The plywood industry has already encountered significant environmental pressures from various state and federal agencies. Oregon, Washington, and California have forced many mills to install air pollution control devices for their "hog fuel" (waste wood) burners used to generate steam and power, and some mills have reported spending in excess of $1.5 million for new burners. Others have converted to natural gas in areas where a sufficient, low-cost supply of that fuel is available. Many mills have done nothing, however, and have yet to expend funds to solve this problem.

In addition, mills are being pressed to eliminate the "haze" which rises from a veneer dryer, although no one to date has technically solved that problem. Several methods of coping with veneer dryer emissions are being tested, but no results are yet available. Mills contacted believe equipment to accomplish this may cost from $100,000 to $500,000, although there is no way of concluding that with certainty.

In addition to air pollution control needs, mills are increasingly faced with solid waste disposal problems. Bark and sawdust (if not burned) accumulate at a great rate and are voluminous. The markets for these waste products are very limited so mills must dump them somewhere. Oregon and Texas in particular have severely limited dumping of plywood mill wastes due to water percolation and leaching through the waste materials. Texas has required some mills to drill wells to prove that water percolating through is not reaching water supplies for human consumption. Oregon has reportedly forced some mills to stop dumping phenol glue wastes, since these are regarded as poisonous.

Finally, several states and the U.S. Army Corps of Engineers have forced mills to begin coping with water effluent. Although no existing state limitations are as strict as those proposed by the Guidelines Contractor, a large number of producers have already invested in recycling and wastewater treatment facilities.

In aggregate, therefore, water pollution control is not the most pressing pollution control problem of plywood mills. Air pollution is the most expensive problem currently faced and solid waste disposal, although less expensive, is difficult to accomplish also. Water pollution control may be at the top of the "worry list" for some mills in some states, but in general it is lower in priority.

Plywood mills have historically operated or closed down on an intermittent basis due to prevailing market prices. Below a certain

price level they reduce production (cut back on shifts) and ultimately close down. As prices rise, mills open again.

Plywood mills also close down as the timber base in the local areas is cut out. Mills which own timber in fee can project when this will occur. Others, who must purchase from the U.S. Forest Service and private sources, are in a more tenuous position. In the last few years the creation of new parks and wilderness areas as well as legal action by conservation groups has restricted timber cutting and made the outlook for some mills quite doubtful.

The decision to close a plywood mill, therefore, depends on market conditions and timber availability as well as incremental investments for such things as pollution control. In addition, the waste materials from some mills go to pulp mills which need a large, continuous supply of wood fiber. Therefore, lumber and plywood plants owned by integrated producers may operate or close based on conditions extraneous to end use industries.

At present, Aug. 1973, the plywood industry is experiencing falling prices. This is partially seasonal, but mainly due to a decline in new housing starts as credit resources have been restricted. If prices continue to decline, mills will begin to curtail production and close until prices improve.

It must be emphasized, however, that this is a seasonal and cyclical phenomena and a "closed" mill does not necessarily mean "permanently out of business."

Table III.D.1 shows the annual total of new, reopened, and closed mills in the softwood plywood industry by year since 1960. It will be noted that, although 100 mills closed over the period, there were 35 mills reopened. The historical statistics, therefore, show us that total closings per year should equal about eight mills, reopenings will average three, and new mills should total nine.

Based on the average number of producing units over the period, mill closings should average about 5% of total producing mills in any given year, although the range can be 1-10%, depending on price conditions. It can also be stated that one-third of the mills closed in a year will reopen at a later date, while two-thirds will remain shut.

The Contractor has estimated total U.S. softwood plywood production should grow about 4-5% per year through 1980[1]. In Table III.D.2, therefore, we have estimated the average and possible range of the number of mills likely to close by year under normal conditions. This represents our "base case."

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[1]Outlook for the Forest Products Industry, September 1970.

TABLE III.D.1

SOFTWOOD PLYWOOD MILLS
OPERATING STATUS
1960-1972

Year	No. Producing Units	New Mills	Reopened	Closures
1960	152	13	--	7
1961	151	6	1	3
1962	155	7	--	7
1963	157	8	1	5
1964	164	10	2	4
1965	174	13	1	7
1966	184	15	2	19
1967	180	8	7	18
1968	175	8	5	4
1969	177	3	3	15
1970	179	10	7	7
1971	189	13	4	3
1972	192	4	2	1
TOTAL	N/A	118	35	100
AVERAGE	171	9	3	8

SOURCE: American Plywood Association

TABLE III.D.2

ESTIMATED MILLS OPERATING
AND CLOSING BY YEAR

	No. of Producing Units, End of Year	Average No. of Mill Closings During Year	Possible Range in No. Mills
1973	201	10	2-20
1974	210	11	2-22
1975	220	11	2-22
1976	230	12	2-24
1977	240	12	2-24
1978	251	13	3-26
1979	263	13	3-26
1980	275	14	3-28

SOURCE: Contractor's estimates.

c. Technical and Cost Responses of Mills to the Guidelines Contractor's Report

The Guidelines Contractor's report was reviewed with mills participating in the group meetings. Each alternative was examined from a technical and expected cost basis. In addition, the mills were asked if the recommended procedure was considered feasible and what conditions made that alternative feasible or not feasible. Following are summaries of the groups' responses by alternative. The survey question results are referenced against the appropriate alternative for each.

Alternative A: No waste treatment or control. This was not recommended by the Guidelines Contractor's report and was not discussed.

Alternative B: Complete retention of glue washwater. It was agreed that a significant water saving could be achieved by glue recycling and 69% of the 64 mills surveyed had already installed glue recycling systems.[2] The actual cost reported per installation ranged from $35,000 to $85,000, and it was noted that a mill using more than one glue type must install dual or even triple systems. Nineteen percent of the mills surveyed used dual glue systems and would incur this cost.[3]

Of the 44 mills with glue recycling systems, only one reported achieving complete retention of all glue washwater and that was an installation in place less than two months. All others reported a need to dispose of batches of glue washwater and settled glue solids, most commonly on a weekly basis in volumes of 400 to 1,600 gallons.

All mills reported a need to expend extra labor costs in the clean-up process to achieve washwater recycling. Only one mill reported enjoying "substantial savings in raw materials" as suggested in the Guidelines Contractor's report.[4] Nearly all other mills seriously challenged this claim, although a number reported achieving better glue consistency and better glue bonds from using the washwater in glue make-up. We conclude, based on these reports, that glue material savings at best might equal the cost of added labor required for clean-up and probably would be less than this extra expense.

It is worth noting also that one operator was in the process of adopting concentrated glues which do not require make-up water. These mills would be unable to recycle the washwater.

Two methods were commonly used for batch disposal of glue washwater which could not be recycled--burning in the hog fuel boiler burner

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[2]Question 1, Table III.D.3.
[3]Question 2, Table III.D.3.
[4]P.P. 167

TABLE III.D.3

1. Q: Does mill have existing glue recycling system?

Ans:		
	Yes	44
	No	15
	NA/DK	5

2. Q: Type of glue used?

Ans:		
	Phenol only	45
	Dual	12
	NA/DK	7

3. Q: Type of fuel used for boiler burner?

Ans:		
	Hog Fuel	47
	Gas	13
	Both	--
	NA/DK	4

4. Q: Type of log handling facilities?

Ans:						
	Log Pond	7	Dry Deck	18	NA/DK	11
	River Storage	3	Wet Deck	12		
	Ocean Storage	2	Combination Wet and Other			11

5. Q: Have existing evaporative or aeration ponds (not log ponds) usable for water treatment?

Ans:		
	Yes	23
	No	36
	NA/DK	5

6. Q: Land constrained (i.e., do not have water treatment pond and no land adjacent on which to build one)?

Ans:		
	Yes	8
	No	52
	NA/DK	4

7. Q: Type of log conditioning practiced?

Ans:			
	Steam Spray Vats	6	9%
	Steam Vaults	7	11%
	Hot Water Vaults	23	36%
	None	23	36%
	NA/DK	5	8%
			100%

8. Q: Would mill close if had to spend

a) $100,000 capital plus $75,000 operating costs per year thereafter

b) $500,000 capital plus $75,000 operating costs per year thereafter

Ans:			
	a)	Yes	--
		No	33
		NA/DK	31
	b)	Yes	3
		No	30
		NA/DK	31

Distribution of Respondent Plywood Mills:

	#	%
South	23	36%
West and Intermountain	41	64
Total	64	100%

Distribution of APA Member Mills:

	#	%
South	48	32%
West and Intermountain	103	68
Total	151	100%

and land fill dumping. Seventy-three percent[1] of the plywood plants surveyed had hog fuel burners and 27% did not. Of these remaining mills, a few could dump glue wastes into municipal sewers,[2] but most were faced with batch disposal into land fill areas (some used independent contractors to haul off these wastes). Mills dumping glue wastes into land fill in Oregon and Texas were doubtful of the ultimate legality of this practice and were probably in violation of state regulations. Mills in other states reported increasing pressure against certain land filling and felt this course was likely to be foreclosed to them.

Based on our survey data, we estimate 15-25% of plywood mills could be unable to comply with the Alternative B recommendation except by batch disposal of glue wastes.[2] If local authorities prevent land filling, they would probably be forced to directly incinerate these materials, a practice for which we have no cost estimates.

Alternative C: Complete retention of wet decking wastewater. This alternative was based on the assumption that "dry decking" of logs is not a source of wastewater effluents and that "log ponds," presumably including ocean and river storage, were to be considered in Phase II of the Timber Products Processing study. Therefore, only "wet decking" wastes were considered.

Dry decking of logs as a technique was practiced by 28% of the mills surveyed.[3] Nearly all of this group as well as many other mills seriously questioned the proposition that dry decks produced no wastewater effluent. During rainy periods (one mill received 90 inches of rain per year) runoff from dry deck log storage was believed to contain an equal amount of waste as water sprinkled on a log deck. Perhaps an "act of God" exclusion might apply to dry decks during rainy weather, but if not, this would appear to be a serious problem.

During periods of low rainfall or in the land area between the Rocky Mountains and the Sierra/Cascade ranges, collection and recycling of wet decking wastewater using a sump or settling pond was generally regarded as possible. However, all mills operating in the South or on the western side of the Sierra/Cascade ranges objected strongly to the proposition that containment and evaporation would be adequate to handle the water runoff.

It was pointed out that most rain in these areas falls in the winter and that evaporation is at its lowest during this period. In addition, during the winter some ponds are frozen and do not evaporate at all.

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[1]Question 3, Table III.D.3.

[2]Dumping phenol wastes into municipal sewers requires careful metering of the load to prevent sudden surves of high-phenol content which

[3]Question 4, Table III.D.3.

Table III.D.4 shows the average rainfall for selected points within the three areas discussed (South, Intermountain, and west of the Sierra/Cascades) by month. It will be noted there are substantial climatic differences with the Intermountain region receiving much less rainfall than the others. The West, in particular, receives a large percentage of its precipitation in the winter.

Table III.D.5 shows the distribution of American Plywood Association member mills among the three areas. Of this group, 89% are located in higher rainfall regions. In addition, there are an estimated 75 mills in Oregon producing green veneer only who are not members of the APA. Most of these producers are also located west of the Cascade mountains in the higher rainfall area.

The state of Oregon and the U.S. Army Corps of Engineers have recognized this problem and permits issued to mills with existing aeration and evaporation ponds allow pond overflows during specified periods of the year. This forces the mills to treat the water, yet still allows overflows which they cannot prevent.

Our survey[1] showed 23 mills (36% of those surveyed) using wet decking alone or in combination with some other method of log storage and 18 mills (28% of the survey group) using dry decks alone. We conclude the latter group faces the same problems as the former and that a total of 64% of plywood mills or 123 mills must cope with this issue.

By excluding mills located in the Intermountain region who could probably evaporate most water the year around (estimated at 11% of the total), we conclude that 57% of plywood mills (89% x 64% = 57%) or 109 plywood mills in total would be adversely affected. To this number we would add the approximately 75 "green veneer only" mills in Oregon. This gives a total of 184 facilities who would be unlikely to successfully collect and recycle all log deck waters throughout the entire year and would be in violation of the proposed standards.

Our survey[2] showed 23 of the 64 plywood mills (36%) already have evaporative/aeration ponds or have ponds (not log ponds) which could be used for this purpose. Of those mills without ponds[3], 8 reported no available land at the mill site for the construction of ponds or for land irrigation. These mills were located in urban areas, on pilings over water, sandwiched between the ocean or river and some other barrier, etc., and were all in the West. Most Southern plywood mills were built since 1964 and company managements generally acquired excess land around these plants.

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[1]Question 4, Table III.D.3.
[2]Question 5, Table III.D.3.
[3]Question 6, Table III.D.3.

TABLE III.D.4

NORMAL MONTHLY RAINFALL IN INCHES FOR SELECTED CITIES

Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total	Total High Sequential 6 Month Period (1)	% of Rain Received During High Period
West of Sierra/Cascades															
Seattle, Wa	4.5*	3.8*	3.0*	2.0	1.6	1.3	.5	1.0	1.5	3.1*	4.6*	5.3*	32.2	24.3	75%
Portland, Wa	4.6*	4.2*	3.5*	2.2	1.8	1.7	.5	.6	1.8	3.2*	5.2*	6.2*	35.5	26.9	75
Eureka, Ca	6.2*	5.6*	4.7*	2.9*	1.8	.6	.1	.1	1.8	2.8	4.6*	6.1*	37.3	30.1	80
Intermountain															
Spokane, Wa	1.7*	1.5*	1.3*	.9	1.0	1.1	.3	.4	.9	1.2*	1.9*	2.2*	14.4	9.8	68
Pendleton, Or	1.3*	1.2*	1.1*	1.0	.9	1.2	.3	.3	.8	1.2*	1.5*	1.6*	12.4	7.9	63
Grand Junction, Co	.6	.7	.8	.7	.6	.4	.8*	1.2*	1.0*	.8*	.6*	.7*	8.9	5.1	57
South															
Houston, Tx	4.1	2.6	2.7	3.0	4.9	3.8	4.8*	4.2*	4.4*	3.8*	4.2*	4.6*	47.1	26.0	55
Shreveport,La	4.7*	3.8*	4.7*	4.6*	4.5*	2.7	3.7	2.4	2.2	3.3	3.9	4.9*	45.4	27.2	60
Jackson, Ms	5.1*	5.1*	6.2*	4.9*	4.1	3.7	4.7	3.3	2.1	2.2	4.2*	5.6*	51.2	31.1	61
Pensacola, Fl	4.5	3.9	6.0*	4.9*	4.4*	5.2*	7.6*	7.4*	5.8	3.9	3.9	4.2	61.7	35.5	58

(1) This represents the total rainfall received during those sequential six months of the year when the rainfall is greatest.

Months marked with an asterisk fall into the high rainfall period.

Source: Climatic Atlas of the United States.

TABLE III.D.5

DISTRIBUTION OF APA MEMBER SOFTWOOD PLYWOOD MILLS IN 1972 AND ESTIMATED TOTAL U.S. DISTRIBUTION

Area	1972 APA Member Mills (1)		1972 Total U.S. Estimate (2)
	#	%	#
South	48	32	61
West of Sierra/Cascades	86	57	110
Intermountain	17	11	21
	151	100%	192 (1)

(1) SOURCE: American Plywood Association

(2) SOURCE: Based on APA member distribution by %.

Based on this evidence, we conclude as many as 20% of plywood mills outside the South, (8 mills with land constraints ÷ by 41 Western and Intermountain mills responding) would be unable to construct evaporation and aeration ponds to comply with this alternative. This could mean as many as 26 plywood mills in total would be unable to follow this recommendation and could be forced to close or relocate.

Half of the 8 mills with land constraints were asked what they would do under these circumstances. All would probably relocate a portion of the plant (the "green end" of the plywood line) or the entire plant. Thus, there would be no permanent closing on the part of these four mills, although the expense would be high.

Cost experiences related to building sumps and ponds for recycling varied widely according to the specific land condition where a log deck was situated. In the case of a deck located on flat, rocky land, a mill had only to bulldoze ditches and install a pump in an existing pond to recycle at a cost of less than $40,000. Other mills believed they would be forced to pave the log deck area (as much as 30 acres) in order to collect the water. This cost was estimated at $300,000 to $500,000. We are unable to suggest the correct average figures, although the suggested $39,000 cost for Alternative C in the report was considered by the mills to be very low.

Alternative C received the most severe criticism of any portion of the Guidelines Contractor's report. The consensus of firms attending the meetings was that complete containment and recycling of wet (and dry) decking wastewater was not possible at all times of the year. Mills with ponds or with land area to build ponds believed they could contain and treat water in dry periods and could treat during wet periods but would still be faced with a seasonal overflow. We believe this argument has merit.

Alternative D: Complete retention of wastewater from log conditioning. This alternative allowed an exclusion through 1983 for mills with existing steam spray vats for log conditioning with the provision that wastewater be treated to specified levels before release. Our survey[1] showed six mills, or 9%, of those responding fell into this category. This would mean 17 plywood mills in total would operate under this exclusion through 1983 (our sample size does not permit generalization to the total population of veneer mills).

Of the remaining group 36% did not condition logs, 8% did not answer, 11% had steam vaults and 36% used hot water vaults. The latter two groups, totalling 47% of mills surveyed or 90 plywood mills in all, would be required to comply with the recommendation of complete retention and recycling of conditioning wastewater.

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[1]Question 7, Table III.D.3.

Principal discussion items concerning recycling log conditioning water related to the need to periodically drain and clean the vats. Sludge collects in the bottom of vats and must be removed to a solid waste dump. Minerals collect on heat exchanger pipes and form a scale which is difficult to clean yet must be removed. Settling ponds and sumps were again criticized as inadequate to handle overflow or drained water due to the problem of heavy seasonal rainfall.

In addition, there was much discussion about the best type of log conditioning to use in different parts of the country and with different wood species. It was clear there is no accepted industry norm for practice.

None of the mills surveyed had existing systems to achieve complete retention and recycling. However, three mills represented at the meetings but not surveyed had new installations which did achieve this goal. In two cases the approximate cost of the system was $200,000 in capital and in the third, the "hardware" costs were $40,000 and labor cost to build the system was not known. One of these mills reported annual labor maintenance expenses of $25,000; the others had not yet developed operating cost experience.

Two veneer mills reported proceeding with engineering plans to build recycling systems for existing steam vats. The plans included large holding tanks for settling of solid wastes with the water then recycled through the steam boilers. The estimated cost of these systems was $300,000. This could conceivably be cheaper for some mills than investing in treatment facilities allowed under the interim exclusion until 1983 and then complying with a zero discharge requirement later.

In summary, this proposal was less troublesome than wastewater from log decking. Dependence on ponds and sumps was again rejected but it appeared there were other courses which were open and the industry was exploring them.

Alternative E: Complete retention of dryer washwater. Veneer mills generally sell their product without drying, and this alternative does not apply to them.

Plywood mills felt this recommendation could be followed at the cost level suggested ($5,000 to $10,000) with one exception. The amount of water used by a sprinkling system to put out a veneer dryer fire is substantial. Again, it was not clear this water could be contained during rainy weather since it was believed ponds would be overflowing. It was further argued that less frequent cleaning of veneer dryers produced more fires, and hence more wastewater. Nevertheless, it appeared a switch to dry and steam cleaning of veneer dryers would solve the problem, although the labor cost for cleaning would increase.

One mill reported veneer dryer washwater was put into hot water soaking vats for makeup water. No others were now completely retaining and recycling this water.

In general, however, this problem was considered less severe than the major difficulty of controlling pond overflows. We estimate 95% of plywood mills would have to expend funds to contain dryer washwater.

d. General Comments by Attending Mills

In addition to the points previously mentioned, mills raised the following issues:

1. Exclusion for lack of available land. The Guidelines Contractor report recommends "consideration" be given mills with a land availability problem, but this recommendation is omitted from the reports' conclusions and recommendations. This was particularly troublesome to affected mills, since they had no idea what "consideration" means.

2. Reliance on irrigation and land fill. The long-term viability of this method of water pollution control was seriously questioned. One mill had attempted irrigating and had voluntarily stopped the practice because of damage to the land.

3. Treatment and release versus total containment. The concept of "zero discharge of wastewater" was continually questioned. Mills believed the Federal Water Pollution Control Act specified zero discharge of "pollutants" instead. Mills wanted the option to treat water and then release it. This was particularly true for operators of integrated facilities (i.e., a plywood mill situated adjacent to a pulp and paper complex) who believed EPA standards will allow treatment and release for pulp mill wastes. These operators would prefer to build one treatment facility to handle wastes from an entire complex.

4. Interest depreciation, and land costs. The report ignores interest expense on capital employed and land cost. While it is true most mills do have land available, there are probably alternate economic uses for the land which create an opportunity cost for the mill. Similarly, some mills would have to purchase available land and this possibility has been ignored. Depreciation was similarly ignored and should be taken into account.

e. Summary of Expected Costs and Mill Closings

This summary will deal with three possible conditions relating to the cost and workability of the proposed alternatives.

Option 1: Assumes the Guidelines Contractor's cost estimates are correct and the technical steps suggested will work. Plants unable to comply (i.e., no land available) would close.

Option 2: Assumes the industry cost estimates are correct and the technical steps suggested will work. Noncomplying plants would close.

Option 3: Assumes the industry cost estimates are correct and the industry's evaluation of the workability of the technical steps is correct. Under this assumption a plant in violation would close.

The cost levels used for each alternative are shown in Table III.D.6 and are estimated annual operating costs.

Table III.D.7 summarizes costs and compliance statistics for Option 1 by alternative.

Option 1 indicates the softwood plywood industry would be likely to spend $10,929,000 for capital facilities, $980,000 for annual energy requirements, and $14,000,000 in annual maintenance costs to comply with the proposed regulations. A total of 26 mills might close due to a lack of land (although we estimate most if not all of these would reopen elsewhere).

Softwood veneer mills would spend $14,605,000 for capital facilities and $177,800 for annual energy needs. As many as 15 veneer mills might close, although again we feel many would relocate.

Table III.D.8 summarizes expected costs for Option 2 which reflects mill estimates of the costs of compliance again assuming the technical feasibility of the proposed steps. Under this option plywood mills would expend $45,792,000 for capital facilities, $980,500 for energy needs and $10,580,500 for annual maintenance. Again, 26 mills might close.

Veneer mills would expend $14,605,000 for capital facilities, $177,800 for energy needs, and 15 mills would close.

Option 3 assumes the same level of expenditure as in Option 2 but also assumes the steps taken are not adequate to bring the mills into compliance. The major technical issue is the ability of the mills to contain rainwater runoff in evaporation ponds during the heavy rainfall seasons. Based on climatic differences, we have estimated as many as 109 plywood mills and 75 veneer mills might not be in compliance during the heavy rainfall periods (mainly winter). Obviously, this would have a severe effect on the industry.

TABLE III.D.6

ESTIMATED INCREMENTAL CAPITAL AND OPERATING COST LEVELS FOR EACH ALTERNATIVE

Alternative:	Option 1 (1)	Options 2 and 3 (2)
A Capital Cost	NA	NA
Energy Cost	NA	NA
B Capital Cost	$17,500	$50,000
Energy Cost	800	800
C Capital Cost	$39,000	$150,000
Energy Cost	2,100	2,100
D Capital Cost (5)	$12,000	$200,000
Energy Cost	2,200	2,200
E Capital Cost	$7,500	$7,500
Energy Cost	2,300	2,300
Total Capital Cost	$76,000	$407,500
Total Energy Cost	$7,400	$7,400
Annual Operating Costs	$75,000 (3)	$50,000 (4)
Total Energy and Operating Costs	$82,400	$57,400

SOURCE: (1) EEI Report
(2) Estimates based on group response
(3) EEI Report, page 263
(4) Industry estimates of annual operating costs were lower than EEI estimates.
(5) Cost of aeration facilities for mills with existing steam vats is estimated at $81,000

TABLE III.D.7

ESTIMATED MILL COSTS AND COMPLIANCE BY ALTERNATIVE

OPTION 1

Softwood Plywood Mills: Alternative		Mills Affected %	Mills Affected #	Capital Cost ($1,000's)	Industry Capital Cost ($1,000's)	Energy Cost	Industry Energy Cost	# Mills Unable To Comply
A			NA					
B	(1)	31%	60	$17.5	$1,050.0	$ .8	$ 48.0	-
	(2)	19	36	35.0	1.260.0	1.6	57.6	-
C		64	123	39.0	4.797.0	2.1	258.3	26(3)
D	(1)	47	90	12.0	1,377.0	2.2	198.0	-
	(2)	6	17	81.0	1,377.0	-	-	-
E		95	182	7.5	1,365.0	2.3	418.6	-
Total					$10,929.0		$980.5	26
Operating Costs $75,000		100%	192				$14,400.0	
Softwood Veneer Mills (75):								
A			NA					
B			NA					
C	(6)	64%	48	$39.0	$1,872.0	2.1	$100.8	15(3)
D	(4) (6)	47	35	12.0	420.0	2.2	77.0	-
	(5) (6)	6	5	81.0	405.0	-	-	-
E			NA					
Total					$2,697.0		$177.8	15
Operating Costs not estimated								

(1) Mills with single glue systems
(2) Mills with dual glue systems
(3) Noncompliance is due to land constraint
(4) Mills with hot water vats and steam vaults
(5) Mills with existing steam vats
(6) Percentages estimated to be the same as for Western plywood mills

TABLE III.D.8

ESTIMATED MILL COSTS AND COMPLIANCE BY ALTERNATIVE

OPTION 2

Softwood Plywood Mills:		Mills Affected %	Mills Affected #	Capital Cost	Industry Capital Cost	Energy Cost	Industry Energy Cost	# Mills Unable To Comply
Alternative								
A			NA					
B	(1)	31%	60	$ 50.0	$ 3,000.0	$ .8	$ 48.0	-
	(2)	19	36	100.0	3.600.0	1.6	57.6	-
C		64	123	150.0	18,450.0	2.1	258.3	26(3)
D	(1)	47	90	200.0	18,000.0	2.2	198.0	-
	(2)	6	17	81.0	1,377.0	-	-	-
E		95	182	7.5	1,365.0	2.3	418.6	-
Total					$45,792.0		$980.5	26
Operating Costs $50,000		100%	192				$9,600.0	
Softwood Veneer Mills (75):								
A			NA					
B			NA					
C	(6)	64%	48	$150.0	$ 7,200.0	2.1	$100.8	15(3)
D	(4) (6)	47	35	200.0	7,000,0	2.2	77.0	-
	(5) (6)	6	5	81.0	405.0	-	-	-
E			NA					
Total					$14,605.0		$177.8	15
Operating Costs not estimated								

(1) Mills with single glue systems
(2) Mills with dual glue systems
(3) Noncompliance is due to land constraint
(4) Mills with hot water vats and steam vaults
(5) Mills with existing steam vats
(6) Percentages estimated to be the same as for Western plywood mills

2. Price Effects

The softwood plywood industry cannot pass increased costs along to its customers in the short run. In the longer run, increased operating costs can serve to decrease supply during periods of low market prices because mills may close down sooner than they would otherwise.

Under Option 1, we would expect the longer term price effect to be a "new floor" under plywood prices in a depressed market equal to no more than $.75 per 1,000 square feet. (This is equal to the maximum projected increase in annual operating and energy costs of $82,400 ÷ the average mill size used of 110,000,000 feet.) Under Option 2, the "new floor" would be about the same as under Option 1. We are unable to predict the effect on price if Option 3 is accurate.

It should be noted here that only the annual change in variable operating expenses should be taken into consideration in this calculation. Capital expenditures, once made, are a "sunk cost", and the depreciation charges are a bookkeeping transaction, not a cash outflow. Therefore, the decision to operate a mill or close it down in the short run will not take "sunk costs" into account.

One interesting possible secondary effect on prices is the potential impact on the market value of stumpage timber. The largest seller of timber in the United States is the U.S. Forest Service. Since mills cannot set the selling price of their finished product, the price they can pay for timber is effectively:

Expected Selling Price - (Converting Cost - Profit) = Timber Price.

It is possible, therefore, that the U.S. government could share this added cost to some extent through lower values realized for timber sold and there would be essentially no impact on plywood prices.

3. Financial Effects

In the short run (up to 3 years), we believe the plywood and veneer industry will suffer reduced annual profits in the amounts of:

	For Option 1	For Option 2
Reduced profits from added:		
Operating and Energy Costs	$15,558,300	$10,758,300
Depreciation on Facilities (7-yr. write off)	1,946,580	8,628,140
Interest Cost (8% simple int.)	1,090,080	4,831,760
TOTAL	$18,594,960	$19,391,271

Furthermore, the industry will direct between $13,600,000 and $60,397,000 into water pollution control facilities that would otherwise be invested elsewhere. It is doubtful that all of these funds would have gone into plywood industry expension however. Many industry participants also engage in other businesses and must allocate capital between various industries. Mills questioned say capital is available for this purpose, but note that this would be a diversion from other uses.

4. Production Effects

Under Options 1 and 2 we have projected up to 26 plywood plants and 15 veneer plants may close due to a lack of available land to comply with the suggested standards. However, it was also noted by those mills responding to the question that the plants affected would probably be wholly or partially moved to another site to continue operations. We estimate nearly all of these plants might be relocated by 1977. Given the time available to accomplish this, it is doubtful there would be a significant impact on total industry production, although the companies involved could suffer large accounting write-offs.

Our survey[1] of 64 plywood mills asked the question, "Would you close any of your mills if you had to spend: a) $100,000 for new pollution control equipment and $75,000 per year thereafter in operating costs, or b) $500,000 for new pollution control equipment and $75,000 per year thereafter in operating costs?" These options essentially conform to Options 1 and 2 of the expected cost of compliance.

No mill reported it would close if faced with Option 1. Two plywood mills and one veneer mill were considered possible candidates for closure under Option 2. This represents 3% of the plywood mills surveyed. (Due to the small number of veneer mills surveyed we cannot project across this part of the industry.)

If 3% of the plywood mills now operating closed under Option 2, a total of six mills would permanently close their doors. However, respondents answering this question indicated the mills in question were already "marginal", chiefly due to shortages of timber (resulting in higher timber costs) in the areas where they operate. Therefore, the need to expend sums for pollution control facilities might only briefly hasten the closing of an already weak unit.

Industry production in the local area would suffer in the short run, but remaining mills would now be able to produce more plywood (more logs available) or stay in business longer than they would otherwise. Again, we believe the impact on total industry production would be nominal.

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[1]Question 8, Table III.D.3.

If Option 3 were to prevail, however, plywood industry production could be dramatically reduced. If the position mills have taken is correct (i.e., evaporative ponds will not hold all wastewater at all times), two possibilities could occur:

1. 109 plywood mills and 75 veneer mills could permanently close; or,

2. the above mills might close on a seasonal basis.

The latter case would obviously be more likely, although again we cannot predict the impact.

We believe the effects of Options 1 and 2 on total industry growth will be negligible.

5. Employment Effects

Total employment in the plywood industry is not expected to be seriously affected by the impacts of Options 1 and 2. Most mills closing due to a lack of available land should reopen in the same local areas where they now operate, since a plywood mill is usually tied to a specific timber base (either owned in fee or a stand of market timber). Again, the amount of time available to effect a relocation should allow a reasonably smooth transition.

Production curtailments are more difficult to project. If producers pass part of the added marginal costs of production back to the log supplier, production curtailments might be nonexistent. Otherwise, some mills might close sooner than they would have planned to in a depressed market. We cannot predict the extent to which this will occur, but we do not believe water pollution control costs will have a serious impact through production curtailments.

6. Resultant Regional Effects

Most plant closings will occur in the West. The oldest mills are located here (chiefly Oregon), and they suffer most from a lack of available land. Therefore, the greatest disruption will occur in the West, although as previously noted we expect most, if not all, of these mills to rebuild in the local area.

In the event a mill does not rebuild, workers unemployed would face a variety of local job conditions. A mill closing down in an urban area would have less impact on local conditions than one situated in a remote location. Oregon in particular has enjoyed strong economic growth in the last decade, chiefly in its urban areas. In general the economic climate in that state is good, although workers could be forced

to relocate. We do not expect significant secondary employment effects except in a very few isolated areas.

7. Balance of Trade Effects

The softwood plywood industry is not a significant exporter of its finished products, nor does the U.S. import large quantities of this material. It is possible a few mills might elect to sell their timber into export markets and close production facilities. If so, this would positively impact our balance of trade in the short term, although by a very small amount.

Industry sources claim the logs likely to be freed by a plywood mill closure are not those regarded as most desirable for export. We project essentially no impact in this regard.

E. HARDWOOD PLYWOOD AND VENEER

1. Overview

The hardwood plywood and veneer industry is characterized by a large number of small operations, in contrast to the softwood plywood and veneer sector described in III.D. For example, both industries have approximately the same number of plants--190 in hardwood plywood, 192 in softwood plywood. However, the total output from these 190 plants in the hardwood sector is only 12% of the total output of the same number of plants in the softwood sector. Further, typical representative plants in these sectors would be of the following sizes:

- Hardwood: 5-10 million square feet per year, 3/8" basis;
- Softwood: 75-150 million square feet per year, 3/8" basis.

In fact, a simple arithmetic average shows that the 190 hardwood plywood mills produced 11.6 million square feet each, the softwood plywood mills, 95.4 million square feet each in 1972.

The Guideline Contractor's original cost and technological data for the plywood and veneer industry was based on a 100 million square foot Southern pine (softwood) plywood and veneer mill. These abatement cost factors were not applicable to the hardwood sector. Cost translations on the basis of size are difficult to make, since the cost function is not linear; it is more parabolic in nature. For the technological options developed by the Contractor, there are minimum costs to achieve the technological solution, beneath which cost is not related to size. That is, for example, for a 25 million square foot plant, the capital investment required may be the same as that for a 5 million square foot plant.

Since this industry is comprised of small plants, with relatively modest plant and equipment investments, even small pollution-related capital costs can force closure. For example, the $76,000 capital investment required by the Guidelines Contractor's Alternative E is not significant in the softwood plywood industry, compared against a capital base of $10-15 million for plant and equipment. However, in the hardwood plywood industry sector the investment base is in the range of $200,000-$1,000,000 of capital invested; a $76,000 capital investment would be significant. (8%-38% of assets)

Thus, new guidelines cost and technological data was prepared by the Guidelines Contractor. At the writing of this report, the new data was still preliminary. However, since it represented a substantive revision, which would alter significantly the economic impact, the new data was incorporated into this revised analysis.

The initial economic impact analysis performed by the Contractor was accomplished on the basis of the Guidelines Contractor's softwood plywood cost and technology information. The impact of those costs on the hardwood sector are severe. Thus, to indicate the sensitivity of the industry to capital costs, at critical points in the analysis, the results of both the present and prior analysis are presented. It is important to note that for small plants in this industry sector, capital investments of $10,000-$15,000 carry important decision-making significance. For most of these plants a "shut down" decision would be the same at either a $25,000 or a $76,000 investment level.

The revised cost and technology data supplied by the Guidelines Contractor is*:

- Alternate B: $2,000; for glue washwater;
- Alternate D: $5,500; retention of hot water vat effluents.

In addition:

- Total annual costs: $11,025;
- One-time cost of process changes: $10,000.

Thus, the total cost of abatement to a hardwood plywood mill is approximately $17,500 capital costs (process changes plus abatement equipment).

Although profit margins are tight in the industry and price increases over the past few years have lagged cost increases, an increase in annual operating costs due to pollution control equipment is not really the key issue. Rather, the issue is the ability and willingness

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*Based on a 5 MMSF hardwood plywood and veneer mill.

of the management of firms in these sectors to raise necessary capital costs, and the availability of land to support settling ponds. The impact analysis indicates that the impact on the industry is most sensitive to these two issues.

2. Price Effects

The basic point to be made is that prices in the industry are constrained to certain levels by the prices of low-cost import plywood, and the manufacturing efficiencies of the larger firms. Because of the import-related pressure the industry generally has relatively little ability to pass on increased costs. Because of the efficiency of the larger firms, the smaller firm is constrained.

a. Primary Price Increases

The additional cost to the major producers is insignificant; it would not be necessary for them to alter prices in response to water effluent abatement costs. The smaller firms will simply have to absorb any cost increases, yielding lower profit margins. Specifically, we anticipate a range of price increases from zero to a maximum of 2%.

Prices in the industry range from a low of $50 per thousand square feet (3/8" basis) for imported, commodity, unfinished panels to $1200 per thousand square feet (3/8" basis) for specialty, "fancy face" decorative panels for expensive furniture. The inability to pass on prices will put small firms in a further profit margin squeeze situation. To the large firms the costs will not matter.

b. Secondary Effects

Since primary price increases are insignificant, there should be no effect related to water effluent abatement costs translated into higher prices for end products.

Pollution abatement costs will not affect stumpage costs, the primary raw material factor. Changes in cost of stumpage will be due to general wood availability and quality, influenced by the rising cost of imported veneer and imported peeler logs.

3. Financial Effects

Financial effects on plants in the hardwood, plywood, and veneer industry segment are presented here in terms of the profitability of a representative hardwood plant. As noted above, this representative plant is much smaller, with a much smaller asset base, than a representative softwood plant. The characteristics of this plant are as follows:

- Annual production: 6 million sq. ft. per year (3/8" basis)
- Employees: 50

- Investment in plant and equipment: $500,000
- Product line: (1) Stock, 4' x 8' panels
  (2) Cut-to-size panels
- Products unfinished ; rough sanded
- Markets: (1) Wall panel prefinishers
  (2) Furniture manufacturers
- Integrated to veneer production, but no ownership of woodlands and no market integration
- Privately held
- Works two shifts: Maximum 46-50 hours per week
- Location: Mid-South, Southeast
- Species: 5-15 different hardwood varieties

In essence, a plant such as this is producing commodity, but quality, panels. The panels are sold in direct competition with low-cost imports, and plywood panels manufactured domestically from low-cost imported veneer. The use of hardwood plywood in the markets for the firm's products is growing at a rate of 4-5% per year, but more than half of that growth is met by imported products.

With no woodland ownership, the company operates with uncertainty as to the ready availability of quality peeler logs and the cost of those logs. The company does at least a portion of its own logging, employing 2-5 men in its logging operations.

a. Effects on Profitability

In 1972 the company would have enjoyed a better year than in any of the previous three years, and probably as good a year as any since 1966 or 1967. The income statement for 1972 appears as the base case in Table III.E.1 The base case is the income statement without allowing for any pollution abatement costs.

As the table shows, the company's net profits on approximately $1 million worth of sales would be about $25,000, or 2.6% net return on sales. The return on net assets would be 5.0%.*

*Net assets were estimated to be $500,000, which would represent the investment necessary to install the plywood and veneer equipment in 1972. Since many of the mills are 10 years older or more, the depreciated asset base could be approximately half of this, thus doubling the return on net assets figure.

TABLE III.E.1

PROFITABILITY OF REPRESENTATIVE HARDWOOD PLYWOOD AND VENEER PLANT--1972

	Base Case Alternate A		Alternate B **		Alternate D **	
	%	$M	$	$M	$	$M
Net Sales	100.0	1,000	100.0	1,000	100.0	1,000
Cost of Goods Sold	84.9	849	84.9	849	84.9	849
GS&A	10.0	100	10.0	100	10.0	100
Pollution Costs	-	-	0.2	2	1.1	11
	94.9	949	95.1	951	96.0	960
Operating Profit	5.1	51	4.9	49	4.0	40
Other Income	(.1)	(1)	(.1)	(1)	(.1)	(1)
Total Income	5.0	50	4.8	48	3.9	39
Provision for Income Tax	2.4	24	2.3	23	1.9	19
Net Income	2.6	26	2.5	25	2.0	20
Return on Net Assets	5.0%		5.0%		4.0%	
Pollution Investment / Net Assets	0		0.4		3.5*	

*Includes one-time costs for process changes, plus costs of abatement equipment; $10,000 (process) + $7,500 (abatement) = $17,500.

** Abatement Costs = Best Available Technology Economically Achievable by 1983; New Source Standards.

Due to a combination of factors, such as increasing labor costs, a firm such as the representative firm listed here would have enjoyed its highest rate of profitability in 1966 at about 6-8% return on sales, pre-tax.* In the years since then, labor costs have increased at a rate faster than the company's ability to improve productivity and raise prices. Thus, the past 5-7 years show a trend of a gradually shrinking margin of profit for these firms.

The last two columns in Table III.E.1 present the effect on profitability incurred as the plant uses the technology developed in the Guidelines Contractor's report to meet effluent abatement guidelines. The factor entitled "Pollution Costs" represents the total yearly cost of investment,and operating and maintenance expenses as estimated by the Guidelines Contractor.

The important fact to notice as the effect on profitability is traced from alternative B through alternative D, is that while net profits shrink by approximately 30% to achieve alternative D, at alternative D the rate of profit is only 2.0%. An important factor is the magnitude of the net profit, namely only $20,000.00 after tax for alternative D. Assuming a simple depreciation rate of 10% per annum over 10 years, the cash flow of the business would be approximately $70,000 per year.

The other important figure to track is the ratio of the magnitude of the pollution investment to the net asset base. In alternative D, that ratio is 3.5%.

Assuming that the representative plant was 20 years old, the value of plant and equipment would be in the range of $200-$300,000.00. This would, of course, raise each return on net assets figure, from 10% in terms of the base case, to 8% for alternative D. However, it would imply a pollution investment to net assets ratio ranging up to 7% for alternative D.

Table III.E.2 presents the corresponding financial analysis based on the Guidelines Contractor's original estimates. The potential impact is obvious. For example, at a $76,000 capital cost, a firm would be investing in abatement equipment at the rate of 15% of its asset base. For a company with the low profitability depicted here, that would usually be an untenable situation; the company would probably shut down the facility rather than make the investment.

*Data supplied by the Hardwood Plywood Manufacturers Association annual financial survey.

TABLE III.E.2

PROFITABILITY OF REPRESENTATIVE HARDWOOD PLYWOOD AND VENEER PLANT--1972

Utilizing Prior Guidelines Data

	Base Case Alternate A		Alternate B*		Alternate C*		Alternate D*		Alternate E*	
	%	$1,000	%	$1,000	%	$1,000	%	$1,000	%	$1,000
Net Sales	100.0	1,000	100.0	1,000	100.0	1,000	100.0	1,000	100.0	1,000
Cost of Goods Sold	84.9	850	84.9	850	84.9	850	84.9	850	84.9	850
GS&A	10.0	100	10.0	100	10.0	100	10.0	100	10.0	100
Pollution Costs	-	-	.5	5	1.2	12	1.5	15	1.7	17
	94.9	950	95.4	955	96.1	962	96.4	965	96.6	967
Operating Profit	5.1	50	4.6	45	3.9	38	3.6	35	3.4	33
Other Income	(.1)	(1)	(.1)	(1)	(.1)	(1)	(.1)	(1)	(.1)	(1)
Total Income	5.0	49	4.5	44	3.8	37	3.5	34	3.3	32
Provision for Income Tax	2.4	24	2.2	22	1.9	18	1.7	17	1.6	16
Net Income	2.6	25	2.3	22	1.9	19	1.8	17	1.7	16
Return on Net Assets	5.0		4.4		3.8		3.6		3.4	
Pollution Investment / Net Assets	0%		3.5		11.3		13.7		15.2	

* Abatement Costs = Best Available Technology Economically Achievable by 1983; New Source Standards

b. Effects on Capital Availability

The representative plant depicted in Table III.E.1 would also be characterized by a low level of long-term debt. At most, the firm would be relying on some short-term borrowing to finance operations, but would generally finance new investments out of cash flow or retained earnings, or through a lease-purchase arrangement with the equipment supplier. Most pieces of production equipment are available on the lease-purchase arrangement. This allows the firm to install new productive capacity without a major capital expenditure and to gradually gain ownership as the equipment becomes a productive, profitable asset.

Pollution abatement equipment might be available on a lease-purchase arrangement, but since it is not a productive asset, its cost is not financed in the same sense out of increased profitability. The recourse to debt financing, of an amount such as this, which represents a significant capital investment burden, is not attractive to the small business owner. Rather than meeting the investment, the tendency will be to close the plant and attempt to sell the assets.

In most cases, these companies have good relationships with local financial institutions. Generally the companies will have met their short-term borrowing responsibilities and will be operating at very low rates of leverage. However, debt for pollution equipment will represent a risk, one not buffered by economic incentives. On balance, a one-time investment of $17,500 could be supported by individual firms in this industry.

Simply put, then, the problem in this industry is not one of relative capital availability, but one of willingness to support the risk of debt to finance capital investment in pollution control equipment.

4. Production Effects

a. Production Curtailment

In this industry, production curtailment short of plant closure is not a likely option. In a few cases, a company which is a producer of both plywood and veneer may discontinue production of veneer, thereby saving the investment in pollution abatement equipment on the veneer side. However, veneer is becoming scarce, as domestic veneer mills shut down and as imported veneer becomes less available. Thus, it is not likely that large numbers of mills destined for closure will be able to cease veneer production and continue plywood operations.

It is possible for a plywood plant to operate on less than 2-3 full shifts. However, since a significant portion of the abatement costs must be absorbed by even a small plant, reducing production does not affect capital costs for abatement equipment significantly. Thus, there is little to be gained by simply reducing production. The decision in

terms of production curtailment is reduced to one of complete shutdown with no pollution abatement investment or full absorption of pollution abatement costs at the same or a higher rate of output.

b. Plant Closings

We estimate initially that we would categorize 76 plants as high-probability-of-closure plants, representing approximately 240 million square feet of annual production. This is approximately 11% of the 1972 output of 2.2 billion square feet.* The fact that the plant closures projected amount to 11% of 1972 production would not imply that the industry output would be reduced by that amount. The existing plants in the industry could increase output to more than meet the apparent deficit caused by these closures.

These plants were segmented as follows:

- Plants producing veneer only: 31;
- Plants producing plywood and veneer and plywood: 45.

The production of these plants is:

- Veneer: 85 MMSF per year; 3% 1972 veneer production;
- Plywood and veneer and plywood: 155 MMSF per year; 7% 1972 plywood production.

Realistically, these 76 plants can be categorized as highly probably to close based on the interaction of three factors:

- A series of market/competitive environment parameters related to decreasing profitability and inability to compete with low-priced imports;

* This figure of 240 MMSF includes some double counting. That is, some of the veneer production is sold by the veneer mill to a plywood plant not integrated to veneer manufacture. However, that did not create a substantive problem for the analysis.

- Anticipated costs for air pollution abatement programs, in many* cases estimated to be in excess of the costs associated with effluent abatement programs;

- Costs of effluent abatement.

Originally, the costs of effluent abatement were projected to account for two-thirds (51 plants) of the plants in this category.

In essence, the costs of air and water pollution abatement would have been the deciding factor which influenced closure, already made imminent through a history of marginal profitability over the previous 5-10 years.

Although statistics from different sources come up with different answers in terms of recent plant closures, our analysis pinpoints at least 39 hardwood plywood plants which were in operation in 1969 and are not in operation in 1973. These 39 plants ranged in size from an annual output of 1 million square feet per year to as much as 15 million square feet per year. The average size was approximately 6 million square feet per year.

Applying the revised cost data shifts the onus of the economic impact from water pollution related costs to (anticipated) costs of air pollution abatement and market/competitive environment parameters. Thus, only 25-30 plants**can be categorized as high-probability-of-closure plants. This is equivalent to approximately 100 MM square feet annual production, or 4% of the domestic production in 1972.

Table III.E.3 lists the characteristics of the plant in the high-probability-of-closure category. Table III.E.4 outlines the rationale the owner of a hardwood plywood plant would undertake to make the closure decision.

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* It is difficult to separate plant closure effects due to water pollution related costs and air pollution related costs. In many cases the air pollution costs will be the more significant burden. At least the tenor of the industry is such that the anticipated investments in equipment necessary to control both sources of pollution will be sufficient to cause the closure decision.

** To simplify calculations, 30 plants will be used as the number in the high-probability-of-closure category.

TABLE III.E.3

CHARACTERISTICS OF REPRESENTATIVE MILL
IN HIGH PROBABILITY OF CLOSURE CATEGORY

Product Line:

- Commodity, unfinished panels, or
- Specialty products at cost disadvantage, e.g., curved plywood for upholstered chairs losing market share to plastics, reconstituted wood

Plant Operating Characteristics:

- Small plant, 10 MMSF or less annual capacity
- Operating at 60-70% of capacity
- Veneer manufacturing, but no woodlands ownership
- Modest profitability, e.g., 2-3% net profit margin
- Basic equipment 10 years old or older

Ownership:

- Privately held
- Second generation in management

Employees:

- Skilled (veneer peeler)--semi-skilled
- Live near plant
- Generally older workers

Location:

- Rural/remote or suburban
- Mid-South region

TABLE III.E.4

FACTORS INFLUENCING PLANT CLOSURE DECISION

Plant Characteristic Factor	Plant Closure Implications	Net Effect (Plant Closure Decision)
• Salvage value of assets	• Old equipment, not valuable in new plant • Little woodlands ownership	• Favors closure
• Degree of integration	• Low degree; veneer and plywood, little raw material integration	• Favors closure
• Multiplants	• Generally single plant or strategically distinct plant operations	• Favors closure
• Technological obsolescence	• Rate of change of technology is slow	• Favors continued operation
• Air pollution	• Little equipment installed • Anticipate higher charges than for water pollution	• Favors closure
• Corporate commitment	• Some community commitment/emotional attachment • Second generation owners less committed	• No clear effect

c. Industry Growth

The growth of the hardwood plywood and veneer industry will not be materially affected by the anticipated plant shutdowns outlined here. The 39 plants identified as ceasing operations between 1969 and 1973 represented 11% of 1972 domestic production. However, the actual production in 1972 was 8% greater than that in 1969. Any increase in demand will be absorbed by higher operating rates among both small and large plants in the industry. For example, the industry's rated capacity in 1972 was approximately 3.1 billion square feet; production in 1972 was 2.2 billion square feet. This implies an operating rate of approximately 72%. Although due to the impreciseness of statistics, this operating rate is not a hard figure, it does suggest that the industry is not now operating, and typically does not operate, at maximum capacity utilization rates.

5. Employment Effects

Employment effects were based on consideration of the number of employees in the typical plant considered highly probably for closure. For a large-scale mill, more than 75 million square feet output annually, substantial productivity efficiencies can be gained. A ratio of approximately two employees per million square feet of production pertains to plants in this larger-sized category. However, for smaller plants, the ratio increases rapidly as size decreases. While a specific 40 million square foot plant operates with approximately 70-80 employees (2 employees per million square feet), another 6 million square foot plant requires approximately 50 employees to operate (10 employees per million square feet). Even a mill producing 1-2 million square feet annually would require 20-30 employees. Thus, the impact on employment due to plant closure in this industry will be higher than the impact on production.

a. Production Curtailment

As discussed in Section III.E.4, curtailment of production is not a generally viable option for the industry. Thus, the employment effects due to curtailment will be negligible.

b. Plant Closings

Plant closures account for the bulk of the employment impact. We estimate the employment impact due to plant closures will be as follows:

	Abatement Alternative	
	B	D
Gross Employment Impact		
Number	-	750
%	-	4.3%
Net Employment Impact		
Number	-	550
%	-	3.1%

Again, it is worth contrasting the impact of the revised costs with the impact based on the prior assumption of costs. Under the assumption of prior data, the impact was:

Gross Employment Impact	
Number	2,400
%	14%
Net Employment Impact	
Number	1,045
%	6%

Employment dislocations of 1,000 or more persons are possible in this industry sector if required capital costs, per plant, reach levels of $25,000 or higher (based on 5 MM square feet annual production volume).

The actual total employment in the hardwood plywood industry sector was difficult to determine since government employee statistics list total employment in softwood and hardwood, and do not separate the two sectors. Also, some plywood prefinishers which we have excluded from our analysis are also included in these statistics. However, we estimate that the employment in the hardwood plywood and veneer industry is approximately 17,500 employees.

c. Industry Growth

Again, as detailed in Section III.E.4 on production effects, we do not anticipate that the industry growth rate will be materially disrupted by plant closures due to abatement costs. Thus, the effect on employment due to industry growth changes will be negligible.

6. Resultant Regional Effects

a. Regional Economic Impacts

Table III.E.5 presents the regional distribution of plant closures* and unemployment. As the table demonstrates, 47% of the plant closures and dislocated persons are located in the states of the mid-South (the Carolinas, Virginia, Kentucky, Tennessee). Approximately 70% of the 750 persons dislocated (550 net unemployment) will be unable to find other, comparable jobs due to the following factors:

- location in a remote, rural community
- unwillingness/inability to relocate in a new community
- age
- lack of skills needed/translatable to other industries

* All of these plants, of course, may not close. They are categorized as high-probability-of-closure due to required abatement cost burdens.

TABLE III.E.5

REGIONAL ECONOMIC IMPACT

Region	Closures		Gross Employment Impact
	%	Number	
Mid-South	47	14	350
North-Central	21	6	160
Southeast	17	5	130
Northeast	9	3	70
Southwest	3	1	20
West	3	1	20
	100	30	750

Net Employment Impact: 550

Most of the plant closures will be located in rural communities. Thus, the number of impacted communities will be approximately the same as the number of plant closures, e.g., 30.

Again, to suggest the possible impact on the industry due to higher required capital costs, Table III.E.6, based on the original assumption of softwood plywood capital costs, is presented.

b. Probability of New Plants

Our studies of investment patterns in the forest products industry in the United States suggests that for several reasons, including wood availability and generally lower operating costs, the domestic forest products industry will be investing more heavily in the states of the mid-South and Southeast than any other comparable region. This suggests that workers displaced from these plants could be utilized in new plants. However, the lead time from investment decision to plant startup for a pulp and paper mill is 3-5 years; it is about one year for a large saw mill or veneer and plywood mill. Thus, while there will be new opportunities in these areas, they will not be available immediately. And, rather than being located in a number of small communities throughout the region, they will tend to be concentrated as larger complexes in fewer communities.

c. Probability of Relocation in Local Work Force

Skills applicable to work in a plywood and veneer mill are, on balance, translatable into other manufacturing operations. Certain operations, such as the actual peeling of veneer from a debarked log, are quite high-skill occupations. However, the bulk of the operations performed in the plywood mill can be learned readily. Thus, employees displaced from plants will generally not have skills so specific that they could only find employment in another plywood plant. Nor will they be in demand as highly skilled labor.

Since these mills are generally quite small, relatively few people will be put out of work in an individual community. Thus, those communities with a large enough population and economic base not to be significantly impacted are expected to have vocational opportunities for the displaced persons. We would expect of the persons displaced in non-impacted communities, approximately 60-70% of these people would be able to find other, comparable employment.

d. Secondary Effects Yielding Further Unemployment

Secondary effects should be minimal in this industry. Most of the small plants are relatively self-contained, even to the extent of having their own logging crews. Thus, the closure of a small veneer mill will probably not imply displacement of logging personnel as well.

TABLE III.E.6

REGIONAL IMPACT

Based on Prior Data

State	Number of Closures	Number of Community Impacts	Gross Employment Impact All Closures	Gross Employment Impact Impacted Community
Alabama	6	3	210	100
Arkansas	1	-	20	-
California	2	-	35	-
Florida	2	1	70	35
Georgia	3	1	100	45
Indiana	3	-	100	-
Kentucky	2	-	70	-
Michigan	3	1	100	30
Mississippi	1	-	45	-
Minnesota	1	-	25	-
New Jersey	1	-	25	-
New York	5	4	170	135
North Carolina	15	7	470	220
Ohio	1	1	30	30
Pennsylvania	2	-	75	-
South Carolina	9	6	290	195
Tennessee	3	-	100	-
Texas	2	1	50	25
Vermont	1	1	30	30
Virginia	7	1	210	30
Wisconsin	6	4	190	130
TOTAL	76	31	2,400[1]	1,005[1]
		Net Employment Impact:	1,045	655[2]

[1]Numbers may not add due to rounding.

[2]Based on assumption that 65% will not find comparable employment.

Also, many of the persons who supply logs to plywood and veneer mills are farmers and other land owners who cut logs to augment their income but are not solely dependent on logging fees to support their families.

7. Balance of Payments Effects

Hardwood plywood imports account for approximately 75% of the total domestic consumption of hardwood plywood. The imported product competes on the basis of lower price due to substantially lower labor costs and ready availability of quality peeler logs. In the last 20 years, there has never been a substantial export of domestically produced hardwood plywood. We do not anticipate a shift in this basic trend.

There will be no effect on balance of payments due to pollution abatement cost requirements. Although a significant number of plants will be closed, the net effect will not be a significant reduction in industry output or growth. Thus, domestic supply will not be materially affected and, for that reason, imports will not materially increase.

There are other factors which may have a salutary effect on the balance of payments. For example, Japan is consuming more hardwood plywood from the primary producing nations, i.e., Korea, Philippines, and Taiwan. Japanese demand siphons off a significant portion of the productive capacity from this region. The Japanese market has been willing to pay the prices which make it very attractive to ship to Japan instead of to the United States. Further, the availability and cost of high-quality peeler logs is rising in the Southeast Asia/Oceania countries, causing higher landed prices in the United States. The net effect is to make domestic production more competitive.

In effect, the balance of payments will not be materially affected by pollution abatement requirements under the assumptions used for this analysis. Other factors have a far more important influence on balance of payments in this sector than environmental control costs.

APPENDIX A

The Costs of Water Pollution Abatement

An evaluation of the impact of pollution control costs on the wood preserving industry rests on an understanding of the industry and of the costs of control. The industry description has been developed in Section II.B of this report. This section takes the cost of control data developed by the Guidelines Contractor and puts it into a form which can be used for the impact analysis.

The cost data only applies to pressure treating plants using oil borne preservatives and steam conditioning of the wood. Other industry segments are required to have zero discharge and thus no treatment costs. Firms which are in these segments of the industry and which are not now in compliance will have to make expenditures to achieve zero discharge. But these costs have not been estimated and are not included in the impact analysis.

The costs and this impact analysis are thus confined to firms which are for the most part in the Southeastern and South Central United States.

Sources of Data

The cost of abatement estimates use data from two sources -- the Effluent Limitation Guidelines Standards and the Contractor's field interviews.

Standards

The industry has expressed a substantial level of concern about meeting the pollution standards. However, it appears that much of the concern derives from confusion as to what the standards are, particularly in the areas of the definition of zero discharge and the collection of storm water runoff.

The following sections from the standards should be kept in mind:

- "Control of storm water in the immediate vicinity of retorts and preservative storage tanks may be required because of the accumulation of oil from spillage... total area should be quite small."

- "Collection and treatment of storm water from yards where treated products are stored are unnecessary."

- "Construction of a lagoon or other suitable structures at a location such that it will intercept major spills is recommended at all plants."

- "Plants unable to acquire the land needed for lagoon construction should be given special consideration with regard to effluent limitation requirements."

Also from conversations with the Guidelines Contractor, it is our understanding that "zero discharge" includes (under prescribed conditions):

- discharge into a sewer system

- land disposal (3500 gal/acre/day) of effluent that has been flocculated and put through an equalization pond

- storage in a lagoon for reuse

Capital Costs of Abatement

The Guidelines Contractor conducted a survey of the costs of control which "exemplary" plants were actually experiencing and then constructed a set of costs of a "hypothetical" plant. It is these later costs which have been used in the analysis. The abatement components are:

A - Oil Separation

B - Coagulation and Filtration

C_1- Biological Treatment, Aerated Lagoons

C_2- Biological Treatment, Activated Study

D - Polishing Treatment, Chlorination

E - Effluent Measurement

The costs for 1977 assumed components A, B, C_1 or C_2, and E. For 1983, component D is added. Table A-1 lists the capital and annual costs of each component.

When evaluating the impact of the costs for 1977, components A, C_2, and D were omitted. The Guidelines Contractor's survey found that almost all plants now have oil separation equipment, and plants would choose C_1 over C_2 as being less expensive. Thus, the total capital costs for the hypothetical plant are $68,040 with annual costs (including capital costs)of $22,917.

TABLE A-1

CONTROL TECHNOLOGY COST FACTORS

Cost Factor	Treatments [1] A	B	C_1	C_2	D	E
Investment	29,760	43,320	21,120	120,000	8,400	3,600
Annual Cost						
Capital (6%-20 yrs.)	2,600	3,800	1,850	10,500	650	315
Depreciation (20 yrs.)	1,488	2,166	1,056	6,000	4,200	180
Operation and Maintenance	800	3,000	7,000	10,000	5,300	2,000
Energy	-	200	1,300	1,300	150	50
Total Annual Cost	4,888	9,166	11,206	27,800	10,300	2,545

Based on 15.9 million liters per year

A - $0.31/1000 liters
B - 0.58/1000 liters
C_1 - 0.70/1000 liters
C_2 - 1.75/1000 liters
D - 0.65/1000 liters
E - 0.16/1000 liters

SOURCE: Development Document for Effluent Limitations Guidelines and New Source Performance Standards, May 1973.

[1] Best Available Technology Economically Feasible by 1983; New Source Standards.

An Evaluation of Hypothetical Plant Costs

The hypothetical plant (HP) is described as producing 15.9 million liters per year of effluent. We want to be able to relate the costs to plants by their production volume and employment. With internal process changes, a plant could get its effluent flow down to 133 liters (L) per cubic meter (m^3) of production.

The average flow/production value for plants 1, 2, 3, 4, 6, 7, 8, and 9 is 180 L/m^3. (Plant 7 had 189,300 L/day exclusive of cooling water.) The plants in the Contractor's survey had an average flow of 192 L/m^3. The Contractor's number covered more plants but without the emphasis on accuracy of the Guidelines Contractor's number. Therefore, we have taken the 192 L/m^3 as confirmation that our data sources are comparable and used the 180 L/m^3 figure in our calculations.

Perhaps the easiest way to see the approximate nature of the calculations one must make for evaluating the impact of control costs on firms is to examine the listing of effluent flow per production for the plants in the Guidelines Contractor's survey. This is indicated on Table A-2.

The cost values are directly related to the flow, yet one sees that the flow per unit of production and thus the costs per unit of production can in principle vary by as much as -57% to +44%. These differences reflect different products (railroad ties have significantly less flow) and different amounts of internal housekeeping. But the important point is that any analysis using the average values must be understood to represent a wide range of values.

Using the effluent per production value, one can compute the production of the HP as being 88,300 m^3 of product.

From the Contractor's survey, those plants reporting both employment and production give the value of 706 m^3 of product per employee. Thus, the HP has an employment of 125.

One can also compute the approximate sales of the HP by knowing that the total production for the industry for 1971 was 7.6 million m^3 with a value of $416.9 million. The price per unit of production was $\$54.86/m^3$. Thus, the sales for the HP would be $4,844,140.

When the total yearly control cost of $22,917 is divided by the total production, one gets the cost of control per unit of production as $\$.259/m^3$. Thus, value divided by the unit sales price gives the cost of pollution control as a percent of the sales price as .47%. This means that in order to completely cover the added yearly cost of pollution control, the HP would have to raise prices by .47% neglecting any increased margin to cover a return on assets.

TABLE A-2

EFFLUENT FLOW PER UNIT OF PRODUCTION

Plant No.	Effluent/Production (L/m^3)
1	261
2	174
3	223
4	78.2
6	84.8
7	267
8	231.5
9	84.8

- average of ratios is 176 L/m^3
- sum of effluent flow/sum of production is 186

SOURCE: Timber Products Effluent Limitation Guidelines

As a measure of how realistic the capital costs are, one can compute the capital expenditures per unit of production for the HP and the actual plants surveyed. The $68,040 cost for processes B, C_1, and E has a ratio of $.77/$m^3$ of product for the HP. Using the data from plants 2, 3, 4, 6, and 7, which are in compliance with the standard, one finds that on the average these plants have experienced $.47/$m^3$ or $.37/$m^3$ assuming 250 working days and 312 working days per year respectively. Thus, the cost of abatement estimates for the HP are significantly higher than the average of actual costs experienced by plants in the industry, even assuming significant inflationary effects. The impact analysis can be largely regarded as a worst case analysis.

The Effects of Scale

When extrapolating the costs of the HP to the impact analysis for the whole industry, one quickly faces the problem of economies of scale. If one assumes that the costs of abatement are a linear function of production with zero cost for zero production, then the impact on the industry will be very small. The cost data supplied to ADL implies such a relationship.

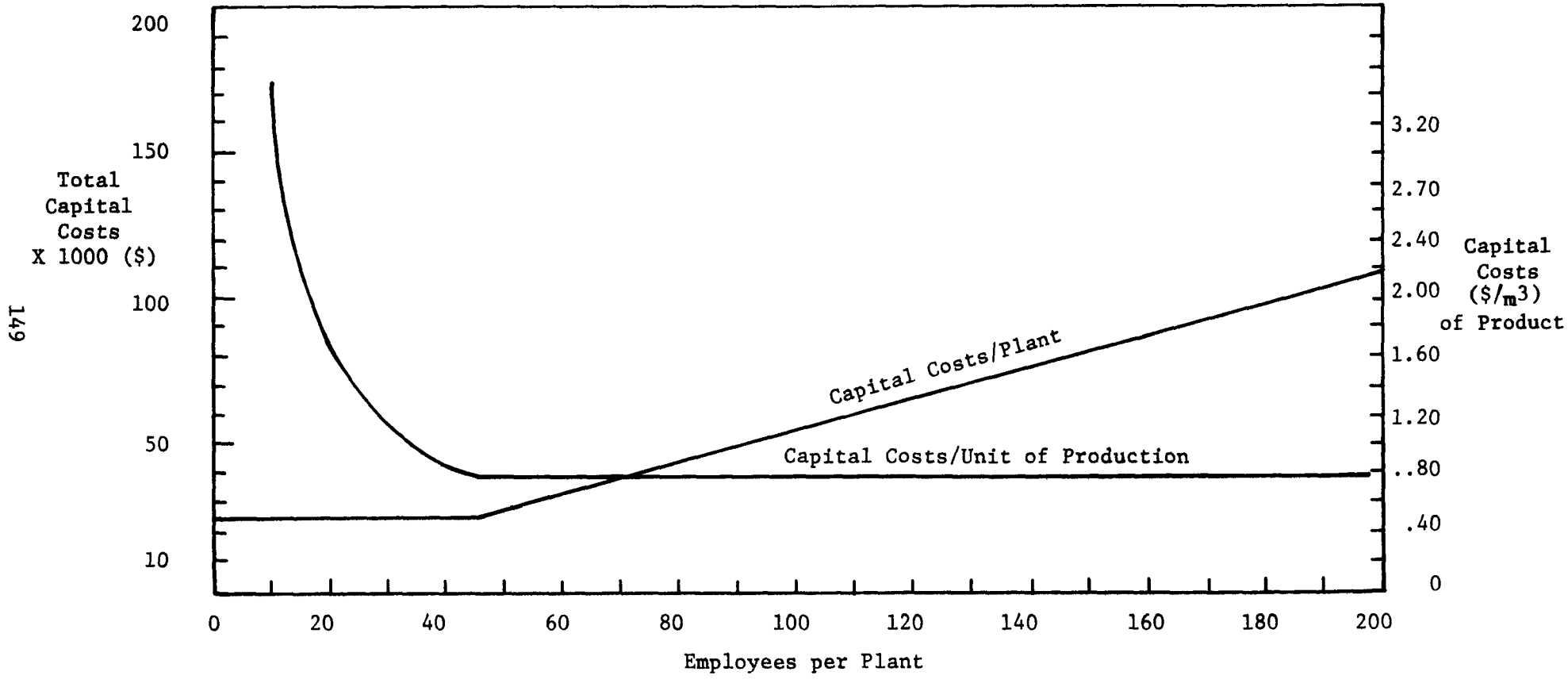
This cannot be the relationship since there are economies of scale associated with water pollution control. There are specific technologies with largely "off the shelf" components assumed in the cost estimates. The situation suggests both discrete steps in treating capacity and costs and perhaps a minimum size treatment plant.

We do not have any data to resolve this issue and can only describe how it will have an effect. Figure A-1 plots the capital costs per plant versus plant size and also the capital costs per unit of production versus plant size. The figure assumes the HP costs and extrapolates them linearly to other plant sizes. At 46 employees, it is assumed that the minimum treatment plant size is reached. Smaller plants must build a treatment plant of at least 18,950 L/day (5,000 gal/day). (It is the Guidelines Contractor's impression that 5,000 gal/day is the smallest treatment plant currently in existence and may be approximately the smallest that can be built with the assumed costs). This may not be the right minimum size, but the effect can be seen by the example. The capital cost per unit of production rises very sharply for smaller plants. This does not mean that every plant with less than 46 employees will be closed. The costs are still small for plants in the 30 to 46 range. But already marginal plants of 20 and fewer employees will have great difficulty justifying the financial investment necessary to be in compliance, especially when they will be at a further competitive disadvantage when they reach compliance because the costs will have fallen more heavily on them than their larger competitors.

As a point of comparison, Figure A-2 shows the distribution of wood preserving plants by number of plants and by value of shipments versus the number of employees per plant. One quickly sees that the

FIGURE A-1

Possible Effects of Economies of Scale on Treatment Costs

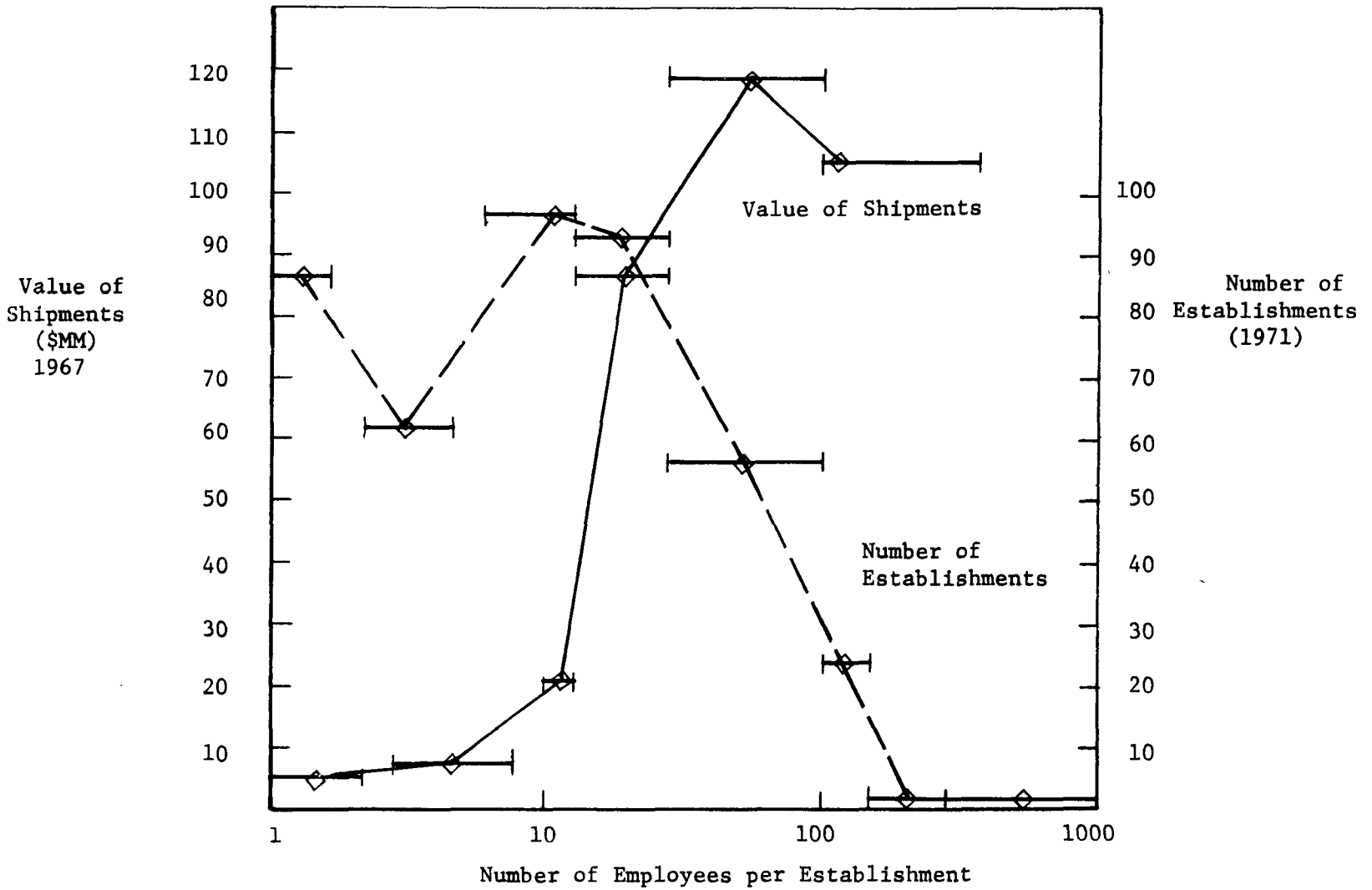


Capital Cost of B + C, + E = $68,040 for 15.9 x 10^6 L/yr of effluent

SOURCE: Contractor Estimates

FIGURE A-2

Number and Size Distribution of Plants



NOTE: (———) indicates range of employees per plant.

The Hypothetical Plant (HP) has 125 employees.

majority of the plants are below the 46 employee size and a significant portion of the production is also below that size. One can also see that the HP is much larger than the typical firms in the industry measured both by the number of such firms and the production accounted for by such firms.

TECHNICAL REPORT DATA PAGE	1. Report No. EPA-230/1-73-029	2.	3. Recipient's Accession No.
4. Title and Subtitle: Economic Analysis of Proposed Effluent Guidelines - Timber Processing Industry			5. Report Date: August 1973 6.
7. Author(s): Thomas L. Doorley, Karl P. Fagans, Ronald Levy, Lauren S. Ward and Richard Williams			8. Performing Organization Rept. No. C-75901
9. Performing Organization Name and Address: Arthur D. Little, Inc. Acorn Park Cambridge, Massachusetts 02140			10. Project/Task/Work Unit No. Task Order No. 1 11. Contract/Grant No. 68-01-1541
12. Sponsoring Organization Name and Address: Office of Planning and Evaluation Environmental Protection Agency Washington, D.C. 20460			13. Type of Report & Period Covered: Final 14

15. Supplementary Notes

16. Abstracts

An analysis of the economic impact on certain timber processing industry sectors (hardboard, wood preserving, plywood and veneer) of 1977 and 1983 effluent guidelines. Impacts were found to be concentrated on small firms and particularly manufacturers of hardwood plywood and veneer, and wood preservers. For small firms in these sectors, capital costs for abatement equipment will force many of them to consider plant closure. However, for each of these industries, in toto, abatement costs will not be severe; plant closures and increased prices to users will be minor.

17. Key Words and Document Analysis. 17a. Descriptors

Effluent Abatement
Economic Impact Analysis--Timber Products Processing

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Availability through U.S. Environmental Protection Agency Information Center; Rm.W327, Waterside Mall, Washington, D.C. 20460	UNCLASSIFIED	167
	20. Security Class (This Page) UNCLASSIFIED	22. Price