EPA-230/1-76-029a
November 1976

ECONOMIC ANALYSIS OF PRETREATMENT STANDARDS FOR THE WOOD PRESERVING SUBCATEGORIES OF THE TIMBER PROCESSING POINT SOURCE CATEGORY

Prepared for
Office of Water Planning and Standards
Economic Analysis Staff
U.S. Environmental Protection Agency
Washington, D.C. 20460

Environmental Protection Agency
Region V Library
230 South Dearborn Street
Chicago, Illinois 60604

This report has been reviewed by the Office of Water Planning and Standards, EPA, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

ENVIRONMENTAL PROTECTION AGENCY

PREFACE

The attached document is a contractor's study prepared for the Office of Water Planning and Standards 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 pretreatment standards to be established under section 307(b) of the Federal Water Pollution Control Act, as amended.

The study supplements the technical study, "EPA Development Document," supporting the issuance of interim final regulations under section 307(b). The Development Document surveys existing and potential waste treatment control methods and technology within particular industrial source categories and supports interim final promulgation of pretreatment standards based upon an analysis of the feasibility of these standards in accordance with the requirements of section 307(b) 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 Water Planning and Standards of EPA. This report was submitted in fulfillment of Contract 68-01-4156 by Arthur D. Little, Inc. Work was completed as of November, 1976.

This report is being released and circulated at approximately the same time as publication in the Federal Register of a notice of interim final rule making under Section 307(b) of the Act for the subject point source category. The study is not an official EPA publication. It will be considered along with the information contained in the Development Document and any comments received by EPA on either document before or during interim final 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.

TABLE OF CONTENTS

	Page
List of Tables	vi
List of Figures	viii
I. EXECUTIVE SUMMARY	1
A. SCOPE OF WORK	1
B. CONCLUSIONS	1
1. Industry Subsegments	2
2. Financial Profiles	2
3. Pricing	2
4. Methodology	3
5. Costs of Compliance	4
6. Economic Impact Analysis	4
II. METHODOLOGY	9
A. GENERAL APPROACH	9
B. PRICE EFFECTS	9
C. PLANT CLOSURE EFFECTS	10
D. MODEL PLANTS	12
III. INDUSTRY STRUCTURE	13
A. INDUSTRY DESCRIPTION	13
1. Products	13
2. Production	14
3. Substitute Products	17
4. Future Demand	17
5. Ownership	17
B. INDUSTRY SEGMENTS	20
1. Types of Firms	22
2. Types of Plants	23
3. Financial Profile	29
4. Industry Pricing	31
C. MODEL PLANTS	39
1. Model Inorganic Plants	39
2. Model Organic Plants	41
3. Models of Plants Treating with Both Organic and Inorganic Preservatives	43
4. Model Financial Statements	43

TABLE OF CONTENTS

(Continued)

		Page
IV.	EFFLUENT LIMITATIONS, TECHNOLOGIES AND COSTS	48
	A. LAND	48
	B. EFFECTS OF EQUIPMENT ALREADY IN PLACE	50
	C. TREATMENT PHASE C	54
	D. SCALE EFFECTS	54
	E. INDUSTRY ESTIMATES	54
V.	ECONOMIC IMPACT ANALYSIS	56
	A. ANALYSIS AND PROJECTION OF PRICE EFFECTS	56
	1. Industry Factors Governing Price Increases	56
	2. Price Increases Required to Cover Abatement Costs	59
	3. Probable Price Increases for the Inorganic Subsegment	59
	4. Probable Price Increases for the Organic Subsegment	63
	5. Probable Price Increases and Projection of Price Effects for Plants Using Both Inorganic and Organic Preservatives	65
	6. Secondary Effects of Price Increases	66
	7. Effects on Substitutes	66
	B. FINANCIAL EFFECTS	66
	1. Inorganic Plants	66
	2. Organic Plants	68
	3. Plants Which Treat with Both Preservatives	70
	4. Capital Availability	70
	5. Production and Employment Effects	72
	6. Resultant Community Effects	80
	7. Balance of Payments Effects	80
VI.	LIMITS OF THE ECONOMIC ANALYSIS	81

LIST OF TABLES

Table		Page
II-B-1	Price Increase Analysis Matrix	10
II-C-1	Plant Closure Analysis Matrix	11
III-A-1	Wood Treated with Preservatives	15
III-A-2	Preserved Wood Products and Their Substitutes	18
III-A-3	Concentration in Wood Preserving Industry for 1963, 1967, 1970 and 1972	19
III-A-4	Ownership Organization of the Wood Preserving Industry, 1972	21
III-B-1	Ownership of Wood Preserving Plants Discharging into POTW Compared to Total Industry	23
III-B-2	Comparison of Plants Using POTW's and Total Industry by Preservative Used	25
III-B-3	Distribution of Plants Using POTW by Number of Cylinders and Type of Preservative	25
III-B-4	Data of Construction of a Randomly Selected Sample of Plants Utilizing Publicly Owned Treatment Works	27
III-B-5	Regional Distribution of Plants Discharging to POTW Compared to Total Industry	28
III-B-6	U.S. Corporate Profits (After Taxes) as a Percent of Sales	30
III-B-7	Cost of Production Factors: 1967 and 1972	32
III-B-8	Selected Operating Ratios for the Wood Preserving Industry: 1958 to 1973	33
III-B-9	Expenditures for New Plant and Equipment by the Wood Preserving Industry	34
III-B-10	Wood Preservatives--Price History	36
III-B-11	Prices of Selected Preserved Wood Products	37
III-B-12	Material Treated in 1974, by Region, and United States Total 1973-1974	38
III-C-1	Model Inorganic Treating Plants	40
III-C-2	Model Organic Treating Plants	42
III-C-3	Model Inorganic and Organic Treatment Plants	44
III-C-4	1972 Census Statistics by Employment Size of Establishment	46
III-C-5	Representative 1972 Income Statements for Model Plants	47

LIST OF TABLES

(Continued)

Table		Page
IV-1	Capital and Operating Cost Estimates of Pretreatment for Organic Preserving Plants	49
IV-2	Summary of Pollution Control Status	51
IV-3	Summary of Abatement Costs	53
V-A-1	Price Increase Analysis Matrix	57
V-A-2	Price Increases Required for Industry Subsegments	60
V-A-3	Number of Plants in Each Cost Impact Group	61
V-A-4	Minimum Price Increases Required for Industry Subsegments	62
V-B-1	Pro Forma Income Statements for Model Plants--Inorganic Preservatives	67
V-B-2	Pro Forma Income Statements for Model Plants--Organic Preservatives	69
V-B-3	Pro Forma Income Statements for Model Plants--Both Organic and Inorganic Preservatives	71
V-B-4	Plant Closure Analysis Matrix	73
V-B-5	Financial Ratios for Inorganic Preserving Plants	74
V-B-6	Financial Ratios for Organic Preserving Plants	76
V-B-7	Financial Ratios for Plants Which Treat with Both Types of Preservatives	78
V-B-8	Employment Impacts	79

LIST OF FIGURES

Figure		Page
1	Wood Preserving Plants in the United States	16

I. EXECUTIVE SUMMARY

This is a summary of the Contractor's final analysis of the economic impact on the Wood Preserving Industry (SIC 2491) to meet the Effluent Pretreatment Guidelines.

A. SCOPE OF WORK

The industry segment analyzed is the group of Wood Preserving plants which discharge to Publicly Owned Treatment Works (POTW's). This segment was separated into three subsegments:

- Plants which treat only with Inorganic Preservatives,
- Plants which treat only with Organic Preservatives, and
- Plants which treat with both Organic and Inorganic Preservatives.

All of these subsegments were studied to define the structure of the industry and to estimate the nature and severity of the costs of compliance.

B. CONCLUSIONS

It is necessary to consider the three Wood Preserving Industry subsegments separately because they face different costs of compliance. The sectors vary in their business characteristics; e.g., they are in differing states of growth. Products are similar among some of the subsegments, however, so competition among them must be considered. Further, some of the companies may be active in more than one subsegment. Therefore, although separate economic impact analyses are required, some attention must be given to how the impacts on one subsegment will affect the others.

In general, the costs of compliance as reported in the Development Document are not overwhelming for these industry subsegments. Since they do not utilize large amounts of process water, the incremental capital and operating costs necessary to meet abatement Guidelines are not large. However, within specific plants the effect on operations can be significant, especially for the small, independent business which is quite sensitive to relatively small cost increments.

There will be essentially no impact on total production for the industry. Where plants will close, they will be few in number, and will be smaller firms with relatively little impact on total industry output. In addition, these industry sectors are characterized by moderate levels

of capacity utilization, e.g., 40-70% of total capacity. Thus, any production deficiency resulting from plant closures will be offset by the remaining facilities.

Small price increases will occur in all subsegments as a result of pretreatment requirements and plants will absorb the remaining pollution abatement costs. Profit margins of smaller plants will be significantly affected.

Unemployment effects will be distributed around the South, North Central, and Northeast. However, the total effect of unemployment will not be large; no one community will be affected by more than one plant closure.

Abatement costs will not affect balance of trade; export trade is minimal.

1. Industry Subsegments

The objective of dividing the industry into subsegments was to group plants into categories which might be affected differently by effluent control requirements. For these industry subsegments, the costs of compliance can be directly related to the type of process used. Each of the three groups studied performs different operations and has different effluent practices, and thus faces different costs of compliance. Segmentation was based on operating characteristics of plants within the subsegments and representative model plants were developed for each.

2. Financial Profiles

Five financial profiles were developed to represent model plants within the industry. These model plants have widely-ranging characteristics as follows:

- Annual Sales: $150,000 to $6,000,000
- After Tax Income: $6,000 to $240,000
- Net Assets: $100,000 to $1,000,000
- Number of Employees: 2-50+

3. Pricing

Pricing dynamics vary somewhat within the subsegments. Basically, however, they are characterized by negotiated or bid prices which are set in response to industry-wide average price levels. Most products do not maintain brand loyalties, and price competition is high. The products face strong competition from similar treated products, untreated wood products and non-wood substitute products (e.g., steel, concrete,

aluminum) which creates a ceiling for price increases. However, prices have increased considerably in the past three years as a result of increased costs for raw materials.

Inorganically treated products are in a state of growth, in contrast to the essentially zero growth of demand for organic products. As a result, inorganic products experience greater pricing flexibility in some markets.

4. Methodology

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

- The probability that costs of compliance will be passed on to consumers via increased end product costs or will be absorbed by operators, resulting in a lower level of profitability; and

- If costs cannot be passed through, the extent to which the effect on financial condition and limitations of capital availability will force plant closures, thus causing unemployment and community effects.

Since there are many small, privately-held firms in this industry for which data is not generally available on operations or financial position, we had to develop new data on the various industry segments through surveys of firms within the individual subsegments plus interviews with industry associations and others knowledgeable of industry practice. This was supplemented by background and interpretive data which we have accumulated over time.

The conclusion that prices are likely (or not likely) to be able to be passed on is a relatively straightforward economic analysis. Table II-B-1 (p. 10) presents the price increase analysis matrix which we used to derive price increase conclusions. However, if prices are not likely to be increased and costs are absorbed with relatively well-documented financial effects, it is more difficult to reach conclusions regarding plant closures. The plant closure analysis matrix which we used to structure these decisions is presented in Table II-C-1 (p. 11). This analysis is complicated by the fact that small, family-owned and operated, one-plant firms which are common in these industry sectors, show remarkable "staying power" in the face of significant negative financial effects. The extent of subjective commitment to the business is an extremely difficult factor to measure and assess. Standard business reasoning, such as effect of abatement costs on key profitability ratios (e.g., return on net assets, profit margin) can be used to focus on the key issues, but the factors related to the nature of the small firms in this business were used necessarily as subjective elements to supplement the objective analysis.

5. Costs of Compliance

Capital costs of compliance vary dramatically among the subsegments, ranging from $50,000 to $238,500. The cost burden is significant for many of the small plants in each category.

6. Economic Impact Analysis

The wood preserving plants use small volumes of process water for the most part. However, capital expenditures are usually low and asset values small, so the costs of compliance may cause financial setbacks to some plants. Even so, the plants which will be most affected are small, thus the costs required to meet effluent guidelines will not cause a severe dislocation in the industry in total.

- Price Effects. Implementation of Pretreatment Guidelines will result in price increases of about two percent for the 11 inorganic plants, one percent for 23 organic plants, and one percent for 15 plants treating with both types of preservatives. This will allow the larger plants to maintain present rates of return on sales.

- Financial Effects. Since some plants will not be able to fully pass along cost increases, they will suffer a decrease in profitability. For about three inorganic plants, two organic plants, and two plants treating with both preservatives, this will mean a high probability of closure.

- Production Effects. Seven plants may close (14 percent of total in POTW segment). However, this loss in capacity is small, probably less than one percent of the industry and would be counterbalanced by increased production in other plants.

- Employment Effects. About 60-70 workers (approximately seven percent of the total) could be unemployed.

- Community Effects. The plants with high closure probability are located in different geographical areas. At least three are part of other wood-related operations on the same site which may be able to absorb the workers.

- Balance of Payments Effects: Zero.

7. Limits to the Analysis

The two key problems limiting the accuracy of the present analysis are based on:

- A limited availability of data; and,

- The nature of the industry.

We conducted representative surveys of the industry and discussions with industry members to enable us to deal with the data limitation factor. The consistency of our data suggests that this can be accomplished within a relatively narrow band of error.

The second problem, the nature of the industry, makes it difficult to project plant closures, as noted above. However, since some of the costs are modest and even small firms may be able to bear the burdens, the difficulty of accurately projecting plant closures is less important. If new Guidelines would cause increased costs to be borne by companies in this sector, then this would be a more sensitive issue.

Thus, although data was somewhat limited and the nature of the industry forced us to use subjective as well as objective analysis, we believe the analysis as presented is accurate within a fairly narrow band of error (±10%).

INDUSTRY SUMMARY

Wood Preserving Industry

SIC 2491

# Plants in segment	49
% Total plants in industry	12%
# Plants discharging to municipal system	49
% Total plants in segment	100%
Total capital cost	$5,040,000
Total annual incremental increase including capital charges	1,744,000
Total annual incremental increase excluding capital charges	1,217,000

A. Subsegment I: Plants treating with inorganic preservatives

# Plants in subsegment	11
% Total indirect dischargers	22%
	Pretreatment

Cost of Pollution Abatement

Capital costs for subsegment

Total capital cost	$550,000
Total capital expenditures as % average annual investment	167%
Total capital expenditures as % of total capital in place (book value)	17%

Annualized costs for subsegment

Total incremental increases including capital charges	$130,000
Total incremental increase excluding capital charges	65,000
Total incremental increase including capital charges as % of sales	1.0 - 6.7%
Expected Price Increase	2.0%

B. Subsegment II: Plants treating with organic preservatives

# Plants in subsegment	23
% Total indirect dischargers	47%

	Pretreatment
Cost of Pollution Abatement	
Capital costs for subsegment	
Total capital cost	$2,632,000
Total capital expenditures as % of average annual investment	462%
Total capital expenditures as % of total capital in place (book value)	13%
Annualized costs for subsegment	
Total incremental increase including capital charges	$1,004,000
Total incremental increase excluding capital charges	743,000
Total incremental increase including capital charges as % of sales	0.9 - 10.5%
Expected Price Increase	
Expected increase due to pollution control	1%

C. Subsegment III: Plants treating with organic and inorganic preservatives

# Plants in subsegment	15
% Total indirect dischargers	31%

	Pretreatment
Cost of Pollution Abatement	
Capital costs for subsegment	
Total capital cost	$1,858,000
Total capital expenditures as % of average annual investment	628%
Total capital expenditures as % of total capital in place (book value)	17%
Annualized costs for subsegment	
Total incremental increase including capital charges	$610,000
Total incremental increase excluding capital charges	408,000
Total incremental increase including capital charges as % of sales	0.9 - 7.2%
Expected Price Increase	
Expected increase due to pollution control	1%

D. For Total Segment

Plant Closures	
Total closures anticipated % reduction of plants in segment	14%
Employment	
Total # of employees affected	63
% of total employees in segment	7%
Community Effects	small
Impact on Industry Growth	none
Balance of Trade Effects	none

II. METHODOLOGY

A. GENERAL APPROACH

Information concerning general industry trends were gathered from a variety of sources including the contractor's previous work in the industry, Commerce Department statistics on the industry and interviews with knowledgeable industry sources. Information on specific plants discharging to POTW's was obtained from the Development Document and contractor interviews in person, by phone and through a mail questionnaire with selected plants. Estimates of the cost of effluent abatement were obtained from the Development Document contractors. Other estimates provided by industry sources will be considered in the report in the form of sensitivity analyses. All of the above information will be used to evaluate the likelihood of price increases due to the pretreatment standards and, subsequently, the possibility of plant closures for the affected segments.

B. PRICE EFFECTS

The analysis of price effects of the pretreatment guidelines is based upon consideration of both changes in industry average price levels and the ability of individual firms to change their prices.

Firms which are able to change prices sufficiently to fully recover the costs of pretreatment requirements will experience little or no economic impact, assuming there are no capital availability constraints. Changes in average industry prices could result in changes in total demand for preserved wood products, depending upon price elasticity of demand.

The elasticity of demand varies to some extent by individual product. The demand for those products which face less competition from substitute products will not decrease significantly with an increase in price. Railroad ties are an example. Other products face more severe competition from untreated wood and/or substitute construction materials and so have greater price elasticity.

A more serious price constraint is the inability of individual firms to charge prices very different than the industry average. Therefore, firms experiencing significantly higher pretreatment costs than the industry average or price leaders in the industry, will not be able to charge prices sufficient to fully cover their added costs.

If products are sold on the basis of price rather than quality of service, as is true in the wood preserving industry, then individual firms must price their products at industry-wide levels. Similarly,

since market shares are generally small for any individual firm or plant, then price competition is high and cost increases of individual producers are more likely to be absorbed.

There are a number of factors which influence the ability of individual firms to increase their prices. These are outlined in Table II-B-1. In Section V each of these factors will be further described and examined for each industry subsegment to determine the degree to which plants in the subsegment may be expected to be able to pass along cost increases.

The ability for firms in this industry to pass on cost increases is to a significant extent a macroeconomic consideration, i.e., heavily influenced by the total supply/demand balance. In a strong market, demand may be strong enough to accept substantial price increases. Conversely, in a weak market, firms may have to absorb most cost increases. Thus, the final determination of price effects is heavily influenced by analysis of supply/demand factors.

TABLE II-B-1

PRICE INCREASE ANALYSIS MATRIX

Parameter	Condition for Constraint
Annualized Cost as a Percent of Net Sales	Higher than 10%
Substitute Products	High occurrence; ready substitution
Industry Capacity Utilization	Low; e.g., operating rate less than 80%
Demand Growth	Low; e.g., less than GNP
Foreign Shipments	High
Abatement Cost Differences Within Industry	Unequal distribution of costs
Price Elasticity of Demand	High
Basis for Competition	Price
Market Share Distribution	Fragmented

C. PLANT CLOSURE EFFECTS

If costs of abatement cannot be passed on to consumers or if capital is not available, then the management of individual plants must decide whether to continue operations at lower levels of profitability, or to shut down. This decision depends on the magnitude of financial impact on operations. The factors incorporated into our analysis of plant closures are listed in Table II-C-1.

Three of the parameters in Table II-C-1 deserve specific attention.

- Extent of integration--If a plant is part of an extensive lumber, plywood or other wood processing operation, it is likely to be kept open even if financial impacts or capital requirements are relatively severe.

- Other facilities on a common site--An isolated plant is most vulnerable for the reasons described in the integration discussion above.

- Ownership--A large, publicly-owned firm would tend to make a shutdown decision based on "rational" business analysis, such as effects on profitability. Such a firm would likely have specific criteria for each of its operating facilities to meet. However, a private owner tends to have greater "staying power," a greater personal commitment to staying in business even if profitability is substantially reduced. This is true for such subjective reasons as pride in successive family ownership, but also for such specifically economic reasons as the fact that this may be a particular family's sole or primary source of income.

TABLE II-C-1

PLANT CLOSURE ANALYSIS MATRIX

Parameter	Condition for Closure
After Tax Treatment Cost--% Net Income	High, e.g., greater than 30%
Cash Flow	Negative
Capital Cost of Abatement--% Gross Fixed Assets	High, e.g., greater than 30%
Extent of Integration	None--Low
Other Facilities on Common Site	Isolated Plant
Ownership	Large, publicy-owned firm

To accomplish the impact analysis, these factors are assigned different orders of importance based on the specific characteristics of individual subsegments. That is, a small privately-held firm has different profitability criteria than a large, multi-industry, publicly-held firm, e.g., magnitude of cash flow is the important issue to a privately-held firm. Further, the management of such firms is not likely to perform a discounted cash flow analysis as part of its stay-open/shutdown decision making. And, cash flow has a different meaning for such a private, internally-held enterprise which frequently elects to pay higher salaries and more encompassing fringe benefits rather than reporting profits on its income statement. Profitability ratios can be used as a guide when analyzing such firms, but certainly do not define the final story.

D. MODEL PLANTS

In order to determine the economic impact of pretreatment guidelines upon an industry which includes plants of highly diverse nature, a number of model plants are developed for the analysis. These model plants, further described in Section IV, are developed based upon assumptions of operating and financial characteristics which have been reviewed with industry members. The resultant "models" are used as bases over which the price increase and plant closure analyses criteria are applied.

III. INDUSTRY STRUCTURE

A. INDUSTRY DESCRIPTION

1. Products

The wood preserving industry in the United States has developed based on the need for prolonging the life of wooden structural products. Historically, railroad ties, telephone poles, and pilings treated with creosote have been the major products of the industry. In recent years, lumber and plywood treated for fire retardancy and rot resistance have experienced rapid 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 some of the firms use nonpressure processes. The pressure processing uses oil-borne (organic) or water-borne (inorganic) preservatives. The products made with oil, such as piling and railroad ties, have a distinct odor and "oiliness," which

*Standard Industrial Classification 2491.

makes them unsuitable for use where odor is objectionable. The water-borne preservatives are used for preserving plywood and lumber, and especially for treating with fire retardants.

2. Production

From 1960 to 1974 the volume of wood treated with preservatives increased from 216.1 million cubic feet to 274.7 million cubic feet (+27%), with a peak production of 286.4 million cubic feet in 1967 resulting from shipments to Vietnam. Table III-A-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.

Figure 1 shows the national distribution of wood treatment facilities. There are no statistics available on the geographical distribution of final sales. In terms of volume, the major production components are poles and crossties, which would follow the railroad and telephone pole distribution pattern, and 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. However, these captive plants are not considered part of the industry under SIC 2491 and are not included in this report.

The value of shipments rose from $344.2 million (1967) to $557 million (1973).* The price of preserved wood has increased substantially since 1973. This is due in large part to the increases in raw wood and chemical prices.

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.

Preserved wood is largely a commodity market modified by transportation costs which give regional advantages to some producers. Pricing mechanisms appear to be quite varied. For some products, wholesalers and commission firms conduct continuous pricing and bidding between the preserving plants and the final customers on the telephone. Some 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, such as utilities, 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.

---

*Annual Survey of Manufacturers, 1967-1973.

TABLE III-A-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
1973	2.6	67.6	15.2	68.9	13.0	75.4	5.0	6.9	254.4
1974	(D)	(D)	(D)	77.8	(D)	73.1	(D)	(D)	274.7

(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.

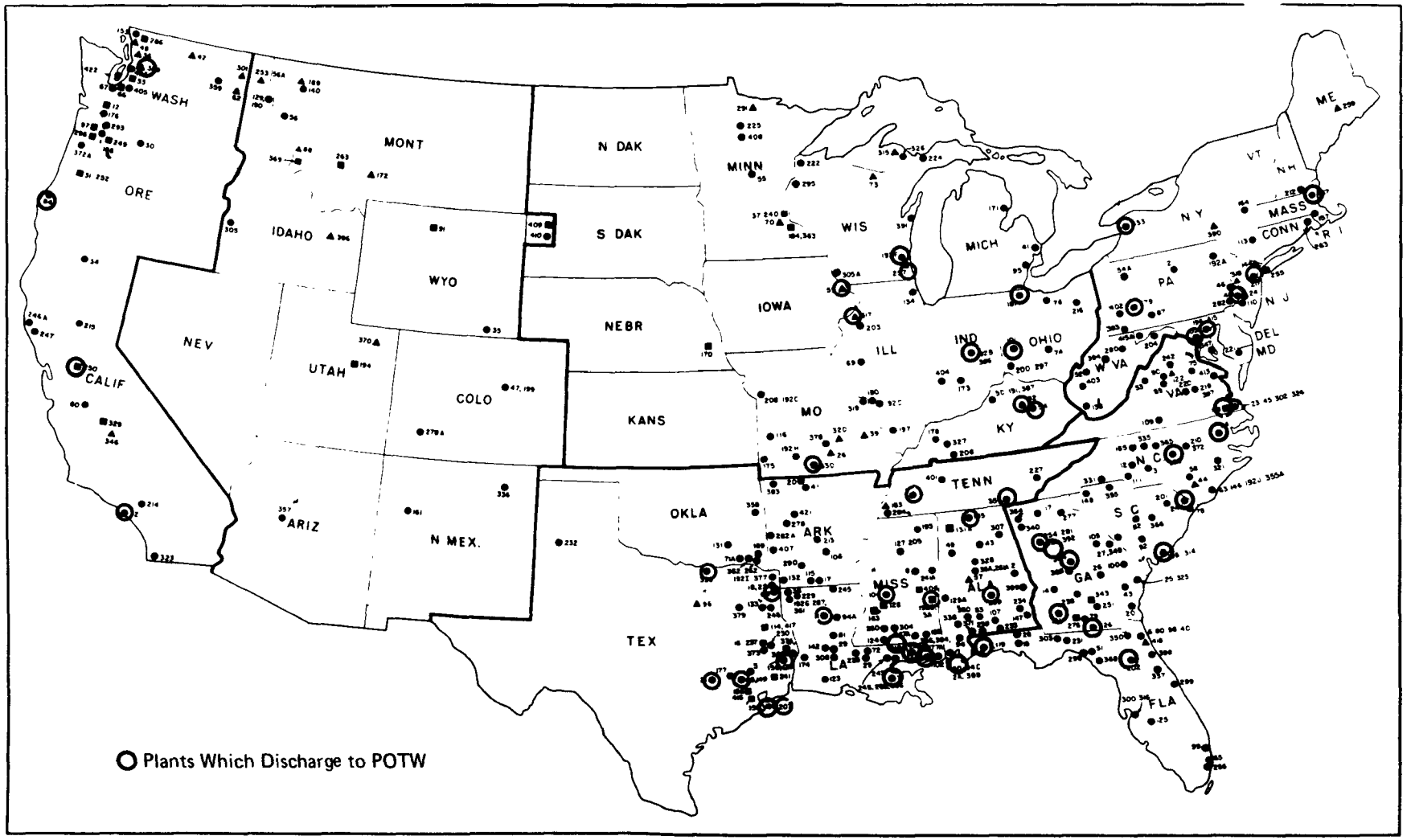
(2) WOOD BLOCKS: Data for 1957-1969 are included in MISCELLANEOUS.

(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.

(D) Data not shown to avoid disclosure of individual company data.

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

FIGURE 1 WOOD PRESERVING PLANTS IN THE UNITED STATES



Source: American Wood Preservers Association and ADL estimates.

A few wood preservers own forests. These companies are less likely to 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.

3. Substitute Products

Preserved wood products face continuing competition from non-wood products such as steel, concrete, and aluminum. 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 III-A-2 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. Railroad ties experience little competition from substitutes.

4. 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 little long-term growth--less than the GNP growth rate. Some products will be exceptions to this slow growth rate. Growth of demand for railroad ties will continue to be strong because of tightened federal railroad safety regulations and the Northeast Railroad Reorganization and Revitalization Act. Treated dimensionalized lumber and plywood will experience growth higher than the GNP rate, subject, of course, to fluctuations in the construction market. Products treated with organic preservatives (creosote, oil, pentachlorophenol) have experienced little annual growth and even a decline in recent years. Inorganically treated products (using inorganic salts), although a small portion of all treated products, have recently had rapid growth, even up to 20% per annum.

5. Ownership

The wood preserving industry has a large number of small firms, although it is moderately concentrated in terms of market share held by the largest firms. Table III-A-3 shows that the concentration in the industry did not change significantly from 1963 to 1972.

There are basically two different patterns of ownership and management in the industry. In the first category are plants owned by corporations which may or may not have wood preserving as the primary activity. These plants are managed by individuals with little or no equity in the

TABLE III-A-2

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 Gypsum Metal sheets
Poles	Metal tubing Precast concrete

TABLE III-A-3

CONCENTRATION IN WOOD PRESERVING INDUSTRY FOR 1963, 1967, 1970 AND 1972

		Value of shipments			
		Percent accounted for by--			
SIC Code	Industry and Year	4 largest companies	8 largest companies	20 largest companies	50 largest companies
2491	Wood Preserving - 1972	35	44	60	78
	- 1970	34	NA	NA	NA
	- 1967	35	44	63	84
	- 1963	34	44	64	84

Source: U.S. Bureau of Census, Annual Survey of Manufacturers, 1972, 1970, and 1967.

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. Table III-A-4 lists the organizational breakdown of companies in the industry as of 1972, the most recent census information available.

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. One may accept an increase in abatement costs as a necessity for staying in business. The other may decide that the increased cost is not justified by the expected returns. As shown in Table III-A-4, there are 117 multiunit companies in the industry with 20 or more employees; all but one are corporately held. The 117 produce $129.1 million (73%) of the $175.8 million of value added by the entire industry. The remaining 282 will tend to have older technology, less financial resources, and higher unit costs of production.

Size of the plant is also important in determining abatement impacts. On the basis of per unit of production, the costs of pollution control tend to fall more heavily on smaller plants because they have less production base over which to spread the increased abatement costs.

Thus, the firms and wood preserving plants may behave differently under the new pretreatment requirements; i.e., some may consider closure, while others favor consolidation and still others are relatively unaffected. The behavioral differences will be determined by the competitive advantages or disadvantages which each perceives. These expected behavioral differences and their determining factors will be further discussed throughout this report.

B. 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 larger companies include Koppers Corporation, Kerr-McGee Corp., J. H. Baxter & Co., American Creosote Works, Inc., and Southern Wood Piedmont Co. Each of these firms operates at numerous locations.

There are approximately 400 wood preserving plants in the country, some 49 of which are known to discharge their wastewater effluent to publicly-owned treatment works (POTW's). These 49 do not appear to differ in any significant way from the plants in the industry as a whole. The exception is that the indirect dischargers tend to have lower availability of land. This observation is related to the fact that the plants must be in or near towns and cities in order to discharge into POTW's, and such locations usually do not provide opportunity for acquisition of adjacent land.

TABLE III-A-4

OWNERSHIP ORGANIZATION OF THE WOOD PRESERVING INDUSTRY, 1972

Item	Establishments Total (number)	Establishments With 20 employees or more (number)	Employees (number) (1,000)	Value added by manufacture ($ Million)	Value of shipments ($ Million)
Wood Preserving, Total	(399)	(168)	(11.3)	(175.8)	(475.8)
Type of operation					
Multi-unit companies, total	149	117	7.6	129.1	339.9
Corporate ownership	148	116	(D)	(D)	(D)
Non-corporate ownership	1	1	(D)	(D)	(D)
Single unit companies, total	250	51	3.7	46.7	135.9
Corporate ownership	156	47	(D)	(D)	(D)
Non-corporate ownership	94	4	(D)	(D)	(D)
Legal form of organization					
Corporate	304	163	10.8	170.0	460.4
Non-corporate, total	95	5	0.5	5.8	15.4

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

SOURCE: U.S. Bureau of Census, Annual Survey of Manufacturers, 1972.

As was described in the Development Document for the wood preserving plants which discharge into POTW's, most of the characteristics of the plants which are indirect dischargers, such as size, age, and process technology differ very little from the overall industry patterns. The following segmentation of the industry reflects the opinion that the major basis for differentiation of wood preserving plants with respect to the impacts they will face as a result of the pretreatment standards, is the difference between the inorganic salts and organic (creosote, oil, pentachlorophenol) types of preserving. The boultonizing and steaming conditioning processes, as distinguished in the Development Document, have not been used here as a basis for segmentation of the industry because they do not have any inherently different wastewater flow rates, technology requirements or other characteristics which will result in significantly different costs of effluent abatement.

1. Types of Firms

Based on a series of surveys from 1972 to 1975, there are assumed to be 61 plants discharging to POTW's.* Fifty-eight plants are identified. The number of plants currently discharging or planning to discharge to POTW's may actually be somewhat different. We find two plants closed and six not discharging to sewers. Two more are impossible to locate. One additional POTW discharger has been identified, bringing the total number of known plants to 49. For the purpose of this analysis, 49 plants will be used.

a. Size--The 49 plants which are identified are owned by 35 companies. These companies vary considerably in both sales and number of wood preserving operations. Available information shows that total annual sales of these companies including operations not related to wood preserving probably range from about $200 thousand to over $1 billion. This range is based upon reported sales figures for about half of the 35 companies.

A breakdown of ownership of POTW users into single and multi-plant as compared to the total industry is shown in Table III-B-1.

As can be seen from the table, there is a similar pattern in single and multi-plant ownership between POTW users and the industry in general except that the total industry has a larger percent of single plant companies.

Of the 13 multi-plant firms in the POTW user category, four own two plants (in total), Koppers owns 26 and the rest are in between. This includes wood preserving plants which are direct dischargers. Five companies, Koppers, Kerr-McGee, Escambia Treating Company, Langdale Company, and Southern Wood Piedmont have more than one plant using POTW. These companies together own 20 of the plants using POTW's; fourteen treat with organic preservatives only; six treat with both organic and inorganic preservatives.

---

*Burns & Roe, 1976.

TABLE III-B-1

OWNERSHIP OF WOOD PRESERVING PLANTS DISCHARGING INTO POTW[1]

COMPARED TO TOTAL INDUSTRY

	Companies			Plants		
	No. Using POTW's	% of Segment	% Total Industry	No. Using POTW's	% of Segment	% Total Industry
Single plant ownership	22	63	90	22	45	59
Multi-plant ownership	13	37	10	27	55	41

[1]Based on Wood Preservation Statistics, 1974.

b. Integration--The wood preserving companies tend to have very little vertical integration. Some of the plants in the POTW category are part of a lumber operation or associated with a company's sawmill. Seven of the 11 inorganic plants are affiliated with lumber yards. In such cases the wood preserving operation is an additional service for lumber customers. Plants in the organic segment appear to have much less involvement with other wood or lumber-related activities.

c. Product Diversification--On the basis of preliminary data, we do not vote any variation in product mix within the POTW plants compared to the total wood preserving industry. Inorganic users treat mostly dimensionalized lumber, posts and poles for rot resistance and fire retardancy; organic plants treat primarily poles, posts, pilings and railroad ties with some other products such as cross arms and bridge timber. Only the largest plants have extensive product diversification.

d. Ownership--Both privately and publicly-held companies are represented in the industry segment. About 78% of the plants are privately held; this includes all of the inorganic treating plants. In general, single plant companies are small and privately held.

2. Types of Plants

The Development Document provides data on plants within the wood preserving industry which discharge their effluent into POTW's. We have used the Development Document information in preparing this report supplemented by other published information and the results of surveys of about 90% of the plants in the sector. The subcategorization which we have elected to use in assessing economic impact is based on the types of preservatives used. The three subcategories are:

- plants treating with organic materials, oil, pentachlorophenol and creosote

- plants treating with waterborne inorganic salts principally zinc, copper, arsenic and chromium

- plants treating with both organic and inorganic preservatives.

a. Process--The basic wood preserving processes are 1) organic treatment with either pentachlorophenol in a petroleum solvent or creosote, and 2) treatment with aqueous solutions of inorganic salts of zinc, chromium, arsenic and copper. The effluent from these two processes vary in biodegradability and potential for reaction in a POTW.

In the Development Document the inorganic and organic methods of preserving wood were further subcategorized by process type as follows:

Subcategory	Type of Preservative
Wood Preserving	Salt-type
Wood Preserving--Steam subcategory	Organic
Wood Preserving--Boultonizing subcategory	Organic

Steaming or boultonizing is used to pre-condition wood in wood preserving plants. The choice of conditioning is largely governed by the physical characteristics of the wood. During the conditioning process extraneous oils and water soluble materials are extracted from the wood. Direct steaming, where oils are received and water recirculated, is used by a number of plants. Inorganic treatment can also be preceded by steaming. Boultonizing (boiling-under-vacuum) is a milder conditioning process used with woods like Douglas Fir which are easily damaged by the higher temperature of the steaming process. This process is used only with organic preservatives.

For the purposes of this economic analysis, no distinction has been made between the steaming and boultonizing subcategories. These processes have no significant differences in wastewater characteristics or abatement costs which merits separate analysis.

The plants using POTW's do not vary significantly in the process used from the industry as a whole (Table III-B-2).

Fifteen plants have facilities for treating with both organic and inorganic solutions. Cylinders may be reserved for a particular solution or used interchangeably.

b. Number of Cylinders--The size distribution of plants in the segment, based on number of cylinders, is shown in Table III-B-3. For the purpose of this analysis the number of cylinders includes pressure and non-pressure cylinders and vacuum tanks. Considerable difference

TABLE III-B-2

COMPARISON OF PLANTS USING POTW'S AND TOTAL

INDUSTRY BY PRESERVATIVE USED

Type of Preservatives	Plants Using POTW No. Plants	Plants Using POTW % Total	Total Industry % Total
Inorganic	11	22	28
Organic	23	47	53
Both	15	31	19

Sources: (1) Letter from Dr. W. Thompson to R. Williams--EPA, August 5, 1976.

(2) Wood Preservation Statistics, 1974.

(3) ADL industry survey.

TABLE III-B-3

DISTRIBUTION OF PLANTS USING POTW BY NUMBER OF

CYLINDERS & TYPE OF PRESERVATIVE

Number of Cylinders	Inorganic No. Plants	Inorganic % Total	Organic No. Plants	Organic % Total	Both No. Plants	Both % Total	Total No. Plants	Total % Total	Total(3) Industry
1	9	82	1	4	0	0	10	21	37
2	2	18	10	43	3	20	15	28	29
3			8	35	1	7	9	16	17
4			1	4	5	33	6	7	7
5 or more			3	13	6	40	9	13	10
Total	11		23		15		49		

Sources: (1) Letter from Dr. W. Thompson to R. Williams--EPA, August 5, 1976.

(2) Wood Preservation Statistics, 1974.

(3) Draft Supplement to Burns & Roe Development Document Table 403.

(4) ADL Industry Survey.

is found among the three types of plants, the inorganic segment is limited to one or two cylinder operations; where both types of preservatives are used, a large percentage (40%) of the plants have five or more treating units. About 43% of the plants using organics have two cylinders. A comparison of POTW users and the total industry, based on number of cylinders shows that POTW users are typical of the total industry. The breakdown of the total industry was taken from the analysis made by Dr. Thompson using 1972 data.*

c. Production--There are no published data on individual plant capacities or production. Although the numbers of cylinders and types of processes used are known, there is no correlation between these and either plant capacity or production. Sales figures are known for about 50% of the companies, as was discussed above, but these sales figures cannot be directly related to production because of a lack of knowledge of the specific products sold from each plant. Some industry members** reported that a typical 80 ft. cylinder, operating with an organic process, has an output of 30-45 thousand board feet per day (based on 15,000 board feet per charge, 2 or 3 charges per day). Reported annual rates (time used for treating as a percent of total time available for treatment, not including loading and unloading time) for the industry range from 40-70%.

d. Age of Plants--The Development Document shows the average age of a randomly selected sample of plants using POTW's to be 43 years old (Table III-B-4). The plants sampled were built 17 to 70 years ago and all use organic preservatives or a combination of organic and inorganic. Telephone interviews with several inorganic plants (using POTW) show that these plants are newer--built about 1 1/2 to 25 years ago. There is no reason to assume that plants discharging into POTW's differ markedly with respect to age compared to the industry in general.

e. Location--Figure 1 shows the location of plants in the wood preserving industry; POTW users are circled. The regional distribution of plants by process, in this segment and in the total industry is shown in Table III-B-5. The distribution pattern for total POTW users is similar to that for the industry in general, especially for the organic treatment plants and plants with both types of processes. The distribution of inorganic plants differs significantly from the industry. Table III-B-5 shows that there are a high percentage of POTW inorganic plants in the Northeast, and a low percentage in the South Atlantic region.

It is assumed that plants discharging to POTW's are located in an urban environment to have access to the sewer. This also implies a limitation on land available for effluent treatment, as was confirmed in recent telephone interviews.

---

* Burns & Roe Development Document, Supplement 1976.

** As reported by AWPI in private conversations.

TABLE III-B-4

DATA OF CONSTRUCTION OF A RANDOMLY SELECTED SAMPLE OF PLANTS UTILIZING PUBLICLY OWNED TREATMENT WORKS

Plant Identification	Plant Location	Year Constructed
Conroe Creosoting Co.	TX	1946
Koppers Co., Inc.	FL	1914
Sentinel Wood Treating Co.	MO	1959
Koppers Co., Inc.	TX	1936
Wood Treating Corp., Inc.	MS	1946
Kerr-McGee Chemical Corp.	MS	1926
Kerr-McGee Chemical Corp.	WI	1906
Southern Wood Piedmont Co.	GA	1922
Dickson Treating Co.	MS	1946
Langdale Co.	GA	1946
McCormick and Baxter	CA	1944
J. H. Baxter and Co.	CA	1927
W. C. Meredith	GA	1922
Kerr-McGee Chemical Corp.	MS	1928
Koppers Co., Inc.	AL	1926
Average Age		43.2

Source: Burns & Roe, 1976.

TABLE III-B-5

REGIONAL DISTRIBUTION OF PLANTS DISCHARGING TO POTW COMPARED TO TOTAL INDUSTRY

Region	Inorganic Treatment			Organic Treatment			Organic & Inorganic Treatment			Total Plants		
	POTW		% Total	POTW		% Total	POTW		% Total	POTW		% Total
	No.Plants	% Total	Industry	No.Plants	% Total	Industry	No.Plants	% Total	Industry	No.Plants	% Total	Industry
Northeast	4	36	10	0	0	5	1	7	8	5	10	7
North Central	2	18	13	4	17	15	0	0	8	6	12	13
South Atlantic	1	9	44	6	26	21	7	47	36	14	29	30
South Central	3	27	24	13	57	42	4	27	25	20	41	34
West	1	9	8	0	0	17	3	20	23	4	8	16
Unidentified												
Total U.S.	11			23			15			49		

*Based on U.S. Census regional breakdown

Sources: (1) Letter from Dr. W. Thompson to R. Williams--EPA, August, 1976

(2) Wood Preservation Statistics, 1974.

f. Employment--Employment in plants discharging to POTW's is assumed to be typical of the industry as a whole. Plants contacted which use inorganic salts reported from one to 12 employees including on-site management on a regular basis for a one or two cylinder operation. Some part-time help is also used. Organic treatment plants, especially those with several cylinders, tend to have more employees. Plants which operate in conjunction with a lumber yard or a saw-mill often pool labor.

Size distribution for the wood preserving industry in 1972 is shown below:

Number of Employees	Number of Plants
1-4	116
5-9	48
10-13	67
20-49	90
50-99	57
100-249	20
250-499	1

Source: 1972 Census Annual Survey of Manufacturers.

These data are also indicative of the large number of the small-scale operations characteristic of this industry.

g. Level of Exposure to New Technology--There have been very few recent technological changes or innovations in the wood preserving industry. The process itself is simple, the raw materials (wood and chemicals) and basic plant equipment are typical of those used 40-50 years ago. Typical of the changes which have taken place have been in the inorganic treatment plants which have directed their efforts towards a closed system. This was dictated primarily by process economics and currently by the need to achieve zero discharge.

Beyond this, there has been limited incentive for technological growth. Competition for markets from other materials, e.g., steel and concrete, although it exists, has not seriously eroded existing markets. Competition exists within the industry for markets but this too has produced no technological advances in the basic process or products made.

3. Financial Profile

An industry such as the wood preserving industry 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 readily profiled in a financial sense. Thus, financial data presented here is a blend of total industry (macro) and individual (micro) data. The following information is based upon information

received through a survey of about 90% of the POTW dischargers, as well as upon other published information as cited. These sources have revealed the following aspects of the industry segment's financial status. This information has been verified and revised through discussions with industry members.*

a. Profitability--The profitability of the wood preserving firms appears to have remained fairly constant over the years. Recent reports of a number of the larger firms indicate that after tax return on sales was in the range of 6 to 10% for 1974 or 1975. This is an unrepresentative sample of the entire segment segment because it is a small sample and does not show profitability of the smaller companies. The reports were also representative of years when inventory profits were high. For the same companies, profits were 3-6% for 1972 or 1973. The 6 to 10% range is higher than average return relative to trends in U.S. Corporate Profits. Table III-B-6 shows recent increases in profitability for All Manufacturing and for Lumber & Wood Products. From these statistics, a profitability factor of 4% was chosen for this analysis as a good long term average for wood preserving facilities.

TABLE III-B-6

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
1972	4.3	5.1
1973	4.7	6.3
1974	5.5	n.a.
1975	6.6	n.a.

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

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

*Discussions were held with several members of the AWPI.

It is important to remember that the costs of wood and chemicals account for a majority of the sales price. When profitability is measured against net worth or stockholders' equity rather than sales, the profits are much stronger. The firms examined generally have little or no long-term debt. They have made substantial capital expenditures in the last two or three years relative to previous years. These expenditures have generally been made out of cash flow. As might be expected, it appears that firms which are the most profitable are the ones which have made the greatest capital expenditures. The bottom quartile of firms with lower before tax profits have less leeway for existing with increased costs due to abatement, especially if industry demand slackens.

Tables III-B-7 through III-B-9 describe this industry on the macro scale. Key factors characterizing this industry include:

- Cost of materials (including raw materials, part, containers, resales, contract work, and energy) exceeds 60% of value of shipments. Wood and chemicals are the major expenses. (Table III-B-7)

- Value added, in total dollars has greatly increased, measured both in value added per employee and value added per hour of production work. (Table III-B-8)

- The amount of new capital committed to the industry is low, though growing somewhat. Largest expenditures have been for new machinery and equipment as opposed to new structures or additions. (Table III-B-9)

In short, the industry is a mature industry, attracts relatively little new investment, and anticipates a low rate of demand growth. The inorganic preserving subsegment is less mature than the industry as a whole and has experienced more rapid growth of demand and greater new investment in recent years.

4. Industry Pricing

A critical issue to resolve in determining how the 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. Thus, we will factor individual company and plant characteristics into our analysis. The data presented in this section covers some of the important industry price information which is necessary for determination of price effects of pollution control expenditures. It is believed that the industry segment which discharges into POTW's is representative of the performance of the entire industry in terms of price setting mechanisms.

TABLE III-B-7

COST OF PRODUCTION FACTORS: 1967 AND 1972

Items	Units	Wood Preserving (SIC 2491) 1967	%[1]	1972	%[1]
Establishments, total	Number	375		399	
With 1 to 19 employees	do	198		231	
With 20 to 99 employees	do	149		147	
With 100 employees or more	do	28		21	
All employees, average for year	1,000	12.2		11.3	
Payroll for year, all employees	million dollars	61.9	18.0	74.5	15.7
Production workers:					
Average for year	1,000	10.3		9.2	
Wages	million dollars	47.1	13.7	54.4	11.4
Cost of Materials, etc., total	do	214.5	62.3	303.6	63.8
Materials, parts, containers, etc. consumed	do	198.4	57.6	278.0	58.4
Cost of resales	do	8.7	2.5	13.4	2.8
Fuels consumed	do	4.3	1.2	5.8	1.2
Purchased electric energy	do	1.7	0.5	3.0	0.6
Contract work	do	1.5	0.4	3.5	0.7
Value of shipments, including resales	do	344.2		475.8	
Value of resales	do	10.9	3.2	17.6	3.7
Value added by manufacture	do	135.6	39.4	175.8	36.9
Manufacturers' inventories:					
Beginning of year, total	do	71.3		94.1	
Finished products	do	37.4		53.8	
Work in process	do	9.1		9.4	
Materials, supplies, fuel, etc.	do	24.8		31.0	
End of year, total	do	77.0		94.7	
Finished products	do	41.7		46.6	
Work in process	do	10.7		20.2	
Materials, supplies, fuel, etc.	do	24.5		27.9	
Expenditures for plant and equipment, total	do	11.3	3.3	21.0	4.4
New plant and equipment, total	do	10.7	3.1	14.8	3.1
New structures and additions to plant	do	1.4	0.4	2.2	0.5
New machinery and equipment	do	9.3	2.7	12.6	2.6
Used plant and equipment	do	.5	0.1	6.2	1.3

SOURCE: Census of Manufactures, 1967, 1972.

[1] % of value of shipments.

TABLE III-B-8

SELECTED OPERATING RATIOS FOR THE WOOD PRESERVING INDUSTRY: 1958 TO 1973

Year	Payroll per employee (dollars)	Production worker as percent of total employment (percent)	Annual man-hours per production worker (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)
1973 ASM	7,436	83	2,131	3.08	.67	.80	18,446	40	10.41
1972 Census	6,593	81	2,043	2.89	.64	.80	15,557	42	9.35
1971 ASM	6,593	82	2,100	2.72	.64	.82	13,800	48	7.94
1970 ASM	6,108	81	2,082	2.56	.63	.81	12,017	51	7.14
1969 ASM	5,587	83	2,089	2.45	.64	.81	11,818	47	6.78
1968 ASM	5,175	84	2,085	2.29	.61	.79	11,540	45	6.58
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

SOURCES: Census of Manufactures, 1967, 1972, and Arthur D. Little, Inc., estimates.
Annual Survey of Manufacturers, 1973.

TABLE III-B-9

EXPENDITURES FOR NEW PLANT AND EQUIPMENT BY THE WOOD PRESERVING INDUSTRY

Number of Plants	Year	Total New Expenditures (millions of current dollars)	$ Per Plant	New Structures and Additions to Plants (millions of current dollars)	$ Per Plant	New Machinery & Equipment (millions of current dollars)	$ Per Plant
375	1967	10.7	$28,533	1.4	$3,733	9.3	$24,800
	1968	9.3		(1.4)		(7.9)	
	1970	8.4		1.4		7.0	
	1971	10.4		.5		9.9	
399	1972	14.8	$37,093	2.2	$5,514	12.6	$31,579
	1973	11.6		2.0		9.6	

( ) Standard error is greater than 15%.

Source: U.S. Bureau of the Census, Annual Survey of Manufacturers--1967, 1968, 1970, 1971, 1972, 1973.

The two major factors affecting the price of preserved wood appear to be the price of raw materials and the price of substitute products (untreated wood, steel, concrete, aluminum, and other non-wood 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 III-B-10 shows the price history of wood preserving chemicals. The price of preservatives remained fairly constant over a long period of time but has increased dramatically since 1973.

Rising labor costs are an important phenomenon in the wood preserving industry. Wages per employee rose by 21% between 1970 and 1973 (Table III-B-8).

In recent years much of the industry's capital expenditures have gone to pollution control equipment. Firms which have not been making the expenditures to reduce labor costs are thought to have been 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 III-B-11 and III-B-12 show recent price and production figures. Two important relationships arise. The first is the ability of the industry to change its prices when the cost of producing the product is changes. (Can the industry raise prices to pass on the added cost of pollution control?) The second relationship is the degree to which individual plants are affected by the changes in price levels. (Will increased prices reduce the total number of plants or total industry production?) These issues will be further addressed in the economic impact analysis.

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 cost of raw materials. In the past the basis for price determination has been the price of raw wood. However, with the large increase in the cost of preservatives, the price of preserved wood products is still parallel to raw wood prices but at a higher margin of added value.

Higher wood and chemical prices and the resulting higher prices for preserved wood could tend to reduce the demand for preserved wood relative to substitute products, although products such as concrete and steel are experiencing rapid cost increases, perhaps even greater than the preserved wood products. Pollution control costs could raise

TABLE III-B-10

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	-
1973	27.0	19
1974	46.0	19
1975	55.0	38
1976	54.9	42

(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:

1960-1972	Works, freight adjusted
1963-1972	Works, freight equalized
1973-1976	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
1972-1976	50 lb. bags, freight equalized

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

TABLE III-B-11

PRICES OF SELECTED PRESERVED WOOD PRODUCTS

Date	Piles			Ties		
	Untreated ($/ft.)	Treated ($/ft.)	Difference ($/ft.)	Untreated ($ each)	Treated ($ each)	Difference ($ each)
Aug., 1976	1.24	3.15	1.91	6.90	10.75	3.85
July, 1976	1.24	3.15	1.91	6.90	10.75	3.85
March, 1976	1.24	3.15	1.91	6.90	10.75	3.85
Dec., 1975	1.24	3.15	1.91	8.00	11.25	3.25
Oct., 1975	1.24	3.15	1.91	8.00	11.25	3.25
July, 1975	1.24	3.15	1.91	8.00	11.25	3.25
May, 1975	1.24	3.15	1.91	8.00	11.25	3.25
Feb., 1975	1.24	3.15	1.91	8.00	11.25	3.25
Nov., 1974	1.24	3.15	1.91	8.00	10.75	2.75
Aug., 1974	1.24	2.75	1.51	8.00	10.75	2.75
April, 1974	1.24	2.00	0.76	7.75	9.75	2.00
Jan., 1974	1.24	2.00	0.76	4.50	7.50	3.00
Sept., 1973	1.08	2.00	0.92	4.45	7.00	2.55
April, 1973	0.98	2.00	1.02	4.00	6.70	2.70
March, 1973	0.98	2.00	1.02	3.95	6.70	2.75
Feb., 1973	0.94	1.80	0.86	3.95	6.70	2.75
Oct., 1972	0.90	1.80	0.90	3.25	5.80	2.55
July, 1972	0.90	1.70	0.80	3.25	5.80	2.55
April, 1972	0.85	1.70	0.85	3.00	5.50	2.50
Nov., 1971	0.78	1.64	0.86	3.55	5.40	1.85
July, 1971	0.78	1.64	0.86	3.55	5.40	1.85
April, 1971	0.72	1.64	0.92	3.55	5.40	1.85
Jan., 1971	0.72	1.56	0.84	3.55	5.40	1.85
Sept., 1970	0.72	1.56	0.84	3.55	5.40	1.85
June, 1970	0.72	1.56	0.84	3.55	4.95	1.40
March, 1970	0.72	1.56	0.84	3.55	4.95	1.40
Jan., 1970	0.72	1.56	0.84	3.55	4.95	1.40
Oct., 1969	0.72	1.49	0.77	3.55	4.95	1.40
July, 1969	0.72	1.38	0.66	3.55	4.95	1.40
April, 1969	0.72	1.38	0.66	3.55	4.95	1.40
Jan., 1969	0.67	1.38	0.71	3.50	4.80	1.30
Oct., 1968	0.67	1.20	0.53	3.35	4.70	1.35

Piles: 12-3 ft. from butt 7 in. 40 to 50 ft., Truck lots.
Ties: 6"x8"x8'6", Chicago, Red Oak, Carload lots.

Source: Engineering News Record.

TABLE III-B-12

MATERIAL TREATED IN 1974, BY REGION, AND UNITED STATES TOTAL 1973-1974

(THOUSAND UNITS)

		NORTHEAST	NORTH CENTRAL	SOUTHEAST	SOUTH CENTRAL	ROCKY MOUNTAIN	PACIFIC	TOTAL 1973	TOTAL 1974	PLANTS REPORTING
					USUAL UNITS OF MEASURE					
POLES	NUMBER	60	485	2110	1990	212	422	4879	5279	147
CROSSTIES	NUMBER	2811	7502	4109	6488	1448	1527	20569	23885	90
LUMBER AND TIMBERS	BOARD FEET	52619	76699	322317	322831	20711	178112	1012154	973289	264
FENCE POSTS	NUMBER	392	2321	6695	16431	763	284	23384	26887	133
PILING	LINEAR FEET	4229	710	5470	10102	74	1704	21139	22290	82
SWITCH TIES	BOARD FEET	12269	21263	21453	18236	3084	1916	60409	78221	69
CROSSARMS	NUMBER	42	244	789	239	0	1176	2528	2490	24
PLYWOOD	SQUARE FEET	3800	4439	9062	5970	516	23234	49890	47021	49
OTHER	CUBIC FEET	431	2971	821	908	305	1264	4786	6700	66
					CUBIC FEET					
POLES		871	6158	21039	30859	3109	11075	75379	73112	
CROSSTIES		9589	22114	13584	20972	4703	4908	67603	75870	
LUMBER AND TIMBERS		3832	5519	29358	25404	1572	12036	68851	77760	
FENCE POSTS		433	1681	3798	10647	505	240	15168	17304	
PILING		2430	453	3080	6025	27	1300	12978	13315	
SWITCH TIES		1022	1730	1788	1511	271	178	5006	6501	
CROSSARMS		47	295	713	215	0	1146	2592	2416	
PLYWOOD		180	144	259	231	25	926	2079	1766	
OTHER		431	2971	821	908	305	1264	4786	6700	
TOTAL		18836	41064	74481	96771	10517	33074	254443	274744	

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

Source: American Wood-Preservers Association

preserved wood prices. The requirements to finance pollution control equipment costs could be a major problem for small, marginal firms.

In summary, the history of cost changes in the industry suggests that when demand is strong, increased variable costs (e.g., raw wood and preservatives) may be passed along in the form of price increases. However, the nature of the pollution abatement cost is predominantly fixed rather than variable. If fixed costs can be passed along at all, it is likely that the cost per unit of production for a larger, more efficient plant will set the maximum amount of price increase. This assumes, as stated in the Development Document, that there is relatively little economies of scale in abatement costs for the industry.* Since the effluent abatement cost per unit of production will be greater for smaller plants, smaller plants may not be able to pass along the whole cost increase. Market factors will determine whether this cost increase may be passed along as price increases or will be absorbed by reducing profits.

C. MODEL PLANTS

Because the wood preserving industry includes a large diversity of plant types and sizes, a series of model plants for each of the industry subsegments have been developed and reviewed with the industry for use in analysis. Although characteristics of actual plants may vary, these models are representative of the average.

The models were developed according to size of plant--measured in annual sales. For each size of plant in each subsegment, representative operating and financial characteristics are used. The result is three model inorganic plants, four model organic plants, and four models of plants treating with both inorganic and organic preservatives.

1. Model Inorganic Plants

Table III-C-1 lists the operating characteristics assumed for the three model inorganic plants. These plants vary little with respect to size. Employment does increase with sales. The other characteristics remain fairly constant for the subsegment.

Inorganic plants generally produce treated dimensionalized lumber for use in construction. As such, their primary forms of competition

*It is recognized that some scale effects may occur depending partly upon the type of equipment installed. However, wastewater volumes are so small that all the plants are within a similar range with respect to volume dischargers in other industries. Nevertheless, the majority of the analysis provided in Section V is somewhat conservative in that it recognizes no decrease of abatement cost with increased production and therefore shows a somewhat greater impact upon the smaller plants than may actually be the case.

TABLE III-C-1

MODEL INORGANIC TREATING PLANTS[1]

Total Gross Sales per Plant	150,000	500,000	1,000,000
Number of cylinders	1	1	2
Employment	1-5	6-12	12-20
Products	dimensionalized lumber	dimensionalized lumber	dimensionalized lumber
Substitute products	untreated wood, other construction materials		
Imports and Exports	negligible	negligible	negligible
Capacity utilization	40-60%	40-60%	40-70%
Demand Growth	GNP rate	GNP rate	GNP rate
Price elasticity of demand	low	low	low
Basis for competition	price	price	price
Market share distribution	regional, fragmented	regional, fragmented	regional, fragmented
Extent of vertical integration	some[2]	some[2]	some[2]
Other facilities on common site	few	few	few
Ownership	private[3]	private[3]	private[3]
Abatement cost relative to all inorganic sewer and stream dischargers	similar[4]	similar[4]	similar[4]

[1]These are representative models: characteristics of actual plants may vary.

[2]Seven out of 11 plants examined were owned by lumber companies.

[3]Private refers to closely held, i.e., family corporations.

[4]Assuming all inorganic plants will have to reach zero discharge, whether they currently discharge to stream or sewer.

Source: Discussions with industry members; survey of industry; Census information.

are untreated lumber, "do-it-yourself" products, and other non-wood construction materials. Imports and exports of inorganically treated products are negligible.

Capacity utilization* is slightly lower than the American industry average. The smaller two categories have plants with utilization factors ranging from 40-60%, while the largest group may range up to 70% capacity utilization.

The growth of demand for inorganically preserved products is greater than for the total wood preserving industry. It has recently paralleled the growth of GNP, therefore the GNP rate is used for a representation of demand growth for all inorganic plants.

Inorganic products are sold on the basis of price and consequently, price competition is high. Prices are relatively inelastic, however, as indicated by the recent growth of demand despite several increases in wood and chemical costs. Markets are usually regional, extending through the four or five surrounding states. As is true for the whole industry, markets are quite fragmented. Seldom do as few as five companies have claim to 50% of the market.

Many of the inorganic plants are owned by lumber companies. Although these companies are seldom widely diversified, they do offer some degree of vertical integration to the treating plants. Only a few, however, have preserving plants co-located with other lumber operations. Ownership is nearly always private--most often a small, family-held company.

The inorganic plants discharging to POTW's will have a similar abatement cost to all inorganic plants in the industry. All inorganic plants will have to meet zero discharge requirements. Therefore the POTW segment will not incur an inequitable cost burden with respect to its immediate competition.

2. Model Organic Plants

Table III-C-2 lists operating and market characteristics of the four model organic plants. These four plants span a range of sales larger than the range of inorganic plants. The characteristics of the organic plants vary by size more than do the inorganic plants. While products and market characteristics remain similar, ownership and integration factors are variable with sales.

Organic treaters produce a wide variety of products; the major ones are poles, posts, pilings and railroad ties. Major competitive products are steel and concrete. Foreign trade in all products is negligible.

---

*Measured as the amount of time treating is conducted as a percent of available time, not including time for loading and unloading of cylinders.

TABLE III-C-2

MODEL ORGANIC TREATING PLANTS[1]

Total Gross Sales per Plant	500,000	1,000,000	3,000,000	6,000,000
Number of cylinders	2	2	2	3
Employment	6-12	12-20	21-50	50+
Products	poles, posts, ties, cross arms, pilings, bridge timber, lumber			
Substitute products	steel, concrete	steel, concrete	steel, concrete	steel, concrete
Imports and Exports	negligible	negligible	negligible	negligible
Capacity utilization	40-60%	40-70%	40-70%	40-70%
Demand growth	none	none	none	none
Price elasticity of demand	high[2]	high[2]	high[2]	high[2]
Basis for competition	price	price	price	price
Market share distribution	regional, fragmented	regional, fragmented	regional, fragmented	regional, fragmented
Extent of vertical integration	limited	limited	limited	limited
Extent of horizontal integration	none	some	some	some
Other facilities on common site	none	none	none	significant
Ownership	private[3]	private[3]	private/public[3]	private/public[3]
Abatement cost relative to all organic sewer and stream dischargers	low[4]	low[4]	low[4]	low[4]

[1]These are representative models: characteristics of actual plants may vary.

[2]Railroad ties have lower price elasticity than other products.

[3]Private refers to closely-held or family-held companies; public refers to public corporations with more diverse distribution of ownership.

[4]Assumes biological treatment not required for POTW discharges.

Source: Discussions with industry members; survey of industry; Census information.

Like the inorganic subsegment, the organic plants have low capacity utilization relative to other U.S. manufacturing. The smallest plants have the lowest utilization, from 40 to 60 percent, while larger plants range up to 70 percent. Growth of demand for organic products is very low; in fact, demand has fallen off for some products in recent years.

Competition is high in this subsegment, especially against substitute products. Price serves as the major basis for competition within the segment. The competition with steel and concrete create a ceiling for prices which aggravates the price competition among wood preservers. It also causes price elasticity to be very high. Markets are regional, extending through a four to five state area, and fragmented. Never do less than six firms control a majority of the market.

Ownership and integration characteristics vary with the volume of sales of organic plants. The majority of plants are privately held, but some in the larger two groups are public. The plants in the $500,000 per year sales category have very little product diversification, while the larger plants have some diversity. None of the plant sizes show more than limited integration with other wood-related activities.

The effluent abatement costs which the organic POTW dischargers will face are somewhat smaller than the costs faced by direct dischargers. This fact is attributable to the likely requirement that direct dischargers, but not POTW dischargers, will have to install biological treatment. The cost differential will be narrowed somewhat by the higher land costs that sewer dischargers may face in obtaining land for abatement equipment.

3. Models of Plants Treating with Both Organic and Inorganic Preservatives

Table III-C-3 lists the characteristics of model plants in the third wood preserving subsegment. These plants are similar to the plants in the organic treating group. The only exception is that they produce dimensionalized lumber for construction purposes and therefore compete with producers of other construction materials such as untreated lumber, aluminum, and vinyls.

This subsegment will have a higher abatement cost than the organic POTW subsegment because of the requirement to obtain zero discharge for inorganic effluent. However, the cost will be lower than for stream dischargers which treat with organic and inorganic preservatives because it is expected that pretreaters will not have to install biological treatment.

4. Model Financial Statements

In order to analyze the economic impacts of the pretreatment guidelines on different categories of plants, model financial statements have been developed for five sizes of model wood preserving plants which

TABLE III-C-3

MODEL INORGANIC AND ORGANIC TREATMENT PLANTS[1]

Total Gross Sales per Plant	500,000	1,000,000	3,000,000	6,000,000
Number of cylinders using organic	1	1	1	1
Employment	6-12	12-20	21-50	50+
Products	poles, posts, ties, cross arms, pilings, bridge timber, dimensionalized lumber			
Substitute products	untreated lumber, steel, concrete and other construction materials[2]			
Imports and exports	negligible	negligible	negligible	negligible
Capacity utilization	40-70%	40-70%	40-70%	40-70%
Demand growth	none	none	none	none
Price elasticity of demand	high	high	high	high
Basis for competition	price	price	price	price
Market share distribution	regional, fragmented	regional, fragmented	regional, fragmented	regional, fragmented
Extent of vertical integration	limited	limited	limited	limited
Extent of horizontal integration	none	some	some	some
Other facilities on common site	none	none	none	some
Ownership	private[3]	private[3]	public/private[3]	public/private[3]
Abatement cost relative to wood preserving direct discharges	low[4]	low[4]	low[4]	low[4]

[1]These are representative models: characteristics of actual plants may vary.

[2]Including vinyls, aluminum and other non-wood construction materials.

[3]Private refers to family-held or closely-held companies; Public refers to public corporations with more diverse distribution of ownership.

[4]Assuming no biological treatment required for POTW discharges.

Source: Discussions with industry members; survey of industry; Census information.

are believed to be representative of the POTW discharging plants (Table III-C-5). These statements are models only; they are based on industry-wide averages and have been verified through discussions with the industry and comparison with actual financial statements.

There are five model financial statements in Table III-C-5--one for each of the sales levels shown in the tables of model wood preserving plants. Although operating characteristics vary between organic and inorganic preserving plants, the same financial statements can be used. For all three subsegments, costs are roughly the same percentage of sales, that is, margins (as a percentage of sales) are similar. Thus, these five model financial statements can be applied by sales level to the previously described model plants, resulting in eleven complete models.

The latest composite industry statistics available by employment size of establishment are to be found in the 1972 Census of Manufacturers. Relevant 1972 statistics are presented in Table III-C-4. Since that time, due primarily to inflation of wood costs and preservative costs, the cost of wood preserving products has more than doubled. Thus, as a rough approximation, the 1972 value of shipments by employment size of establishment is doubled to obtain approximate 1976 value of shipments comparisons. As illustrated in Table III-C-4, the costs of materials and payroll as a percentage of shipments varied from 76% to 82% for various sizes of establishments with a total industry average of 80% in 1972.

Table III-C-5 was derived using an average profit margin after tax of 4% of sales. Using a 50% tax rate, a before tax margin of 8% of sales was typical for the industry in the recent past. Since the average cost of materials and payroll is 80% of sales, and depreciation is 2% of sales, approximately 10% of sales is due to corporate overhead allocation.

The figures for gross fixed assets were determined through discussions with the industry. In the three largest plants, gross fixed assets are 40% of sales. In the two smaller plants, assets are a larger percentage of sales, reflecting the fact that a minimum amount of equipment is necessary for treating the wood. The smaller plants have lower capacity utilization, which explains the difference in the assets to sales ratio. In all cases, net fixed assets are measured as 40% of gross fixed assets.

These financial statements will be used as a basis for further evaluation in Section V as the effects of the abatement costs for each subsegment are applied to these model financial pictures.

TABLE III-C-4

1972 CENSUS STATISTICS BY EMPLOYMENT SIZE OF ESTABLISHMENT

Number of Employees	1-4	5-9	10-19	20-49	50-99	100-499	TOTAL
Number of Establishments	116	48	67	90	57	21	399
% of All Establishments	29%	12%	17%	23%	14%	5%	100%
% of Industry Shipments	1.7%	3.5%	9.0%	26.5%	33.7%	25.5%	100%
PER ESTABLISHMENT ($1,000)							
Shipments	69.0	345.8	640.3	1,402.2	2,815.8	5,790.5	1,192.5
Production Wages	8.6	29.2	55.2	147.8	350.9	719.0	136.3
Payroll	11.2	41.7	82.1	208.9	468.4	957.1	186.7
Materials Cost	41.4	227.1	422.3	941.1	1,705.3	3,704.8	760.9
Value Added	27.5	122.9	216.4	443.3	1,189.5	2,123.8	440.6
Capital Expenditure	1.7	6.2	10.4	41.1	110.5	166.7	37.1
Inventories (Year End)	12.9	58.3	97.0	275.6	608.7	1,161.9	237.3
SELECTED RATIOS							
Materials/Shipments	0.600	0.657	0.660	0.671	0.606	0.640	0.638
Payroll/Shipments	0.162	0.120	0.128	0.149	0.166	0.165	0.157
Wages/Shipments	0.125	0.084	0.086	0.105	0.125	0.124	0.114
Inventory/Shipments	0.187	0.169	0.152	0.197	0.216	0.201	0.199
Materials & Payroll/Shipments	0.762	0.777	0.788	0.820	0.772	0.805	0.795

Source: U.S. Department of Commerce, Census of Manufacturers.

TABLE III-C-5

REPRESENTATIVE 1976 INCOME STATEMENTS FOR MODEL PLANTS

Total Gross Sales	150,000	500,000	1,000,000	3,000,000	6,000,000
Materials (64% of Sales)	96,000	320,000	640,000	1,920,000	3,840,000
Payroll (16% of Sales)	24,000	80,000	160,000	480,000	960,000
Depreciation (2% of Sales)	3,000	10,000	20,000	60,000	120,000
Operating Margin	27,000	90,000	180,000	540,000	1,080,000
SG&A (10% of Sales)	15,000	50,000	100,000	300,000	600,000
Profit Before Tax	12,000	40,000	80,000	240,000	480,000
Taxes (@ 50%)	6,000	20,000	40,000	120,000	240,000
Profit After Tax	6,000	20,000	40,000	120,000	240,000
Cash Flow	9,000	30,000	60,000	180,000	360,000
Gross Fixed Assets*	250 000	300,000	400,000	1,200,000	2,400,000
Net Fixed Assets (40% of Gross Fixed Assets)	100,000	120,000	160,000	480,000	960,000

*Includes plant and equipment dedicated to wood preserving operations; based on original cost.

Source: Census information, ADL estimates.

IV. EFFLUENT LIMITATIONS, TECHNOLOGIES AND COSTS

The basis for the economic impact analysis described in this report is the estimates of capital costs and operating costs provided in the Development Document for the various levels of pretreatment. In that Document, "model" pretreatment costs for the segment of the industry using organic preservatives were developed. For plants using inorganic preservatives, a cost of $50,000 per cylinder was assumed to obtain zero discharge status. No detailed estimate of the capital costs or operating costs (if any besides depreciation and capital charges) were provided for the inorganic treaters.

The costs of compliance with the EPA guidelines are of course dependent upon the stringency of those guidelines. This economic analysis is based upon the following levels of treatment:

- Inorganic treatment plants will have to achieve zero discharge, including containment of drainage from drying wood after treatment.

- Organic treatment plants will have to install Treatment Phases A and B (oil separation, flocculation, filtration and pH control). Few, if any, plants will be required to install Phase C (biological treatment).

- Plants which treat with both organic and inorganic preservatives will be required to have zero discharge of all inorganic effluent and install Treatment Phases A and B for control of organic effluent.

The Development Document estimates of model plant capital costs and operating costs for organic plants are summarized and presented in Table IV-1. These costs, based upon installment of Treatment Phases A and B are the base costs used in this analysis. A number of variables which may cause these figures to be different are dealt with as additional sensitivity analyses. These variations in cost estimates are described below.

A. LAND

The reader of the Development Document is cautioned that certain costs such as land, equipment such as holding tanks and labor rates will vary from location to location. Land is by far the greatest variable. The price of an acre of land, as reported in the Development Document, can vary from $4,000 to $150,000 per acre. Industry sources quote one instance of land costing $235,000 per acre, however, this was prime ocean front property and not a common location for wood preserving plants. The price used in this analysis is $5,000 per acre.

TABLE IV-1

CAPITAL AND OPERATING COST ESTIMATES OF PRETREATMENT

FOR ORGANIC PRESERVING PLANTS*

	Development Document Estimates	Industry Estimates	Industry Estimates, Smallest Plant
Capital Costs:			
Equipment	$ 97,400	$117,400	$ 58,700
Land(@ $5000/acre)	5,000	5,000	5,000
Engineering	13,000	13,000	10,400
Site Preparation	28,700	28,700	14,350
Contingency	14,400	14,400	14,400
Total Investment	$158,500	$178,500	$102,850
Credit Existing Equipment	20,000	20,000	10,000
New Investment Required	$138,500	$158,500	$ 92,850
Annual Costs:			
Interest** (10%)	$ 13,850	$ 15,850	$ 9,285
Depreciation (10 yr or 5 yr)***	13,350	30,700	17,570
Labor	14,770	14,770	14,770
Maintenance and Repair	3,690	3,690	3,690
Energy and Power	1,060	1,060	1,060
Sludge Disposal	1,920	1,920	1,920
Supplies	3,840	3,840	3,840
Total Annual Cost	$ 52,480	$ 71,830	$ 52,135
USING LAND COSTS OF $150,000/acre:			
New investment required	$283,500		
Adjusted annual cost	66,980		

* For oil-water separation, flocculation, filtration and pH control (Treatment Phases A and B).

** An annual interest charge of 10% of the new investment required is assumed.

*** Does not include value of land. Depreciation is on a 10-year basis in the Development Document and a 5-year basis for industry estimates.

However, to show the effect that varying land prices can have on the cost of abatement, Table IV-1 indicates the additional annual cost which would result from land costs of $150,000/acre. Total capital costs would increase to just over double. Annualized costs, however, would increase by less than 30%.

B. EFFECTS OF EQUIPMENT ALREADY IN PLACE

The cost of pretreatment will vary even within industry subsegments because of the different levels of pretreatment facilities already installed.

As described in the Development Document and ascertained from a recent survey, the pollution control equipment in place in 1974 in the plants discharging to POTW's includes the following:

- Plants using waterborne inorganic chemicals are currently recycling most process water (see Table IV-2). Runoff and spillage is collected in pits or tanks and put back into the system. Discharge from these single or 2-cylinder operations is small, probably less than 50-100 gallons per day. Pollution control needs are represented by new piping or drainage systems and attempts to collect all liquid, including runoff from rainfall, to produce essentially pollution-free plants. There is little difference in the approach being taken by POTW users and by the industry in general except that outside storage of treated wood, which may result in considerable runoff especially in areas of high rainfall, appears to be of more immediate concern to non-POTW users.

- Plants using organic preservatives vary widely in the degree to which they have installed pretreatment facilities. According to information obtained from Dr. Warren Thompson, eleven plants (about 30%) of the total organic treaters discharging to POTW's have already purchased and installed the equipment to achieve a primary treatment consisting of oil-water separation, flocculation, filtration and pH adjustment. In addition, two of these plants have the technology in place to provide additional biological (secondary) treatment if necessary.

- Plants which use both organic and inorganic preservatives reuse as much of the process water as possible and use the conventional treatment (separation, flocculation) for discharge from the organic process.

TABLE IV-2

SUMMARY OF POLLUTION CONTROL STATUS

	Inorganic Plants	Organic Plants	Plants With Organic and Inorganic
Total Number of Plants	11	23	15
Number of Plants That Recycle Most Inorganic Effluent	11	n.a.*	15
% of Total	100%		100%
Number of Plants With Adequate Oil Separation	n.a.	4	7
% of Total		17%	47%
Number of Plants With Adequate Filtration-Flocculation	n.a.	4	7
% of Total		17%	47%
Number of Plants With Adequate Secondary Systems	n.a.	2	0
% of Total		9%	0

* n.a. - not applicable.

Source: Industry survey, discussions with Warren Thompson, Arthur D. Little, Inc., estimates.

The adequacy of existing primary treatment facilities is rated fair to poor at 80% of plants in the industry by Burns & Roe in the Development Document.

Table IV-3 summarizes the estimated additional pretreatment costs that would be required by the guidelines for each of the three industry subsegments.

All of the 11 plants using only inorganic preservatives follow general industry practice and recycle most discharges from the preserving cylinder, although it is not believed that any of these plants have achieved zero discharge. Some may have installed concrete bases on the approach track to the cylinder. Few, if any, have installed storage sheds capable of collecting drippings from treated wood. Thus, using the estimates provided in the Development Document, the total capital cost of achieving zero discharge is $50,000 for a plant with one cylinder. While costs for a two-cylinder plant would not be exactly double those for a one cylinder plant, they would be close to double so an estimate of $100,000 for the capital cost of zero discharge for a two-cylinder plant is conservatively estimated. Any savings in cost would be due to the possible sharing of a storage tank, although, if different inorganic preservatives are used, a plant may want to keep the preservatives separated. Using a ten-year straight-line depreciation schedule and capital recovery at 10% over ten years, annual operating costs are estimated at $10,000 for a one cylinder plant. This estimate assumes no significant increases in labor, materials or energy costs resulting from the pretreatment operations.

Of the 15 plants using both inorganic and organic preservatives, seven currently have adequate oil separation facilities, so there is no added organic effluent abatement cost impact to them due to the pretreatment standards unless biological treatment is required. There is a cost impact for inorganic effluent abatement due to the pretreatment standards. The remaining eight plants have inadequate oil separation facilities. Assuming a savings of $20,000 in capital costs due to the use of existing facilities at these plants, the capital cost and operating cost as revised from the phase A and B model plant are $138,500 and $52,480, respectively. The cost groups are further divided between those with one and two inorganic cylinders. The plants with two inorganic cylinders and inadequate A and B treatment will incur a total annual cost of $72,480.

Of the 23 plants using only organic preservatives, two have adequate oil separation and biological treatment, two more have adequate oil separation and 19 have inadequate oil separation. The two plants that have installed biological treatment were required to do so because of inadequacies in the treatment system of the POTW which was receiving their effluent. It is expected that few, if any, of the other plants may be in this situation, so the number of plants which may be required to install biological treatment is assumed to be small. The total abatement cost, therefore, includes installation of phases A and B only.

TABLE IV-3

SUMMARY OF ABATEMENT COSTS

Type of Preservative	Present Level of Treatment	Use of Cylinders	Zero Discharge of Inorganic Preservatives		Type A and B Organic Treatment		Total Cost		Additional Cost of C-1 Treatment	
			Capital	Annual	Capital	Annual	Capital	Annual	Capital	Annual
Plants using only inorganic preservatives	All have some recycling of salts discharged from cylinders	One cylinder	$50,000	$10,000	N.A.**	N.A.	$50,000	$10,000	N.A.	N.A.
		Two cylinders	$100,000	$20,000	N.A.	N.A.	$100,000	$20,000	N.A.	N.A.
Plants using both organic and inorganic preservatives	Adequate oil separation	One inorganic cylinder	$50,000	$10,000	0	0	$50,000	$10,000	$140,300	$47,000
		Two inorganic cylinders	$100,000	$20,000	0	0	$100,000	$20,000	$140,300	$47,000
	Inadequate oil separation	One inorganic cylinder	$50,000	$10,000	$138,500	$52,480	$188,500	$62,480	$140,300	$47,000
		Two inorganic cylinders	$100,000	$20,000	$138,500	$52,480	$238,500	$72,480	$140,300	$47,000
Plants using only organic preservatives	Adequate oil separation		N.A.	N.A.	0	0	0	0	$140,300	
	Inadequate oil seperation		N.A.	N.A.	$138,500	$52,480	$138,500	$52,480	$140,300	$47,000

* Development Document cost estimates have been used in preparing this Table. Industry sources debate the validity of these estimates, saying that acutal costs are about double those shown in the EPA estimates.

** N.A. is not applicable.

Source: Development Document, ADL estimates.

Another cost variation may arise for plants which do not treat with both creosote from pentachlorophenol and so do not have to separate them in the effluent. The Development Document estimates include the cost of this separation step. Plants which do not treat with both substances may experience a 20-25% saving from the estimates shown.

C. TREATMENT PHASE C

In the event that Treatment Phase C may be required for some plants, it is included here as an additional cost of abatement. Three types of C treatment are identified in the Development Document: C-1 is biological treatment by activated sludge; C-2 is biological treatment by aerated lagoon; C-3 is biological treatment by soil irrigation. Because the POTW dischargers are generally located in more urban areas, land would not likely be available for the soil irrigation and aerated lagoon methods. While some plants would be able to use these less expensive biological treatments, plant surveys indicate that most would not have sufficient land available for this purpose. Therefore, Phase C-1 alone is considered. The additional cost above the base case in shown in Table IV-3.

D. SCALE EFFECTS

As stated in the Development Document, the capital cost of abatement in organic plants does not vary significantly with the volumetric rate of flow. The implication of this finding is that smaller plants with a lower volume of sales will be bearing a higher effluent treatment cost burden per unit of production than larger plants. Industry sources have stated that some slight scale effects could occur in that the smallest plants might be able to install smaller scale separators and other equipment.

Industry sources estimate that the smallest plants, at $500,000 annual sales, would have 50% lower equipment costs, 50% lower site preparation costs and 20% lower engineering costs than industry estimates. These reductions result in an overall annual abatement cost which is lower by 40%, as shown in Table V-1. The effect that this would have would be small relative to other variations which could occur in land costs. In the analysis shown here, the most conservative cost figures from the Development Document are used reflecting no economies of scale.

E. INDUSTRY ESTIMATES

Conversations with industry contacts indicate that many persons in the industry believe that the cost estimates provided in the Development Document are generally too low. The capital cost of zero discharge at plants using inorganic preservatives is estimated by industry sources to be $100,000 to $135,000 rather than the $50,000 estimate provided in the Development Document. This increase is due to the inclusion of a covered shed and additional concrete for spur tracks for containment of drainage from drying wood, and of higher estimates for holding tank costs at the plants. Operating costs for inorganic preserving plants were not included in the Development Document. It is believed that

capital recovery and depreciation charges, at the least, would be incurred for an estimated $30,000 annually for a one cylinder plant and $60,000 annually for a two cylinder plant (depreciated over a five-year period).

Industry estimates of costs at plants using organic preservatives are also higher than the Development Document estimates. Industry sources also state that capital recovery and depreciation are generally taken over five years rather than the ten years used in the Development Document, a change which would approximately double the annual operating costs of pretreatment from those estimated in the Development Document. In addition, the cost of a dehydrator estimated by the industry at $20-30,000 was not included in the capital cost. It may be legitimate to exclude this item because many plants are reported to already have it.

A summary of the industry's cost estimates in shown in Table IV-1. The effects of such changes in cost estimates and depreciation techniques will be handled by a sensitivity analysis.

V. ECONOMIC IMPACT ANALYSIS

A. ANALYSIS AND PROJECTION OF PRICE EFFECTS

The economic impact analysis presented here is based upon the premise that average prices of preserved wood products reflect changes in production costs throughout the industry. That is, cost increases faced by the entire industry or by industry price leaders are in general passed on as price increases. This has been illustrated in the recent price increases following the rise of material costs. However, on an individual plant basis, when selected plants have additional production costs which are not experienced by the rest of the industry, these plants will not be able to pass along full cost and still remain competitive because the average industry price has not risen as greatly. They therefore will have to absorb the rest of the cost difference. Specific product differences also have to be examined. Those with stronger competition from substitute products may have more difficulty in passing on cost increases.

In the wood preserving industry, there are three categories of pretreaters as have been defined earlier in this report: plants which treat with organic preservatives, plants which treat with inorganic preservatives, and plants which treat with both organic and inorganic preservatives. These three categories will have somewhat different proposed effluent guidelines, and hence somewhat different abatement costs. For this reason, price effects on the three categories are examined separately based upon how the degree of cost impact for each segment measures against the impacts of the rest of the industry. In addition, each preserved product competes in a unique market so the pricing effects of each market within the industry categories are also assessed.

The pricing impact analysis is an elaboration of the pricing decision criteria outlined earlier in Table II-B-1 and re-presented here as Table V-A-1. These criteria are applied to each of the industry categories defined in Table IV-3. The reader is advised to follow these tables throughout the following discussion.

The price analysis consists of two parts: first, an evaluation of the maximum amount of price increases which would be allowed by general industry sectors; and second, how much, if any, price increase will occur in each industry subsegment.

1. Industry Factors Governing Price Increases

Because of price elasticity in the timber products industry, we estimate that a 5% to 10% increase in price (annualized cost as a percent of net sales) is the maximum allowable to cover increased production costs. This overall price increase can occur when all plants within the industry face the same additional production costs and when

TABLE V-A-1

PRICE INCREASE ANALYSIS MATRIX

Parameter	Condition for Constraint
Annualized Cost as a Percent of Net Sales	Higher than 10%
Substitute Products	High occurrence; ready substitution
Industry Capacity Utilization	Low, e.g., operating rate less than 80%
Demand Growth	Low, e.g., less than GNP
Foreign Shipments	High
Abatement Cost Differences Within Industry	Unequal distribution of costs
Price Elasticity of Demand	High
Basis for Competition	Price
Market Share Distribution	Fragmented

prices of substitute products remain stable. The ceiling on this price increase is primarily the result of the strict competition from substitute products.

In the wood preserving segment of the timber industry, competition from substitute products exerts a strong pressure on preserved wood prices. This is especially true for organically preserved products; inorganically preserved products and railroad ties have less strong competition from the substitutes. The whole industry, however, is affected by the unequal distribution of abatement costs. Some wood preserving plants are already bearing the cost of abatement to meet requirements for oil separation, etc. They therefore will not have to increase prices to cover further abatement costs. Plants which do not currently have adequate pretreatment will still have to compete with these plants; thus, the 5% to 10% ceiling may be optimistic for the industry segment.

Price increases are further constrained by the low industry capacity utilization. Operating rates for this segment are seldom higher than 60% or 70%. Growth of demand is another constraint, especially for organic preservers. With a growth rate less than GNP, and low operating rates, the organic sector will have difficulty in passing on an industry-wide price increase. The inorganic plants will have somewhat less difficulty because demand is high and growing.

Foreign shipments of wood preserved products are negligible so do not act as a constraint on price increases.

Price elasticity does serve as a price increase constraint. For the organic treaters especially, demand tends to fall off greatly with an increase in price. This is related to the strong competition with substitute products and to the fact that price is the basis for competition. Inorganic products have a lower price elasticity so price increases would be somewhat less constrained. Price, however, is still the basis for competition so inorganic treaters face their most strict ceilings on price increases from their immediate competitors. The market share distribution in all segments of the wood preserving industry is extremely fragmented, with many competitors operating within the same market. This fact increases the constraints upon price increases because all plants have to compete with average industry price levels which are set by the largest, most efficient plants.

In summary, it is doubtful whether the POTW wood preserving plants would be able to pass along a full 10% increase in prices. A 5% increase would probably be the maximum for industry average prices. However, individual plants will have to compete against the price increases set by their competitors. The effect of this competition and actual price increases expected in each of these three wood preserving subsegments will be further examined below.

2. Price Increases Required to Cover Abatement Costs

If we assume that wood preserving companies would recover as much of the abatement costs as possible through price increases, and that these price increases would be uniform for all of the plant's products, then the amount of price increase required can be calculated as follows for each plant:

$$\frac{\text{Total Cost Impact (annual)}}{\text{Annual Sales}} = \text{\% price increase sought}$$

This ratio can be calculated for each model plant and for each cost category from Table IV-3. The results are shown in Table V-A-2.

Table V-A-3 shows the number of plants which occur in each category. For two POTW discharging plants, sales figures were not available. One of these is a non-commercial plant (treating wood for internal uses) for which the decision to remain in business would depend on the cost of producing treated wood versus costs of purchasing the wood and for which no price increase/financial impact is expected. The other plant is an organic treater which is reported to have adequate phase A and B treatment, so would experience no impact.

A similar table of price increases sought can be calculated based upon the industry's higher estimates of abatement cost. Using the industry cost estimates, as described in Section IV-E, annualized costs are divided into annual sales to derive the percentage price increases necessary to cover the abatement costs for each industry subsegment. The controlling price increases derived from such a calculation are shown in Table V-A-4. The controlling increases are those which are the lowest in each subsegment. The difference in required price increases between industry and Development Document cost estimates is considerable in the inorganic subsegment. The inorganic plants would require a minimum of one to two percent by Development Document costs, and four percent by industry estimates. In the organic subsegment the difference is one to 1.2 percent, respectively.

3. Probable Price Increases for the Inorganic Subsegment

The amount of price increase which may occur among inorganically treated products from POTW dischargers will be determined by the respective prices of competing products, primarily from inorganic plants which are not presently discharging to POTW's.

The distribution of abatement costs for inorganic preservers throughout the entire industry is expected to be fairly even, that is, there will be essentially no difference between abatement cost impact on the inorganic wood preservers which discharge to POTW's and those which do not discharge to POTW's. Both categories have to achieve zero discharge and they have a similar level of recirculation equipment already installed. The resultant cost increases for all inorganically

TABLE V-A-2

PRICE INCREASES REQUIRED FOR INDUSTRY SUBSEGMENTS*

	Sales 150,000	500,000	1,000,000	3,000,000	6,000,000
	Price Increase	Price Increase	Price Increase	Price Increase	Price Increase
ORGANIC: Adeq. A & B	----	0	0	0	0
ORGANIC: Inad. A & B	----	10.5%	5.2%	1.7%	0.9%
INORGANIC: One cylinder	6.7%	2%	1%	------	------
INORGANIC: Two cylinder	13.3%	4%	2%	-----	------
BOTH TYPES: Adeq. A & B One cylinder	----	2%	1%	0.3%	0.2%
BOTH TYPES: Adeq. A & B Two cylinder	-----	4%	2%	0.7%	0.3%
BOTH TYPES: Inad. A & B One cylinder	-----	12.5%	6.2%	2.1%	1.0%
BOTH TYPES: Inad. A & B Two cylinder	------	14.5%	7.2%	2.4%	1.2%

*Based upon Development Document Estimates.

TABLE V-A-3

NUMBER OF PLANTS IN EACH COST IMPACT GROUP

	Annual Sales:	$150,000	$500,000	$1,000,000	$3,000,000	$6,000,000
Organic Plants	Adequate A&B	-	1	0	0	2
	Inadequate A&B	-	3	9	6	1
Inorganic Plants	One cylinder	2	4	2	-	-
	Two cylinders	0	2	0	-	-
Inorganic and Organic Plants	Adequate A&B One cylinder	-	0	3	2	0
	Adequate A&B Two cylinders	-	0	0	1	1
	Inadequate A&B One cylinder	-	0	2	2	1
	Inadequate A&B Two cylinders	-	0	0	0	2
Total Number of Plants		2	10	16	11	7

Source: Reported Industry statistics and ADL estimates.

TABLE V-A-4

MINIMUM PRICE INCREASES REQUIRED FOR INDUSTRY SUBSEGMENTS

(Based upon Industry Cost Estimates)

Annual Abatement Cost / Annual Sales	Price Increase (%) Required by Largest Plants
Inorganic subsegment	
$\frac{40,000}{1,000,000}$ =	4.0
Organic subsegment	
$\frac{71,830}{6,000,000}$ =	1.2
Both preservatives subsegment	
$\frac{111,830}{6,000,000}$ =	1.8

treated products will therefore be able to be passed on according to the average increases in production costs. Individual firms will be impacted differently from the average, depending upon market conditions, efficiency and size of plant, and capacity utilization.

Where a given market is served by one or more large-scale plants, the larger or the more efficient plant would be more likely to be able to pass on all additional costs. Smaller or less efficient plants in the same market would have to compete within the price increases set by the larger plant.

This phenomenon is demonstrated in Table V-A-2. The largest inorganic plants would require only a one percent price increase to cover incremental abatement costs. There are only two large plants in this position; because markets are so fragmented, these plants could not compete in all areas; therefore, the next smallest price increase, two percent, may be controlling in some areas. We will assume a two percent price increase for the inorganic subsegment throughout the remainder of this analysis.

The smaller plants, to remain competitive, would have to sbsorb the differential between the percentage increase required and the percentage allowed competitively. This differential is quite large in some cases. For a two-cylinder plant with $150,000 in sales, 11.3 percent (13.3 minus 2.0) would have to be absorbed. We can see, however, from Table V-A-3 that there are no plants in this category. The maximum percentage penalty would be 4.7 percent for the one cylinder plant which has sales of $150,000.

In summary, the cost impact is expected to affect all POTW and non-POTW inorganic wood preservers equally. Distribution of the price impact will be primarily dependent upon the specific market within which each plant is situated, that is, whether or not it faces extreme competition in its regional or local area and upon the size of the plant. Larger plants will have a large production base over which to spread abatement costs than will smaller plants, and so the per unit price increase will be smaller, probably a maximum of two percent. The smaller plants faced with the competition from the larger plants will have to absorb the difference in costs. Average price increases for inorganically treated wood products set by the industry price leaders are therefore expected to be relatively small.

4. Probable Price Increases for the Organic Subsegment

The distribution of abatement costs between POTW and non-POTW dischargers appears to be more uneven in the organic preserving segment than is true for the inorganic segment. Non-POTW dischargers will be required to install a considerable amount of secondary treatment equipment. POTW dischargers are not expected to have to install biological treatment, and thus are offered a cost advantage. On the other hand, plants not discharging to municipal sewers are more likely to be located in rural areas where land is less expensive. POTW dischargers will have a slight cost disadvantage because they will be forced to pay more for land which is needed for additional pretreatment.

Within the group of POTW dischargers, the primary plant characteristic which will determine price increases for this subsegment is level of treatment already installed. There are 23 plants using only organic preservatives.

Four of these plants have adequate Phase A and B treatment already installed. The remaining 19 plants will have to upgrade their pretreatment facilities. Depending upon market conditions, efficiency and size of plant and capacity utilization, these plants will require different price increases. The largest or most efficient plants will be more likely to be able to pass on all incremental costs. Smaller or less efficient plants in the same market(s) would have to compete with these price increases.

Table V-A-2 shows that the largest organic plants require only a 0.9 percent price increase. There is only one plant in this category, and it is unlikely that one plant could set price levels for the entire country, so other plants would probably help to set price levels. The plants which treat with both organic and inorganic preservatives do compete with organic-only plants in some product markets. The smallest price increase required by the dual-preservative plants which have to install pretreatment technology is about one percent. Therefore, we may assume that organic plants may be able to pass on price increase of only about 1%.

The smallest organic only plants require a 10.5 percent increase. Therefore, the three plants in this category would have to absorb the difference of 9.5 percent of sales.

Specific price increase patterns may vary by product. Railroad ties, for example, have a relatively low price elasticity of demand because the material characteristics of wood are well suited to railroad tie use, providing virtually no substitute products. The railroad tie market is characterized by fragmented market share distribution, demand growth lower than the GNP growth rate and price competition between firms. Several railroads own captive wood preserving plants to produce their own ties. Railroad tie producers, therefore, have a greater possibility of passing through effluent abatement costs in the form of price increases, but competition among tie producers may still make such price increases difficult.

The piling and utility pole markets do compete with other products, notably steel and concrete, and their primary advantage over substitute products is price. Higher prices could induce consumers to utilize substitute products having different material characteristics. Therefore, price increases for these products would be more limited.

In summary, it is generally expected that most POTW dischargers will have lower costs than direct dischargers, because they will not have to install biological treatment, whereas the non-POTW dischargers will experience this cost impact. However, for those POTW discharging plants

which do have to install treatment requiring land, costs will be higher because there is generally less land available. Further, those plants with adequate equipment already installed will face lower incremental costs to meet the effluent guidelines. The heaviest cost impacts and likelihood of price increases within the industry subsegment therefore falls upon those pretreators that have less equipment already in place. In addition, as with the inorganic treaters, the larger plants will be more likely to be able to spread abatement costs over their larger production, resulting in an average price increase of about one percent. The smaller plants which will have to compete with the larger plant price limits may be unable to pass on price increases sufficient to cover their full abatement cost.

5. Probable Price Increases and Projection of Price Effects for Plants Using Both Inorganic and Organic Preservatives

Fifteen plants in the POTW discharge category use both inorganic and organic preservatives. The cost impacts upon these plants will depend on whether they already have oil separation facilities for their organic treatment discharges, and whether they have one or two cylinders for inorganic treatment.

The form of price increases that will occur will be most dependent upon the market position of each producer with respect to both organic and inorganic products. This relationship is expected to be similar to those discussed for the separate segments above, that is, the larger plants can be expected to be able to pass on most cost increases, while smaller plants will have to meet the large plant price limit, except for those rare occasions where a single small plant is virtually the only source of supply of a particular product in a given market.

As discussed in the previous section, the average expected price increase among producers of organic and inorganic products will be one percent. The smallest and most impacted plant in this subsegment (Table V-A-2) requires a 6.2 percent price increase so would have to absorb the differential 5.2 percent.

Even more so than the other two subsegments, the plants using both types of preservatives compete in different products for each of their products. Price for each product will be established according to average industry price increase for that product. Hence inorganically treated products from this subsegment may be able to have price increases of two percent and still be competitive with other inorganic plants.

In summary, price increases from this subsegment are expected to be variable according to product/market sector. The largest plants will still tend to establish new price levels with which smaller plants must compete, but the price increase will be small, averaging about one percent, with up to two percent for inorganic products.

6. Secondary Effects of Price Increases

Generally, for both organic and inorganic preserved wood products, no significant price increases in major market areas are anticipated. If significant price increases did occur, they would impact such industries as construction and utilities. It is likely that such increases would be passed along to consumers in the form of higher utility bills, more expensive homes, etc., although such price increases would be minor because the cost of preserved wood is generally a very small component of the costs of the construction and utilities industries.

7. Effects on Substitutes

Since no major price increases are expected, substitute products will not be affected. If price increases were to occur, it is unlikely that demand for substitute products would increase substantially. Generally, the major preserved wood products are bought because of their relatively lower price; however, a price increase of one to two percent would not cause significant changes in demand.

B. FINANCIAL EFFECTS

Following the price increase assumption from Section A, profitability and capital availability impacts are now analyzed.

The purpose is to project the effects that abatement costs will have on individual company financial statements. The model financial statements first shown here in Section III are used as the pre-abatement cost base case financial situations to which incremental changes resulting from abatement are added.

Two versions of cost estimates are used, first those costs shown in Table IV-3 based upon the Development Document, and second, the cost estimates provided by industry sources. Thus, the differences in impacts between the two groups of estimates can be visualized.

1. Inorganic Plants

Table V-B-1 shows the results of the financial analysis of inorganic preserving plants which will have to meet zero discharge requirements. Since the expected price increases are small, two percent in the industry subsegment, the effluent abatement costs will result in a decrease in profitability of the smallest plants which have the highest abatement cost per unit of production.

In Table V-B-1, the income statement based upon Development Document estimates assumes a two percent price increase. It also allows for capital recovery at a rate of 10% over 10 years. The effect is similar to financing the effluent treatment facilities completely with debt at a 10 percent interest rate due in equal installments over ten years (actually, the interest cost may decrease after the first year as the principal is paid off).

TABLE V-B-1

PRO FORMA INCOME STATEMENTS FOR MODEL PLANTS - INORGANIC PRESERVATIVES

	MODEL PLANT 1			MODEL PLANT 2			MODEL PLANT 3		
	Base Case	Dev.Doc. Costs	Industry Costs	Base Case	Dev.Doc. Costs	Industry Costs	Base Case	Dev. Doc. Costs	Industry Costs
Sales	150,000	153,000	156,000	500,000	510,000	520,000	1,000,000	1,020,000	1,040,000
% Price increase		2.0	4.0		2.0	4.0		2.0	4.0
Materials	96,000	96,000	96,000	320,000	320,000	320,000	640,000	640,000	640,000
Payroll	24,000	24,000	24,000	80,000	80,000	80,000	160,000	160,000	160,000
Depreciation	3,000	3,000	3,000	10,000	10,000	10,000	20,000	20,000	20,000
Depreciation-Pretreatment Equipment		5,000	20,000		5,000	20,000		10,000	40,000
Other Annual Pretreatment Expense		5,000	10,000		5,000	10,000		5,000	10,000
Operating Margin	27,000	20,000	3,000	90,000	90,000	80,000	180,000	190,000	190,000
S,G&A	15,000	15,000	15,000	50,000	50,000	50,000	100,000	100,000	100,000
Profit Before Tax	12,000	5,000	(12,000)	40,000	40,000	30,000	80,000	90,000	90,000
Taxes	6,000	2,500	0	20,000	20,000	15,000	40,000	45,000	45,000
PROFIT AFTER TAX	6,000	2,500	(12,000)	20,000	20,000	15,000	40,000	45,000	45,000
Cash Flow	9,000	10,500	11,000	30,000	35,000	45,000	60,000	75,000	105,000
CHANGE IN CASH FLOW		1,500	2,000		5,000	15,000		15,000	45,000
Capital Investment Required		50,000	100,000		50,000	100,000		100,000	200,000

The income statement based upon the industry estimates uses a price increase of four percent. This larger price increase is derived by dividing the industry's annual abatement cost estimates of the largest plants ($40,000) into the largest sales ($1,000,000) as shown in Table V-A-4. A five-year capital recovery period is assumed.

This exercise demonstrates the effects of scale upon reduction in profitability and indicates a severe impact upon the profitability of the smaller plants in each segment. As shown in Table V-A-3, there are two plants in the smallest category. These one cylinder plants will face significantly reduced profits under the Development Document assumptions. They will suffer even more severely if industry estimates are true. There are six plants in the middle size category, four of which have one cylinder and would have no change in profitability. Two of the plants have two cylinders so would have a decrease in profitability. The additional cylinder would account for a profit decrease of approximately five thousand dollars, using Development Document estimates, and 15 thousand dollars by industry estimates. This impact could cause problems for these plants, although cash flow could not be affected.

The two plants in the largest category will experience an increase in profitability.

2. Organic Plants

Table V-B-2 shows the results of a similar financial analysis for plants which treat only with organic preservatives. Again, the smallest plants will feel the greatest impact because they will be able to pass on only a small portion of their abatement costs as price increases. The Development Document cost column assumes a price increase of 0.9 percent. As shown in Table V-A-2 and described in Section V-A-4, price increases for this subsegment may actually be slightly higher, an adjustment which would decrease the financial impact. The pro forma statement based upon industry cost estimates assumes a price increase of 1.2 percent as defined in Table V-A-4.

There are four organic plants in the smallest sales category, one of which has adequate treatment so will face no incremental abatement cost. Of the remaining three plants, two belong to large, multi-plant companies, which would be expected to either consolidate wood preserving operations to reduce total abatement costs, or spread the price increases over other activities to fully recover costs. In other words, although the plants could be closed, the companies would not be seriously impacted. This leaves only one $500,000 plant which would be impacted by a severe reduction of profitability.

In the one million dollar sales category, there are nine plants all with inadequate Phase A and B treatment. Seven of the plants are part of large multi-plant companies and so those firms would not be severely impacted, leaving two single plant firms which would face significant reduction in profitability and fairly significant capital needs in order to comply with pretreatment requirements.

TABLE V-B-2

PRO FORMA INCOME STATEMENTS FOR MODEL PLANTS - ORGANIC PRESERVATIVES

	Model Plant 2			Model Plant 3			Model Plant 4			Model Plant 5		
	Base Case	Dev.Doc. Costs	Industry Costs	Base Case	Dev.Doc. Costs	Industry Costs	Base Case	Dev.Doc. Costs	Industry Costs	Base Case	Dev.Doc. Costs	Industry Case
Sales	500,000	504,500	506,000	1,000,000	1,009,000	1,012,000	3,000,000	3,027,000	3,036,000	6,000,000	6,054,000	6,072,000
% Price Increase		0.9	1.2		0.9	1.2		0.9	1.2		0.9	1.2
Materials	320,000	320,000	320,000	640,000	640,000	640,000	1,920,000	1,920,000	1,920,000	3,840,000	3,840,000	3,840,000
Payroll	80,000	80,000	80,000	160,000	160,000	160,000	480,000	480,000	480,000	960,000	960,000	960,000
Depreciation	10,000	10,000	10,000	20,000	20,000	20,000	60,000	60,000	60,000	120,000	120,000	120,000
Depreciation - Pre-treatment Equipment		13,350	30,700		13,350	30,700		13,350	30,700		13,350	30,700
Other Annual Pre-treatment Expenses		39,130	41,130		39,130	41,130		39,130	41,130		39,130	41,130
Operating Margin	90,000	42,020	24,170	180,000	136,520	120,870	540,000	514,520	504,170	1,080,000	1,081,520	1,080,170
S,G & A	50,000	50,000	50,000	100,000	100,000	100,000	300,000	300,000	300,000	600,000	600,000	600,000
Profit Before Taxes	40,000	(7,980)	(25,830)	80,000	36,520	20,870	240,000	214,520	204,170	480,000	481,520	480,170
Taxes	20,000	0	0	40,000	18,260	10,435	120,000	107,260	102,085	240,000	240,760	240,085
PROFIT AFTER TAXES	20,000	(7,980)	(25,830)	40,000	18,260	10,435	120,000	107,260	102,085	240,000	240,760	240,085
Cash Flow	30,000	15,370	14,870	60,000	51,610	61,135	180,000	180,610	192,785	360,000	374,110	390,785
CHANGE IN CASH FLOW		(14,630)	(15,130)		(8,390)	1,135		610	12,785		14,110	30,785
Capital Investment Required		138,500	158,500		138,500	158,500		138,500	158,500		138,500	158,500

The largest two sales categories contain six and three plants, respectively. These plants will have little or no decrease in profitability. Cash flow in fact will increase.

3. Plants Which Treat with Both Preservatives

Table V-B-3 shows the financial results for the plants which treat with both organic and inorganic preservatives. In the Development Document cost estimates column, a price increase of one percent is assumed. For industry estimates, prices are assumed to increase by 1.8 percent, as determined by Table V-A-4.

The smallest sales category of plants will have negative profits as a result of abatement requirements. However, there are no plants in this group.

In the million dollar sales category, there are five plants, three with adequate A and B treatment. Both of the remaining plants are part of large, multi-plant companies and would be expected to consolidate in order to avoid allowing individual plants to be severely impacted.

None of the plants in the largest categories are expected to be severely impacted by the decreases in profitability assumed. Cash flow will increase in both categories.

In summary, there are three or four inorganic plants, one to three organic plants, and two plants which treat with both types of preservatives which could be heavily impacted.

4. Capital Availability

There is very little information available concerning capital availability of plants under consideration, although credit reports from some sources indicate that capital will generally be available to the larger firms. In general terms, one may consider two sources: equity and debt. Capital availability may also be discussed in terms of ownership characteristics: smaller, closely-held firms and larger, publicly-held firms.

Equity financing may take two forms: new capital infusions and operating cash flow. If the estimate of a 4% after tax margin on sales is correct, and depreciation is approximately 2% of sales, one year's cash flow from an inorganic preservative plant with sales of $1 million and one year's cash flow from an organic preservative plant with sales of $3 million is sufficient to finance zero discharge from a one-cylinder inorganic preserving plant and oil separation, filtration, pH control, and flocculation for an organic preserving plant using Development Document capital cost estimates. If industry capital cost estimates were used, about two years' cash flow would be required for an inorganic plant of this size and one year's cash flow for an organic plant of this size. If biological treatment were required for an organic plant of $3

TABLE V-B-3

PRO FORMA INCOME STATEMENTS FOR MODEL PLANTS - BOTH ORGANIC AND INORGANIC PRESERVATIVES

	MODEL PLANT 2			MODEL PLANT 3			MODEL PLANT 4			MODEL PLANT 5		
	Base Case	Dev.Doc. Costs	Ind. Costs	Base Case	Dev.Doc. Costs	Ind. Costs	Base Case	Dev.Doc. Costs	Ind. Costs	Base Case	Dev.Doc Costs	Ind. Costs
Sales	500,000	505,000	509,000	1,000,000	1,010,000	1,018,000	3,000,000	3,030,000	3,054,000	6,000,000	6,060,000	6,108,000
% Price increase		1	1.8		1	1.8		1	1.8		1	1.8
Materials	320,000	320,000	320,000	640,000	640,000	640,000	1,920,000	1,920,000	1,920,000	3,840,000	3,840,000	3,840,000
Payroll	80,000	80,000	80,000	160,000	160,000	160,000	480,000	480,000	480,000	960,000	960,000	960,000
Depreciation	10,000	10,000	10,000	20,000	20,000	20,000	60,000	60,000	60,000	120,000	120,000	120,000
Depreciation-Pretreatment Equipment		18,350	50,700		18,350	50,700		18,350	50,700		23,350,	70,700
Other Annual Pretreatment Expense		44,130	51,130		44,130	51,130		44,130	51,130		44,130	51,130
Operating Margin	90,000	42,520	(2,830)	180,000	127,520	96,170	540,000	507,520	492,170	1,080,000	1,082,520	1,086,170
S,G&A	50,000	50,000	50,000	100,000	100,000	100,000	300,000	300,000	300,000	600,000	600,000	600,000
Profit Before Tax	40,000	(7,480)	(32,830)	80,000	27,320	(3,830)	240,000	207,520	192,170	480,000	482,520	486,170
Taxes	20,000	0	0	40,000	13,760	0	120,000	103,760	96,085	240,000	241,260	243,085
PROFIT AFTER TAX	20,000	(7,480)	(32,830)	40,000	13,760	(3,830)	120,000	103,760	96,085	240,000	241,260	243,085
Cash Flow	30,000	20,870	7,870	60,000	52,110	66,870	180,000	182,110	206,785	360,000	384,610	433,785
CHANGE IN CASH FLOW		(9,130)	(22,130)		(7,890)	6,870		2,110	26,785		24,610	73,785
Capital Investment Required		188,500	258,500		188,500	258,500		188,500	258,500		238,500	358,500

million annual sales volume, then two years' cash flow would be required. For the smaller plants in each subsegment, the investment required is a significant proportion of annual cash flow. For the larger plants, the investment may often be less than one year's cash flow.

New capital infusions are the other source of equity financing. For the smaller, closely-held firms, the owners are likely to have little access to capital markets and would be dependent upon their own savings. Their savings may be nonexistent or tied up in the business already. Conceivably, if inventories are high or accounts receivable are slow, attempts could be made to pare inventory and speed up collection of receivables. Inventories and receivables may often be 30-40% of annual sales volume in this business. However, it is often difficult to reduce inventories or speed collection of receivables. Also, stretching out payments of accounts payable could jeopardize the credit rating of the firm. For the larger, publicly-held firms, the amount of investment required may not be large enough to justify a new issue of stock. Funds may be available from other portions of the business if management decides to continue operation of the plant. This decision is likely to be based on estimates of the return on equity of the plant over the long term.

Debt financing may be pursued in the form of a commercial loan. The lender is likely to be concerned about the credit worthiness of the firm over the term of the loan. Such considerations as the future profitability of the firm, the cash flow to interest coverage ratio and previous relations with the firm will determine availability. In the present business environment, only the more credit worthy firms may be expected to obtain loans over as long as a three- to four-year term. In general, it is likely that smaller firms will have more difficulty in obtaining loans.

Whether debt, equity or a combination of debt and equity financing are available will depend upon estimates made of the future of the business by the owner and/or the lender. In addition to such quantifiable factors as profitability, cash flow and other business opportunities, many closely-held firms will be influenced by their attachment to the business. Often, a closely-held business provides employment to the owners and they may be willing to accept a less profitable income statement than a publicly-held firm. This intangible factor is more difficult to predict in attempting to analyze which plants will be able and willing to raise the necessary capital.

In summary, the largest plants would have the least problem in obtaining either debt or equity capital. Unfortunately, this aggravates the impact differential between small and large plants in that the smaller plants, with greater relative capital requirements may have the least new capital available.

5. Production and Employment Effects

a. Analysis of Closure--Based upon the financial effects shown in the previous tables, and closure decision criteria shown in Table V-B-4,

an analysis can be made to discover how many plants are likely to close as a result of the effluent abatement costs.

This analysis assumes that organic plants will not have to install biological treatment equipment. Addition of such equipment would increase abatement costs by approximately 100%. Representatives of several plants, large and small, have suggested to us that they would seriously consider closure if biological treatment is required.

TABLE V-B-4

PLANT CLOSURE ANALYSIS MATRIX

Parameter	Condition for Closure
After Tax Treatment Cost--% Net Income	High, e.g., greater than 30%
Cash Flow	Negative
Capital Cost of Abatement--% Gross Total Fixed Assets	High, e.g., greater than 30%
Extent of Integration	None--Low
Other Facilities on Common Site	Isolated Plant
Ownership	Large, publicly owned firm

Impacts on Inorganic Preserving Plants. All of the eleven plants treating with only inorganic preservatives have some effluent recycling facilities in operation. However, to meet zero discharge requirements they will have to make additional expenditures of approximately $50,000 per cylinder.

The effect that this will have on profitability and cash flow was shown in Table V-B-1. Table V-B-5 shows the following ratios for each model plant size: after tax abatement cost as a percent of net income, and capital cost of abatement as a percent of gross fixed assets.

From Table V-B-4 we see that an after tax treatment cost which is greater than 30% of net income is used as a criteria for closure. Similarly, capital cost of abatement greater than 30% of gross fixed assets is condition for closure.

From this standpoint, it appears that plants in the smallest plant category and possibly plants in the $500,000 sales category could close. There are two plants in the $150,000 group and six plants in the middle size group.

TABLE V-B-5

FINANCIAL RATIOS FOR INORGANIC PRESERVING PLANTS

Annual Sales	$150,000	$500,000	$1,000,000
After Tax Abatement Cost as a % of Net Income	83%	25%	12.5%
Capital Cost of Abatement as a % of Gross Fixed Assets*	20%	17%	12.5%

*Book value.

The two small plants will experience a significant reduction in profitability, but a slight increase in cash flow. One plant is the only one the firm has, and might be forced to close. The other is part of a company with some other wood preserving operations. This plant could also be a likely closure, but could be consolidated with the company's other operations.

Of the six larger plants, four have one cylinder and, as shown in Table V-B-1, would have little, if any, decrease in profitability.

Perhaps the most important factor for this subsector is capital availability because it affects several of the analysis factors in Table V-B-4. Provided that capital is available, cash flow for this group would increase considerably. It can be expected, therefore, that these plants would not close.

The other two plants have two cylinders, and will face a larger abatement cost, as shown in Table IV-3. Both plants are part of lumber companies. Therefore, the closure decision would be based upon analysis of the relative costs of producing versus purchasing treated wood. We expect that because of significantly reduced returns on the wood preserving operations resulting from the pretreatment requirements, at least one of these plants may close.

Impacts on Organic Preserving Plants. Of the 23 plants treating with organic preservatives, only four have adequate phase A and B treatment. The others will have to install further effluent abatement equipment.

Table V-B-6 shows the relationship of the incremental abatement costs to net income and gross fixed assets. The smaller two plant sizes have large abatement costs relative to net income and assets. Table V-B-2 shows that the smallest group has a significant decrease in both profitability and cash flow. The $1 million sales group which contains nine plants also has decreases, but is not expected to be impacted to the point of closure, although many of the plants belong to large wood preserving companies and could be consolidated to improve returns.

There are four plants in the small group, one of which has adequate oil separation, flocculation, pH control and filtration equipment already in place and so would experience little impact. Of the remaining three, one has a strong possibility of closure. It is the only plant of a small firm which has wood preserving as its only activity and although it may choose to remain in business for personal reasons, it appears unlikely that it can remain liquid. The other two plants are part of much larger and more diversified firms. Because the closure decision, again, would be based upon internal economic decisions, it is assumed that at least one of these plants may be closed or consolidated.

Impacts on Plants Which Treat with Both Types of Preservatives. Some of the plants in this subsegment face a higher average abatement cost than plants in the other subsegments because in effect they must

TABLE V-B-6

FINANCIAL RATIOS FOR ORGANIC PRESERVING PLANTS

	Organic Preservers			
Annual Sales	$500,000	$1,000,000	$3,000,000	$6,000,000
After Tax Abatement Cost as a % of Net Income	131%	66%	22%	11%
Capital Cost of Abatement as a % of Gross Fixed Assets*	46%	35%	11.5%	5.8%

*Book value

comply with two different effluent standards. Of the 15 plants in this category, seven have adequate Phase A & B treatment. Their cost impact will be considerably less than that shown in Table V-B-3. These plants are not expected to seriously consider closure.

The eight remaining plants face abatement costs of from about $190,000 to $240,000. The costs relative to net income and gross fixed assets are shown in Table V-B-7 for each of the model plants. Again we see that plants in the smallest sales categories are most subject to closure. From Table V-B-3, it is apparent that cash flow will become negative for the $500,000 and $1,000,000 sales categories.

However, there are no known plants in the smallest category. Two plants in the million dollar size category have inadequate Phase A and B treatment. One is the only plant in the company. Both are part of large U.S. companies and would likely be shut down based upon the reduction of profitability.

Summary of Closure Impacts

A high probability of closure has been identified for three inorganic preserving plants, two organic preserving plants, and two plants which treat with both preservatives. This conclusion is based upon the abatement costs cited in the Development Document. If industry estimates of abatement costs or the actual land costs prove to be higher than estimated, then the number of plants which close could be significantly higher, possibly double.

b. Production Curtailments and Employment Reduction

Because demand growth is low for wood preserved products in general and capacity utilization is also low, closure of some plants is not likely to affect total industry production. Plants which remain in operation might be expected to increase production to replace supplies from those plants which close. In some cases, closure of one plant within a multi-plant company could result in make-up production from the other plants within the same company. The small plants, which are most likely to close, have such low production and the product markets are so fragmented that any shift in production levels at remaining plants would be very small.

Employment reductions as a result of plant closures are shown in Table V-B-8.

In many of these plants which are part of other operations such as lumber yards, the employees could be absorbed into these other operations. At least two of the plants fit this category. Even without this maintenance of current employees, the total employment reduction is small relative to the entire industry.

TABLE V-B-7

FINANCIAL RATIOS FOR PLANTS WHICH TREAT WITH BOTH TYPES OF PRESERVATIVES

Annual Sales	$500,000	$1,000,000	$3,000,000	$6,000,000
After Tax Abatement Cost as a % of Net Income	156%	78.1%	26%	13%
Capital Cost of Abatement as a % of Gross Fixed Assets*	62%	47%	15.7%	7.9%

*Book value

TABLE V-B-8

EMPLOYMENT IMPACTS

Subsegment	Number of Plants Closing	% of Plants*	Average Employment per Plant	Total Employment Reduction
Inorganic				
$150,000 size	2	4	3	6
$500,000 size	1	2	9	9
$1,000,000 size	0		15	0
			Subtotal	15
Organic				
$500,000 size	2	4	9	18
$1,000,000 size	0		15	0
$3,000,000 size	0		35	0
$6,000,000 size	0		75	0
			Subtotal	18
Both Preservatives				
$500,000 size	0		9	0
$1,000,000 size	2	4	15	30
$3,000,000 size	0		35	0
$6,000,000 size	0		75	0
			Subtotal	30
Total employment reduction				63

*As percent of 49 wood preserving plants which discharge to POTW's.

c. Industry Growth and Modernization

The capital cost of effluent abatement facilities for the plants discharging to POTW's may be greater than the annual capital expenditures of the whole industry in recent years ($10 million per year). The industry is generally characterized by slow growth and underutilization of capacity. It is believed that much of the industry capital spending in recent years has been for water pollution control. Many of the organic preserving plants are very old. Since it appears that smaller plants are those most impacted by the proposed standards, total industry capacity is not expected to be seriously decreased. Depending on market conditions and profitability, some of the older, larger plants may also be impacted by the standards.

d. Competitive Posture

The proposed standard does increase the relatively low barriers to entry into the industry. The unequal distribution of cost suffered by smaller plants versus larger plants will decrease margins for the smaller plants more than for the larger plants.

6. Resultant Community Effects

Out of nine plants which will be severely impacted, seven will probably close due to the pretreatment standards. Of the nine, four are located in the South, and five in the Northeast-North Central region. No city is expected to have more than one impacted plant. It is not expected that new plants will be built in these areas. However, if the impacted plants were forced to close, existing wood preserving plants serving the same markets would experience increased sales. Of the seven plants which are likely closures, three use inorganic preservatives and employ less than 10 persons. It is not known whether these employees could be absorbed in local workforces. For the remaining four plants, it is estimated that fewer than 20 or 25 employees are working at each plant. Again, it is not known whether these employees could be absorbed in the local workforce. Although the wood preserving plants may be buying timber from small local landowners, it is expected that this timber could be sold for other purposes or to other wood preserving plants.

7. Balance of Payments Effects

Imports and exports of treated wood products represent a very small proportion of the industry. No significant balance of payments effects are anticipated.

VI. LIMITS OF THE ECONOMIC ANALYSIS

The analysis provided in this report has been limited by two key problems:

- A limited availability of data; and,
- The nature of the industry.

We conducted representative surveys of the industry to enable us to deal with the data limitation factor. However, some industry sources were concerned about the confidentiality of the information requested and so were reluctant to supply financial information which might be considered proprietary. To overcome this data problem, we developed model financial information from a variety of sources, including publicly available statistics and financial data which was supplied for some of the firms. The resulting model financial statements were then confirmed through discussions with industry members. The consistent accuracy of our data suggests that this approach can be accomplished within a relatively narrow band of error.

The second problem, the nature of the industry, makes it difficult to project plant closures. Some family-owned plants have remarkable "staying power" even in the event of significant negative financial occurrences. Objective closure decision criteria therefore had to be measured against the subjective commitments to business. However, since some of the abatement costs are modest and even small firms may be able to bear this one-time cost, the difficulty of accurately projecting plant closures is less important. Nevertheless, if new Guidelines would increase the abatement costs to be borne by companies in this industry, then the projection of closures would be a more sensitive issue.

The analysis is based most heavily upon the abatement cost estimates provided in the Development Document. Reported differences between industry and Development Document estimates have been noted and a sensitivity analysis conducted to indicate the resultant differences in economic impact. If the Development Document cost estimates are proven to be inaccurate, the analysis would have to be adjusted accordingly.

☆U.S. GOVERNMENT PRINTING OFFICE: 1977— 241-037:24