ECONOMIC IMPACT ANALYSIS OF ALTERNATIVE POLLUTION CONTROL TECHNOLOGY FOR THE WOOD PRESERVING SUBCATEGORIES OF THE TIMBER PRODUCTS INDUSTRY

report to

U.S. ENVIRONMENTAL PROTECTION AGENCY

CONTRACT NO. 68-01-4194

Arthur D. Little, Inc.

DRAFT

021723

ECONOMIC IMPACT ANALYSIS OF ALTERNATIVE POLLUTION CONTROL TECHNOLOGY FOR THE WOOD PRESERVING SUBCATEGORIES OF THE TIMBER PRODUCTS INDUSTRY

U.S. ENVIRONMENTAL PROTECTION AGENCY

NOVEMBER 1978

Submitted by:

Arthur D. Little, Incorporated
Acorn Park
Cambridge, Massachusetts 02140

Contract No. 68-01-4194

Arthur D Little, Inc.

DRAFT

NOTICE

This document is a DRAFT CONTRACTOR'S REPORT. It includes technical information submitted by the Contractor to the United States Environmental Protection Agency (EPA) regarding the subject industry. It is being distributed for review and comment only. The report is not an official EPA publication and it has not been reviewed by the Agency.

Some data in this report was received by the Technical Contractor too late for inclusion in this report (or the Technical Contractor's report dated September 1, 1978). Therefore there may be some inconsistencies between the data in this draft report and the Technical Contractor's draft report.

The report will be undergoing extensive review by EPA, Federal and State agencies, public interest organizations, and other interest groups and persons during the coming weeks.

The regulations to be published by EPA under Sections 301(d), 304(b), and 306 of the Federal Water Pollution Control Act, as amended, will be based in part, on the report and the comments received on it. Upon completion of the review and evaluation of the technical, economic, and environmental information, an EPA report will be issued at the time of proposed rule-making setting forth EPA's preliminary conclusions regarding the subject industry. These proposed rules will include proposed effluent guidelines and standards, standards of performance, and pretreatment standards applicable to the industry. EPA is making this draft contractor's report available to encourage broad, public participation, early in the rule-making process.

The report 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 and prepared the information. It cannot be cited, referenced, or represented in any respect in any such proceedings as a statement of EPA's views regarding the subject industry.

U.S. Environmental Protection Agency
Office of Water and Hazardous Materials
Office of Analysis and Evaluation
Washington, D.C. 20460

DRAFT

TABLE OF CONTENTS

		PAGE
I.	EXECUTIVE SUMMARY	I-1
II.	INDUSTRY CHARACTERIZATION	II-1
	A. INDUSTRY DEFINITION	II-1
	B. TYPES OF FIRMS	II-1
	1. Size of Firm	II-1
	2. Integration	II-2
	3. Ownership Characteristics	II-4
	C. PRODUCT DESCRIPTION	II-6
	1. Type of Products	II-6
	2. Market Size	II-7
	3. Future Demand Growth	II-7
	D. PLANT CHARACTERISTICS OF THE EXISTING INDUSTRY	II-12
	1. Process Technology	II-12
	2. Product Diversification Within Plants	II-13
	3. Size of Plants	II-14
	4. Location	II-14
	5. Employment	II-17
	E. CHARACTERISTICS OF NEW PLANTS	II-17
	1. Plants Constructed Since 1971	II-17
	2. Capital and Operating Costs for New Plants	II-21
	F. COMPETITIVE STRUCTURE OF THE INDUSTRY	II-24
	1. Market Structure	II-24
	2. Pricing Mechanism	II-26
	3. Price Elasticity of Demand	II-26
	G. PRICE AND COST HISTORY	II-27
	1. Income and Asset Analysis	II-32
	2. Investment Criteria	II-37
III.	COST OF COMPLIANCE	III-1
	A. PURPOSE	III-1
	B. CURRENT EFFLUENT STATUS	III-1
	C. CONTROL OPTIONS	III-1
	D. COST OF COMPLIANCE FOR EXISTING INDUSTRY	III-4
	E. COST OF COMPLIANCE FOR NEW SOURCES	III-11

DRAFT

TABLE OF CONTENTS (CONTINUED)

	PAGE
IV. ECONOMIC IMPACT ASSESSMENT	IV-1
A. ECONOMIC CHARACTERISTICS OF IMPACTED PLANTS	IV-1
B. ECONOMIC IMPACT ON EXISTING INDUSTRY	IV-3
1. Price Impacts	IV-3
2. Demand Shifts	IV-8
3. Financial Impact	IV-8
4. Plant Closures	IV-14
5. Employment Effects	IV-16
C. ECONOMIC IMPACT UPON NEW SOURCES AND CAPACITY EXPANSIONS	IV-18
V. LIMITATIONS OF ANALYSIS	V-1
A. EPA REGULATION AFFECTING WASTE DISPOSAL	V-1
B. RETURN ON INVESTMENT CRITERIA	V-2
C. COST VARIATIONS FROM PLANT TO PLANT	V-4
D. FUTURE GROWTH IN DEMAND	V-4
E. LOCAL CONDITIONS OF IMPACTED PLANTS	V-5
APPENDIX A - Supplementary Discussion	A-1
APPENDIX B - Responses to EPA Financial 308 Survey	B-1
APPENDIX C - References	C-1
APPENDIX D - EPA Financial 308 Survey	D-1

DRAFT

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
II-1	PRESSURE CYLINDER CAPACITY OF THE TEN LARGEST WOOD PRESERVING FIRMS, 1976	II-3
II-2	WOOD PRESERVING PLANTS FORM OF BUSINESS ORGANIZATION, 1976	II-5
II-3	PRESERVED WOOD PRODUCTS AND THEIR POTENTIAL SUBSTITUTES	II-8
II-4	WOOD TREATED WITH PRESERVATIVES	II-9
II-5	VALUE OF SHIPMENTS FOR THE WOOD PRESERVING INDUSTRY 1958 TO 1976	II-10
II-6	DISTRIBUTION BY ANNUAL SALES VALUE	II-16
II-7	NUMBER OF PRODUCTION EMPLOYEES PER PLANT	II-19
II-8	AGE DISTRIBUTION OF WOOD PRESERVING PLANTS	II-20
II-9	PROFITABILITY OF NEW PLANTS VERSUS OLDER PLANTS	II-21
II-10	ESTIMATED FIXED CAPITAL REQUIREMENTS FOR THE MANUFACTURE OF PRESERVED WOOD (ORGANIC TREATMENT)	II-23
II-11	ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD	II-25
II-12	CONCENTRATION RATIOS IN THE WOOD PRESERVING INDUSTRY 1963-1976	II-26
II-13	SELECTED OPERATING RATIOS FOR THE WOOD PRESERVING INDUSTRY: 1964 TO 1976	II-30
II-14	PRO-FORMA INCOME STATEMENTS WOOD PRESERVING PLANTS	II-34
II-15	WOOD PRESERVING PLANTS ASSET TURNOVER BY SALES/ SERVICE CATEGORY	II-35
II-16	WOOD PRESERVING PLANTS DISTRIBUTION OF ASSETS BY SALES AND SERVICE COMPANY	II-37
II-17	CAPITAL EXPENDITURES AND PRODUCTIVITY IN WOOD PRESERVING INDUSTRY	II-39
II-18	TARGET RATE OF RETURN FOR INVESTMENTS MADE BY WOOD PRESERVING INDUSTRY	II-41
III-1	CURRENT DISCHARGE STATUS BY TYPE OF PROCESS	III-2
III-2	COST OF COMPLIANCE OPTION 1: ENHANCED BIOLOGICAL TREATMENT	III-5
III-3	COST OF COMPLIANCE OPTION 2	III-6
III-4	COST OF COMPLIANCE OPTION 3	III-7

DRAFT

LIST OF TABLES (CONTINUED)

TABLE	DESCRIPTION	PAGE
III-5	TOTAL COST OF COMPLIANCE WOOD PRESERVING INDUSTRY INSTALLING OPTION TECHNOLOGY	III-9
III-6	TOTAL COST OF COMPLIANCE WOOD PRESERVING INDUSTRY INSTALLING LEAST COST TECHNOLOGY	III-10
III-7	MODEL PLANTS FOR NEW SOURCE PERFORMANCE STANDARDS	III-13
III-8	COST OF COMPLIANCE NEW WOOD PRESERVING PLANTS	III-14
IV-1	LAND AVAILABILITY FOR DISCHARGING PLANTS	IV-2
IV-2	PRICE INCREASES REQUIRED TO RECOVER COSTS OF COMPLIANCE OPTION 1: ENHANCED BIOLOGICAL TREATMENT	IV-4
IV-3	PRICE INCREASES REQUIRED TO RECOVER COSTS OF COMPLIANCE OPTION 2	IV-5
IV-4	PRICE INCREASES REQUIRED TO RECOVER COSTS OF COMPLIANCE OPTION 3: TOTAL RECYCLE/NO DISCHARGE	IV-6
IV-5	WOOD PRESERVING PLANTS PROFITABILITY WITH NO PRICE INCREASES BEFORE AND AFTER COMPLIANCE	IV-9
IV-6	FORM OF BUSINESS ORGANIZATION BY DISCHARGE STATUS	IV-13
IV-7	POTENTIAL PLANT CLOSURES UNDER BAT ALTERNATIVES	IV-15
IV-8	WOOD PRESERVING INDUSTRY EMPLOYMENT LOSSES FROM PLANT CLOSURES	IV-17
IV-9	IMPACT OF BAT REQUIREMENTS UPON LONG-RUN REVENUE REQUIRED TO SUPPORT NEW SOURCES	IV-20
V-1	REVENUE REQUIRED BY DISCOUNT RATE	V-3

DRAFT

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
II-1	SALES TRENDS FOR PRESERVED WOOD PRODUCTS	II-11
II-2	WOOD PRESERVING PLANTS IN THE UNITED STATES	II-17
II-3	WOOD PRESERVING INDUSTRY PRICE INDICES OF RAW MATERIALS	II-29
II-4	LIST PRICES OF SELECTED PRESERVED WOOD PRODUCTS	II-32
IV-1	INVESTMENT REQUIRED FOR BAT ALTERNATIVES AS A PERCENTAGE OF CASH FLOW	IV-11
V-1	REVENUE REQUIREMENT AS PERCENT OF SALES BY ROR FOR SAMPLE PLANTS	V-3

DRAFT

I. EXECUTIVE SUMMARY

(Not Included in this Final Draft)

DRAFT

II. INDUSTRY CHARACTERIZATION

A. INDUSTRY DEFINITION

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 crossties, poles, posts, and piling."

B. TYPES OF FIRMS

The wood perserving industry is composed of a large number of small, privately-owned plants and a few larger establishments. Larger establishments are generally either:

- Owned by companies whose major source of income is not wood preserving; e.g., Koppers, Kerr-McGee Chemical Corp., Southern Wood Piedmont Co., and International Paper Company.
- Owned by companies who are primarily wood preservers; e.g., J. H. Baxter & Co., Wyckoff Co.

Each of these firms operates at numerous locations. There were approximately 302 companies and 415 wood preserving plants in the country in 1976. The Environmental Protection Agency Financial 308 Letter[1] was answered by 337 plants.

1. Size of Firm

The wood preserving companies vary considerably in both sales and number of wood preserving operations. Of 302 wood preserving companies, 263 (87%) are single-plant firms, 39 (13%) are multi-plant firms. Koppers Company operates 25 plants, the other multi-plant firms operate 10 or or fewer plants.

[1] Survey conducted by EPA under Section 308 of the Federal Water Pollution Control Act, as amended. Response summaries and tabulated data are in Appendices B and D.

Available information shows that total annual sales of these companies, including sales from other operations, range from less than $200,000 to over $1 billion.

The wood preserving industry has a large number of small firms. However, the ten largest firms represent approximately 51% of the total industry, based upon pressure tank capacity. While actual production may not be directly correlated with pressure tank capacity because capacity utilization may vary and different products and different species of wood require varying treating times, pressure tank capacity is an indicator of production capacity. As shown in Table II-1, Koppers Co., Inc. represented 20% of total industry capacity, while the four largest firms represented 37% of total capacity in 1976.

2. Integration

Wood preserving companies tend also to vary with respect to vertical integration. Some plants are part of lumber operations or associated with a company sawmill. In such cases, the wood treating operation may be an additional service for lumber customers. In other cases, such as Koppers Company, Weyerhaeuser, and International Paper, where the company is involved in wood products and/or chemicals, the treatment of wood for customers is a natural expansion of its existing resources. In a few cases, railroads and utility companies own wood treatment facilities. These plants serve as captive suppliers of poles, ties, crossarms, etc., and frequently do not sell to others. The Atchison, Topeka & Sante Fe Railway Company, Burlington Northern, Southern California Edison Company, Texas Electric Cooperatives, Inc., and Utah Power & Light are examples of this type of firm.

By far the greatest number of companies, however, are not integrated back to wood; i.e., they do not own their own timberland, and they purchase wood. A number of plants treat wood for customers on a service basis only, while other plants both treat purchased wood and treat wood for customers on a service basis.

DRAFT

TABLE II-1

PRESSURE CYLINDER CAPACITY OF THE TEN LARGEST WOOD PRESERVING FIRMS, 1976

Company	Total Pressure Tank Capacity (thousand cubic feet)	Percent of Total Industry Capacity
Koppers Co., Inc.	415	20%
Kerr-McGee Chemical Co.	127	6%
Southern Wood Piedmont Co.	123	6%
J. H. Baxter	108	5%
Wyckoff Co.	73	3%
Atlantic Creosoting Co., Inc.	57	3%
International Paper Company	51	2%
McCormick & Baxter Creosoting Co.	50	2%
Crown Zellerbach Treated Wood Products	45	2%
Cascade Pole Co.	34	2%
All others	1,023	49%
Total Industry	2,105	100%

SOURCE: Arthur D. Little, Inc., estimates based upon Ernst and Ernst Wood Preservation Statistics - 1976.

3. Ownership Characteristics

Both privately and publicly-held companies are represented in this industry segment. In general, the smaller, single-plant companies are privately-held and the largest companies tend to be publicly held.

There are basically two different patterns of ownership and management in the industry. In the first category are plants owned by publicly-held 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 corporation. Plants following the second pattern are owner-managed and may be proprietorships or privately held corporations. They may have even been owned by the same family for several generations. Table II-2 lists the organizational breakdown of companies in the industry as of 1976 based upon responses received from the EPA financial 308 survey.

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 and a corporation which more critically views the return on investment from one of many plants. The former may accept an increase in abatement costs as a necessity for staying in business, while the later may decide that the increased cost is not justified by the expected returns. On the other hand, a closely-held company may have difficulty obtaining capital investment funds and thus be unable to continue in operation.

Among plants primarily treating with organic preservatives, 25% of the plants are owned by publicly-held corporations. Among the plants primarily treating with inorganic preservatives, only 10% of the plants are owned by pubicly-held corporations. While publicly-held corporations owned only 22% of the total number of plants responding to the EPA financial 308 survey, according to 1972 Bureau of Census statistics, publicly-held corporations accounted for 73% of the total value added of the wood preserving industry.

TABLE II-2

WOOD PRESERVING PLANTS

FORM OF BUSINESS ORGANIZATION, 1976

	Total	
Primary Organic Preservatives	#	%
Proprietorship	23	10%
Co-op	1	0
Privately-Held Corporation	158	65
Publicly-Held Corporation	59	25
	241	100%
Primary Inorganic Preservatives		
Proprietorship	5	8%
Co-op	-	-
Privately-Held Corporation	54	82
Publicly-Held Corporation	7	10
	66	100%
Total		
Proprietorship	31	9%
Co-op	1	0
Privately-Held Corporation	230	69
Publicly-Held Corporation	72	22
Number of Respondents to Question	334	100%

SOURCE: Derived from EPA 308 Financial Survey

DRAFT

C. PRODUCT DESCRIPTION

1. Type of Products

The wood preserving industry in the United States has developed based on the need for prolonging life in wooden structural products. Historically, railroads ties, utility poles, and pilings treated with creosote have been the major products of the industry. In recent years, lumber and plywood treated for fire retardancy, insect resistance, and rot resistance have experienced rapid growth.

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
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. Generally speaking, the firms that are located in the South are treating mostly Southern Pine, and those in the West are treating mostly Douglas Fir. The industry uses oil-borne (organic) or waterborne (inorganic) preservatives. The products treated with oil, such as poles, piling, and railroad ties, have a distinct odor and "oiliness," which makes them unsuitable for use where odor is objectionable. The waterborne preservatives are used for preserving plywood and lumber, and especially for treating with fire retardants.

Competition is normally very keen within the wood preserving industry and price is usually the major basis of competition. A large number of suppliers

exist to serve regional markets, although some regions are served by only one or two suppliers. Some limited competition exists from other materials such as steel, concrete, and aluminum. There are advantages and disadvantages to each type of material, in addition to price differentials. Generally the type of use dictates the type of material required. For example, treated wood piles must be used in acid soil (such as in a sanitary landfill) because acid conditions corrode steel and concrete. Table II-3 lists some preserved wood products and their potential substitutes. Of particular interest is the possibility of concrete railroad ties becoming a more vigorous competitor. Currently, concrete ties are being used in several locations in the United States and this use is growing.

2. Market Size

Table II-4 shows historical shipments data by product category. From 1955 to 1976 the volume of wood treated with preservatives fluctuated from a low of 213.9 million cubic feet in 1962 to a peak production of 286.4 million cubic feet in 1967. Production was 257.2 million cubic feet in 1976, the most recent year for which data are available. The industry's historical peak production level was 356.6 million cubic feet in 1947, indicating that the long-term trend is down.

The value of shipments from 1958 to 1976 are shown in Table II-5. The value of shipments rose from $344.2 million in 1967 to $761 million in 1974[1], the peak year. Both 1975 ($647.7 million) and 1976 ($704 million) were below this peak level. Typically, about 85% of the value of shipments is from owned wood, with the remainder contract work.

3. Future Demand Growth

Figure II-1 depicts the historic production and future growth trend for the preserved wood products in total and for ties, poles, and timbers. During the early sixties, the demand for preserved wood products increased dramatically compared with levels existing in the fifties. Since then there have been wide swings in total annual production but discernable trends for individual product categories.

[1] Annual Survey of Manufactures, 1967-1976.

DRAFT

TABLE II-3

PRESERVED WOOD PRODUCTS AND THEIR POTENTIAL SUBSTITUTES

Preserved Wood Product	Potential Substitute[1]
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 studs
	I-Beams
	Prestressed walls
Plywood	Concrete
	Cinder block
	Sheetrock
	Particleboard
Fire-retardant lumber, plywood, etc.	Asbestos
	Gypsum
	Metal sheets
Poles	Metal poles
	Prestressed concrete
Railroad ties	Concrete ties

[1]Not all substitutes have been proven to be reliable. The potential for substitution is limited because material selection is often dictated by specific uses.

SOURCE: Arthur D. Little, Inc. estimates.

TABLE II-4

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	2.4	75.9	17.3	77.8	13.3	73.8	6.5	8.5	274.7
1975	1.4	93.1	15.3	61.5	9.4	49.1	8.0	6.4	244.1
1976	4.6	95.3	13.8	67.1	8.5	53.1	5.7	9.0	257.2

1. Data for 1966-1971 are not comparable with previous years because they include wood treated with fire-retardent chemicals under each category rather than under MISCELLANEOUS.
2. WOOD BLOCKS: Data for 1957-1969 are included in MISCELLANEOUS.
3. MISCELLANEOUS: Includes all wood products treated with fire-retardant chemicals in 1955-1965. In 1965, 2.8 million cubic feet of wood were treated with fire retardants.

Source: Ernst and Ernst, Wood Preservation Statistics - 1976.

DRAFT

TABLE II-5

VALUE OF SHIPMENTS FOR THE WOOD PRESERVING INDUSTRY 1958 TO 1976

Year	Value of Shipments ($ Million)	Capital Expenditures ($ Million)
1958	203.0	3.7
1959	218.1	(D)
1960	225.1	3.7
1961	220.1	4.1
1962	230.0	4.9
1963	247.3	5.5
1964	270.9	5.8
1965	279.6	11.4
1966	326.0	10.4
1967	344.2	10.7
1968	375.1	9.3
1969	386.1	13.2
1970	387.8	8.4
1971	416.9	10.4
1972	475.8	14.8
1973	557.4	11.6
1974	761.2	28.1
1975	647.7	27.5
1976	704.3	22.3

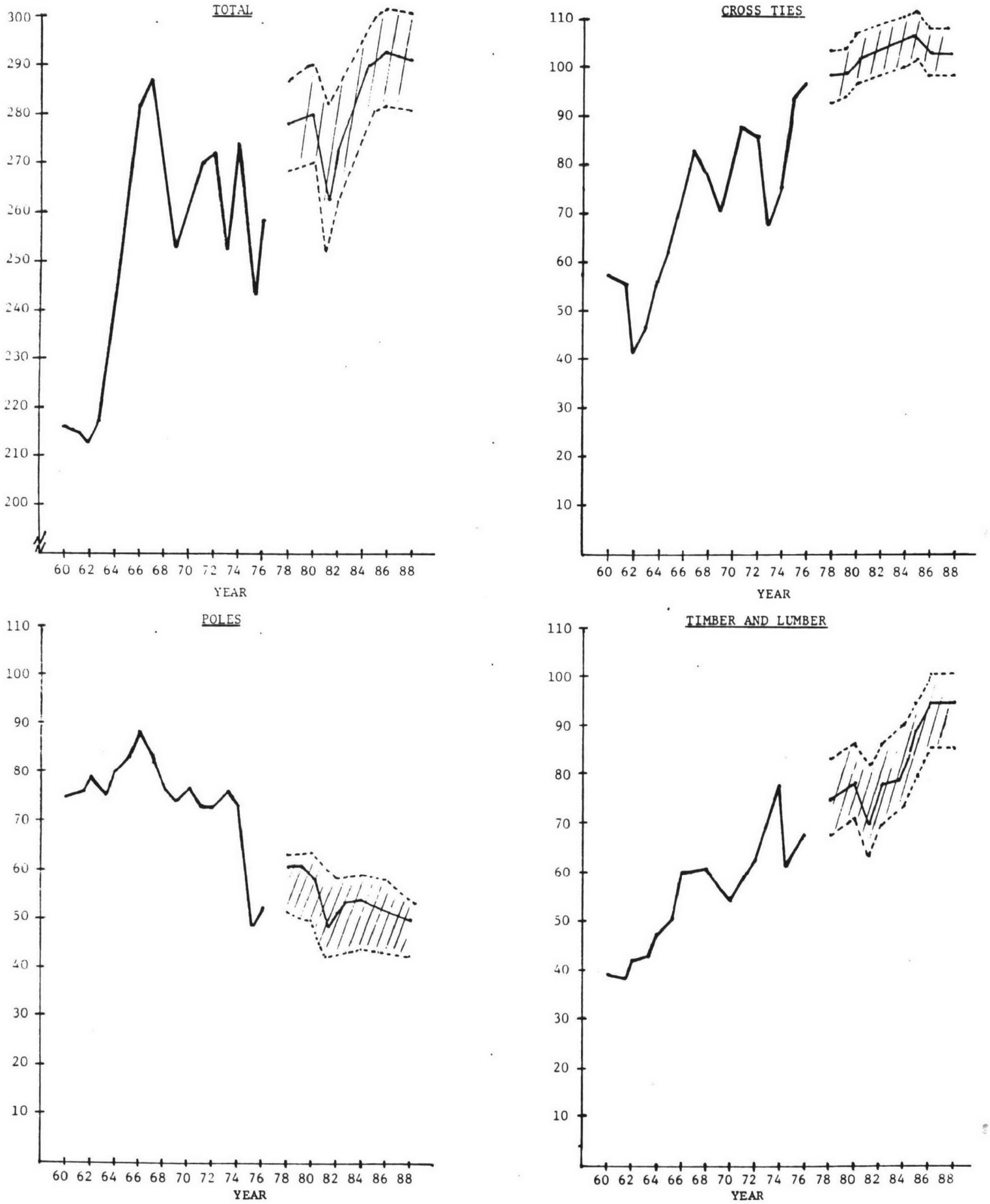
Source: U.S. Department of Commerce, Bureau of the Census, Annual Survey of Manufacturers, 1958-1976

DRAFT

SALES TRENDS FOR PRESERVED WOOD PRODUCTS

(THOUSAND CUBIC FEET)

DRAFT



SOURCE: Historic Data - Ernst & Ernst data cited in The Analysis of Existing Wood Preserving Techniques and Possible Substitutes, June 1977.
Forecast - Arthur D. Little Inc. estimates.

The annual production volumes of ties, poles and timbers also exhibit wide swings but there are definite trends in each of the major categories shown in Figure II-1. In addition, the industry characterization[1] and other studies of the industry have concluded that the trend in individual products shown in Figure II-1 are likely to continue over the next ten years.

The forecast values from 1978 through 1988 were derived by analyzing the trend in production incurred from 1963 to 1976 for each product category as well as the variation around trend. The growth rate (or decline) underlying the trend was compared with forecast growth rates in other studies to check for reasonableness and establish a range. All other preserved wood products as a group exhibited no trend and were assumed to remain stable at about 42,000 cubic feet per year. The forecast for total preserved wood products is the sum of the individual product forecasts.

The reason for doing this analysis was to identify product areas that might be declining in demand, as well as those that are not, to assess the willingness of impacted plants to make an investment in pollution control expenditures given the future outlook for the products they produce. Product growth areas were also examined to gauge the extent to which they would take up the slack in the production of declining products and also to evaluate the potential for any price increase.

On balance, the future outlook for preserved wood products appears good, with the decline in pole demand being offset by the increase in demand for ties and timbers. The decline in pole demand will occur as a result of slowdowns in growth of utilities and the fact that new transmission lines will be of the size requiring steel.[1] Also, the demand for poles in new urban areas is being affected by the requirement to place utility distribution lines underground. The demand for railroad ties is a result of rebuilding roadbeds, which will produce an upward trend over the next ten years, but with a leveling off point occurring as the railroad industry goes from a rebuilding to a maintenance mode. The growth in demand for timbers and lumber is in part a consequence of FHA requirements[2] for

[1] Reference 4, pgs. 21-22.
[2] Op. cit., p. 36.

preserved wood in home construction. While the average annual growth in timbers for 1963 to 1974 was 5.4%, a future real growth rate of 3% is forecasted to reflect the expected level of single family units to be constructed in the 1978 to 1988 period.

D. PLANT CHARACTERISTICS OF THE EXISTING INDUSTRY

1. Process Technology

Wood preserving is a two-stage process consisting of, first, preconditioning the wood to reduce its moisture content and, secondly, treating wood with preservatives.

Any one of several methods can be used to precondition, including: seasoning in large, open yards; kiln drying; pressure steaming in a retort followed by vacuum drying; heating in a preservative bath under reduced pressures (Boulton Process); or vapor drying. Pressure treatment is the most common form of processing. It is also widely recognized that this form of treatment provides a superior product to that resulting from the brush or dip application of preservative.

The wood treating step can employ either a pressure or non-pressure process. Non-pressure processes use open tanks containing the preservatives in which the wood is immersed. Pressure processes are classified as either "full-cell" or "empty cell". In the "full-cell" process, a vacuum is created in the retort and the preservative is added and forced into the wood under pressure. In the "empty-cell" process, preservative is added to the retort and forced into the wood under pressure followed by the application of a vacuum. The "full-cell" process is commonly used with aqueous solutions.

The typical pressure treatment facility includes three major processing areas:

- Treating cylinder or pressure vessel with the necessary pumps, tanks, and control equipment.
- Boiler plant to provide for heated solution and pressurization of the cylinder.

- Seasoning and storage yard including the cylinder loading track and ancillary transportation facilities.
- Support equipment such as hoists and lifts for handling timber; finishing equipment for incising, boring, blocking, framing and shaving materials; and kilns or other processing facilities for artificial seasoning of selected products.

The treating cylinders are the most important component of a wood treatment plant. These steel cylinders (retorts) typically used in pressure treatment range in size from 4 to 10 feet in diameter and up to 175 feet in length. As an indication of the "charge" size held by a treating cylinder, the average charge for a 6 foot by 36 foot cylinder can be 6,000 board feet (500 cubic feet) of lumber for a facility in the Northeast.

Wood preserving plants can also be categorized, based on the types of preservatives used, as follows:

- plants treating with organic materials, such as pentachlorophenol, oil, and creosote solutions;
- plants treating with waterborne inorganic salts principally zinc, copper, arsenic, and chromium;
- plants treating with both organic and inorganic preservatives.

Of the plants identified by the 1976 AWPA Wood Preservation Statistics, 49% are organic treaters, 27% inorganic, and 24% treat with both types of preservatives.

2. Product Diversification Within Plants

Although there is a wide range of wood products treated within the industry, individual plants tend to concentrate on a limited range of products. Inorganic (waterborne) treaters treat mostly dimension lumber, posts, and poles for insect and rot resistance and fire retardancy; organic (oil-borne) plants treat primarily poles, posts, pilings, and railroad ties with some other products such as cross arms and bridge timber. Poles and ties are the major production items of organic plants whereas inorganic treaters have a greater variety of treated wood products, although volume may be smaller.

3. Size of Plants

There are no published data on individual plant capacities or production, because capacity varies with the type of wood treated and the type of treatment. For example, Douglas Fir requires a considerably larger residence time than species found in other parts of the country. Although the numbers of cylinders and types of processes are known, there is not necessarily a correlation between these and either plant capacity or production. Some industry members[1] reported that a typical 80-ft. cylinder, operating with an organic process, has an output of 30,000 to 45,000 board feet per day (based on 15,000 board feet per charge, 2 or 3 per day). Daily inorganic production may be somewhat higher due to shorter treatment times. Reported annual operating 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%.

Table II-6 shows a distribution of plant sizes using 1976 annual sales value as a indicator of size. The plants are very uniformly distributed among the value of sales size categories shown in the table. The median plant size lies in the $0.7 to $1.2 million annual sales range. Six of the 319 plants responding to the EPA Financial 308 Letter had sales of over $11.5 million, while 25 plants had sales of less than $70 thousand.

4. Location

Figure II-2 shows the national distribution of wood treatment facilities. Although there are no statistics available on the geographical distribution of consumption, both production and consumption follow the distribution pattern of facilities. Plants are most heavily distributed in the Southeast region with 45% of all plants in that region. Of the plants responding to the EPA Financial 308 survey, 30% described their plant site as urban while 25% were suburban and 45% rural.

---

[1] As reported by AWPI in private conversations.

DRAFT

TABLE II-6

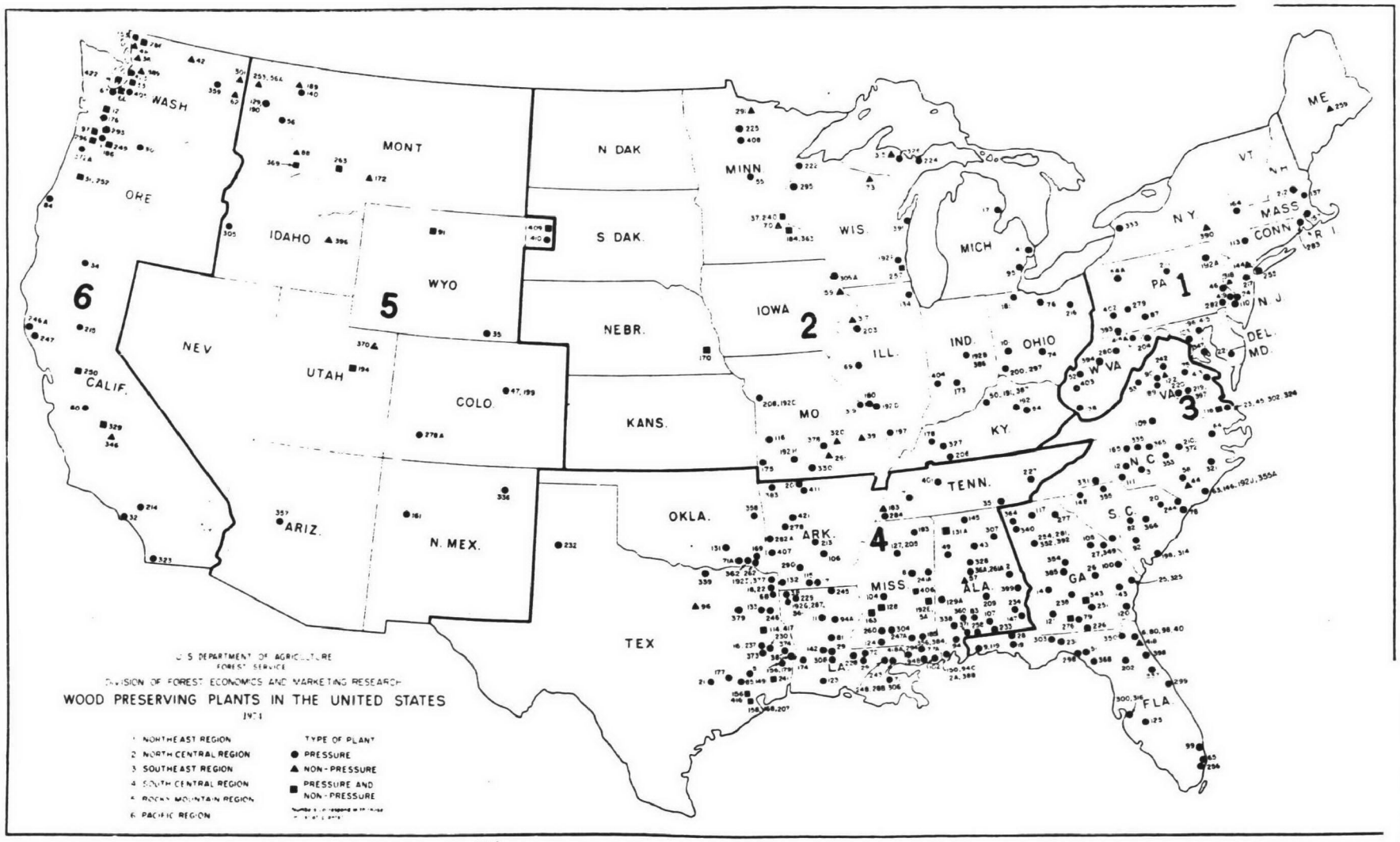
DISTRIBUTION BY ANNUAL SALES VALUE

1970 Sales ($000)	Plants Built Since 1970		Plants Built 1970 or Earlier		Total	
	#	%	#	%	#	%
0 - 70	8	16	17	6	25	8
71 - 155	4	8	21	8	25	8
156 - 300	10	20	19	7	29	9
301 - 700	8	16	40	15	48	15
701 - 1200	5	10	45	17	50	16
1201 - 2400	5	10	37	14	42	14
2401 - 3200	5	10	21	8	26	8
Over 3200	5	10	69	25	74	23
TOTAL RESPONDING	50	100%	269	100%	319	100%

SOURCE: Derived by Arthur D. Little, Inc., from EPA Financial 308 survey.

FIGURE II-2

WOOD PRESERVING PLANTS IN THE UNITED STATES



SOURCE: American Wood Preservers Association.

DRAFT

DRAFT

5. Employment

Table II-7 shows the distribution of plants by the number of production employees per plant. The median sized plant employs 10 to 19 production workers. Two plants employ more than 125 workers, while 22% of all plants employ fewer than 3 workers. The Bureau of the Census estimated the total employment of the wood preserving industry to be 9,700 in 1976.[1] Due to increased use of materials handling equipment, employment has decreased from the peak of 12,800 in 1968.

E. CHARACTERISTICS OF NEW PLANTS

1. Plants Constructed Since 1971

Of the 337 plants responding to the EPA 308 Letter, 56 plants began operation in the 1971 to 1977 period. Table II-6 showed the size distribution of these 50 new plants based on their 1976 value of sales. The average size of new plants is smaller than the older plants, possibly suggesting that existing facilities typically expand over their production life. Comparing the plant size distribution of the new plants to the size distribtuion of all plants (as shown in Table II-6), one may determine that the new plants are smaller than all plants. The median annual sales of the new plants is $0.3 to $0.7 million, while the median annual sales of older plants is $0.7 to $1.2 million.

Table II-8 shows the age distribution of 315 plants responding to the EPA Financial 308 survey. The median age of the plants is approximately 20 years, while 55 plants were built before 1930 and 56 plants began operation between 1971 and 1977, or an average of 7 per year. A majority of the plants responding were built in the 1950's and 1960's.

The profitability of new plants versus older plants is compared in Table II-9. The profitability of the two groups is roughly comparable. Both older plants and new plants have a median profitability after tax of 2% of sales value.

---

[1] Reference 2

DRAFT

TABLE II-7

NUMBER OF PRODUCTION EMPLOYEES PER PLANT

Number of Production Employees per Plant	Number of Plants	Percentage of Plants
1 - 3	73	22
4 - 6	39	12
7 - 9	26	8
10 - 19	56	17
20 - 34	55	17
35 - 48	27	8
49 - 75	36	11
76 - 99	8	2
100 - 125	6	2
Over 125	2	1
Subtotal	328	100%
No Response	10	
Total	337	

Source: Derived by Arthur D. Little, Inc., from Environmental Protection Agency financial 308 survey.

DRAFT

TABLE II-8

AGE DISTRIBUTION OF WOOD PRESERVING PLANTS

Year of Initial Operation	Number of Plants	Percentage of Plants
Before 1930	58	17
1931 - 1940	13	4
1941 - 1950	46	14
1951 - 1960	83	25
1961 - 1970	76	3
1971 - 1977	56	17
Subtotal	332	100%
No Response	5	
Total	337	

Source: Derived by Arthur D. Little, Inc., from Environmental Protection Agency financial 308 survey.

DRAFT

TABLE II-9

PROFITABILITY OF NEW PLANTS VERSUS OLDER PLANTS

1976 Profit After Tax [2]	New Plants[1]		Older Plants[1]	
	Number	Percentage	Number	Percentage
Under 1%	16	37	56	25
1% - 2%	6	14	58	25
3% - 4%	7	16	47	21
5% - 7%	7	16	38	17
Over 7%	7	16	26	11
Subtotal	43	100%	227	100%
No Response	7		60	
Total	50		287	

[1]New plants are those beginning operation between 1971 and 1977, while older plants began operation before 1971.

[2]Profit after tax as a percentage of sales value.

Source: Derived by Arthur D. Little, Inc., from Environmental Protection Agency Financial 308 Letter.

When industry capacity utilization is low, or demand growth is slow, a competitor has difficulty entering the industry. As the industry has become more automated and hence more capital intensive in recent years, the capital cost for entry, in real terms, is significantly higher now than five or ten years ago.

2. Capital and Operating Costs for New Plants

Capital and operating costs were developed for model new source plants proposed by the technical contractor. Two plants sizes were selected, with each assumed to be producing one of four preserved wood products. The plant sizes are:

1. Two cylinders, each seven-foot diameter by 130 feet long.
2. Five cylinders, each seven-foot diameter by 130 feet long.

The product, location and process relationships are shown below:

	Product	Location	Process
A.	Railroad ties	South Central	Boultonizing
B.	Southern Pine poles	South Central	Steaming
C.	Douglas Fir poles	West Coast	Boultonizing
D.	Southern Pine lumber	South Central	Inorganic

Capital costs for each of these two facilities is shown in Table II-10, indicating that the total installed cost for the larger facility is about $4.6 million, in comparison to $2.2 million for the two-cylinder plant. Table II-11 summarizes the operating costs for eight operating conditions--four products being produced at each of the two plants. Appendix A offers supplementary tables on each of the 8 conditions.

The two-cylinder plant has 25 operating, 7 maintenance and 13 supervisory and office employees, at an average annual cost of $15,000 per employee. The five-cylinder plant is assumed to have 65 operating, 17 maintenance and 33 supervisory and office personnel. Taxes and insurance are estimated at 4% of the capital cost. While maintenance and other consummable supplies, such as packaging, do vary based on the operating volume of each plant; these variations are too small to affect overall operating costs and have been assumed to be constant.

DRAFT

TABLE II-10

ESTIMATED FIXED CAPITAL REQUIREMENTS FOR THE MANUFACTURE OF PRESERVED WOOD (ORGANIC TREATMENT)

Location: South, new facility or replacement value[3]

Cylinder Size: 7-foot diameter, 130 feet long, 5000 cubic feet in volume

	Bare Cost of Equipment Per Cylinder ($1,000)	Installed[1] Cost of a Two Cylinder Plant ($1,000)	Installed[1] Cost of a Five Cylinder Plant ($1,000)
Site Preparation		200	400
Yard Equipment[2]	300	400	800
Pressure Cylinder	250	700	1,700
Storage Tanks and Pumps	100	250	400
Utilities: Boiler and Compressor	100	150	300
Primary Oil-Water Separation[4]	NA	32	58
Subtotal	$750	$1,732	$3,658
Engineering, Construction and Contingency at 25%		433	917
Total Fixed Capital		$2,165	$4,575

[1]Installation includes piping, instrumentation, electrical, structures, foundations, erection labor, and allocated portion of shops and offices.

[2]Yard Equipment includes track and trams for cylinder loading, trimming and framing equipment, and mobile equipment. Processing is based on receipt of rough sawn wood, and specifically excludes debarking and rough sawing.

[3]Add 10% for West Coast construction cost differential.

[4]For the primary oil-water separation system, 50% of the cost is included in the cost of the plant.

SOURCE: Arthur D. Little, Inc., estimates based on industry interviews.

TABLE II-11

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD

	Annual Operating Costs in Thousand Dollars for Model Plants:							
	A-1	A-2	B-1	B-2	C-1	C-2	D-1	D-2
Wood	2,064	5,160	5,400	13,500	3,264	8,160	6,480	16,200
Preservatives	672	1,680	378	945	307	768	594	1,485
Total Raw Materials	2,736	6,840	5,778	14,445	3,571	8,928	7,074	17,685
Labor	596	1,491	596	1,491	596	1,491	596	1,491
Supplies*	132	326	132	326	132	326	132	326
Fuel and Power*	132	326	132	326	132	326	132	326
Taxes and Insurance	87	182	87	182	95	200	87	182
Total Operating Cost	3,683	9,165	6,725	16,772	4,526	11,271	8,021	20,010

Case A - Railroad ties, boultonized, South Central location, 30 hours per charge
Case B - Southern pine poles, steamed, South Central location, 16 hours per charge
Case C - Douglas fir poles, boultonized, West Coast location, 30 hours per charge
Case D - Southern pine lumber, CCA treated, South Central location, 16 hours per charge

Case 1 - 2 cylinders, each 7-foot diameter, 130 feet long, 5,000 cubic feet
Case 2 - 5 cylinders, each 7-foot diameter, 130 feet long, 5,000 cubic feet

*Includes 50% of the operating cost of oil-water separation.

SOURCE: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

The following additional assumptions were made:

- A one-product operating mode was assumed, although most facilities have variable and constantly changing mixes, depending on specific and local market conditions.
- Capital requirements for the West Coast facility is estimated to be 10% greater than for the Southern plants.
- Land requirements are 30 acres and 50 acres, respectively, for the two plants.
- Raw wood and preservative costs are obtained from accepted, published industry references.
- 40% of the cylinder volume is used for each charge, plants operating three shifts a day and 300 days per year.
- While cycle time depends on wood specie, mositure content, type of process employed and degree of preservation required, the following, possibly conservative, cycle times were used:

  Railroad ties (Boultonized) - 30 hours
  Southern Pine poles (steamed*) - 16 hours
  Douglas Fir poles, green (Boultonized) - 30 hours
  Southern Pine lumber (CCA) - 16 hours

F. COMPETITIVE STRUCTURE OF THE INDUSTRY

1. Market Structure

Table II-12 shows concentration ratios for the industry between 1963 and 1976. Although the industry is composed of a large number of small firms, the four largest firms had 37% of the total market in 1976, and the eight largest firms had 47% of the total market. The size of the firms various considerably. The top company has about 20% of the market, the next three companies have 5% to 6% each, and the next four about 2% each. The balance of the top 20 have market shares of 1% each and the next 30 have shares averaging about .6%. The level of concentration has not changed significantly since 1963, indicating a stable market structure.

*Only when frozen

DRAFT

TABLE II-12

CONCENTRATION RATIOS IN THE WOOD PRESERVING INDUSTRY 1963-1976

	Percent of Value of Shipments accounted for by--			
Year	4 largest companies	8 largest companies	20 largest companies	50 largest companies
1963	34	44	64	84
1967	35	44	63	84
1970	34	NA	NA	NA
1972	35	44	60	78
1976	37	47	NA	NA

Source: 1963-1972: U.S. Bureau of Census, Annual Survey of Manufactures,
1976: Arthur D. Little, Inc. estimates.

Preserved wood is largely a commodity market modified by transportation costs which give regional advantages to some producers. While some interregional competition exists in the industry, the cost of inbound and outbound transportation results in predominantly regional markets For some applications, a particular wood specie is preferred and wood may be shipped over longer distances in these cases; more often, a suitable wood specie may be found locally.

2. Pricing Mechanism

Pricing mechanisms appear to be quite varied. For some products (mostly lumber), 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 poles, piling, and railroad ties are sold through formal bids for specific projects directly to the customer. Purchase decisions are made on the basis of price, availability, and delivery of future production, since most preservers only keep small inventories and make the products only on order.

3. Price Elasticity of Demand

Demand elasticity in the wood preserving industry varies somewhat among products. The major factors governing demand are competition within the industry and the economic climate of user industries. Demand for those products with high demand growth potential (such as dimensionalized lumber) will probably not be affected by a rise in prices because growth in demand will offset declines due to price increases. Those products which are threatened by lower demand growth potential (such as utility poles) have higher price elasticity and will be less likely to pass along cost increases as increases in price.

At the present time, growth of demand for railroad ties is expected to be strong because of tightened federal railroad safety regulations and the Northeast Railroad Reorganization Act. However, concrete ties are now being used for some of the replacements. 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, and are expected to continue at a growth rate higher than GNP as the construction market improves and demand for dimension lumber and plywood increases. The market for utility poles is not expected to grow strongly, as previously discussed. It is currently nearly a replacement market and it is also threatened in the future by the requirement for underground wiring. Although there are economic and technical difficulties with underground wiring, if these are worked out they may replace wooden poles for some applications. Other products, such as construction and marine pilings, face some pressure from substitute products. In summary, it appears that although some products will have high growth rates, production for the whole industry will continue to have little long-term growth. This situation will make it difficult for producers to increase prices.

G. PRICE AND COST HISTORY

Figure II-3 shows the price trend in current and constant dollars of raw materials used by the wood preserving industry. In the 1970-78 period wood preservative chemicals have shown the greatest increase in cost, followed by that of wood costs (lumber, piles, and ties), and finally labor. All of these inputs have increased at a rate greater than that of general inflation, as shown in the graph of real price increases for the chemical and wood materials. (Figure II-3B).

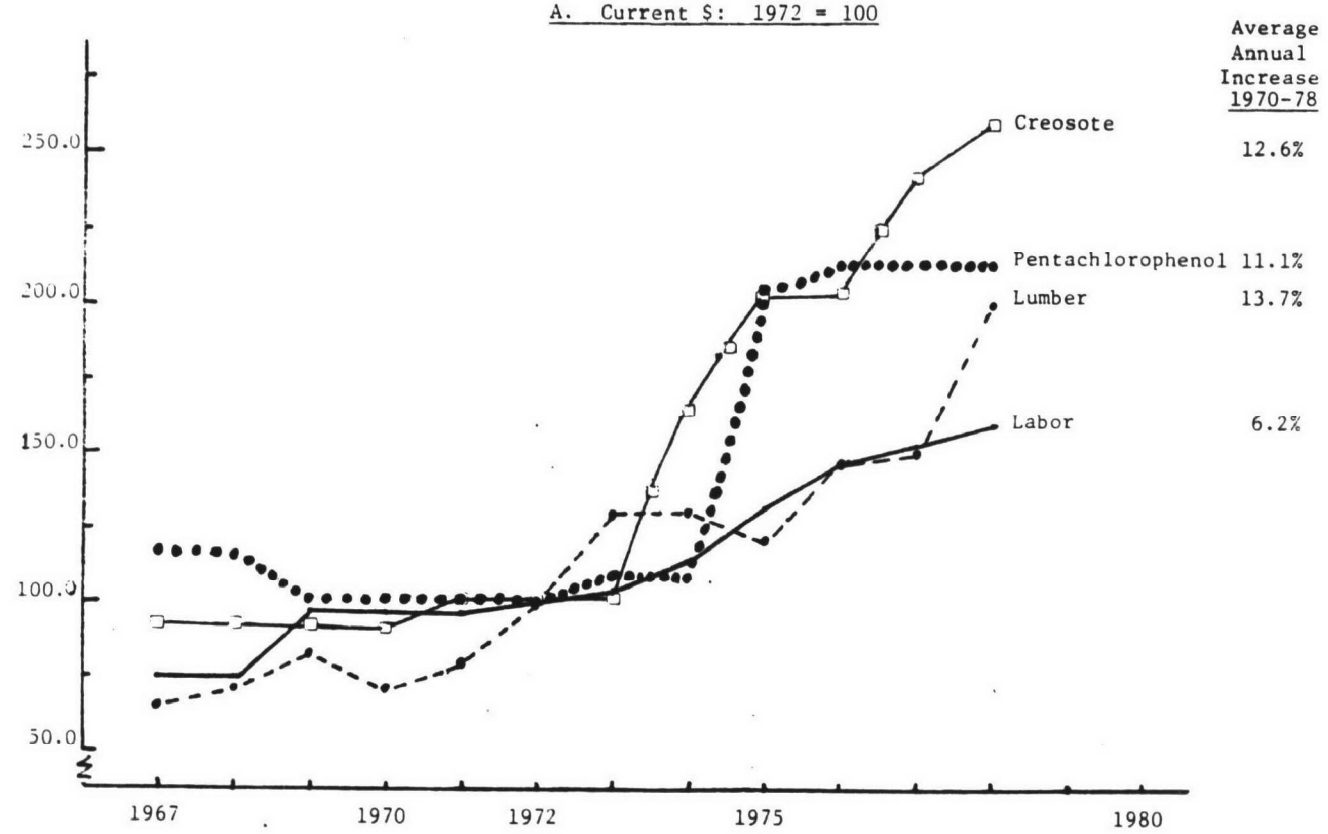
The cost of labor in the wood preserving industry has been increasing steadily; the average payroll per worker was more than 60% higher in 1978 than in 1970, which is an annual increase of 6.2%. However, since 1970, labor as a percent of value added and per dollar of shipments has declined, as shown in Table II-13. In fact, employment in the industry as a whole has declined, from 12,000 in 1970 to 9,700 in 1976, and the percentage of the workforce classified as production workers also declined, from 84% to 79% for the same period (shown in Table II-17). This is principally due to the greater use of materials handling equipment in order to reduce labor costs.

DRAFT

FIGURE II-3

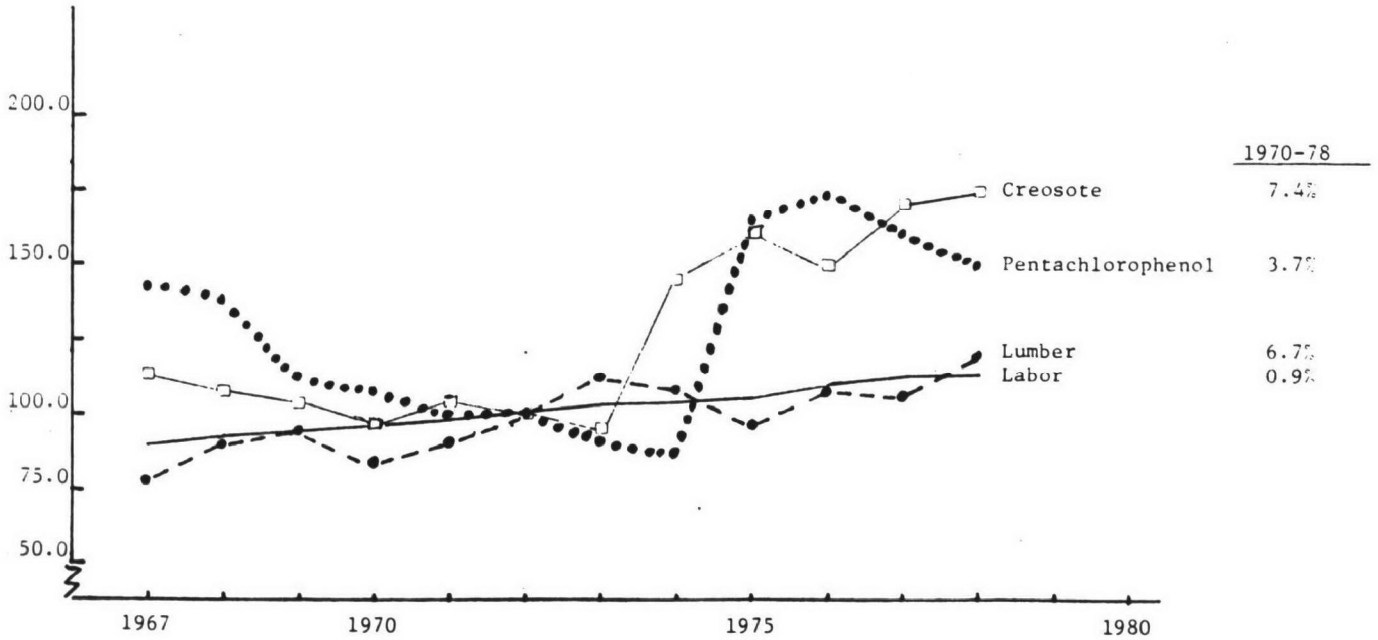
WOOD PRESERVING INDUSTRY
PRICE INDICES OF RAW MATERIALS

A. Current $: 1972 = 100



1972 Values: creosote, 27c/gallon; pentachlorophenol 18¢/pound; labor $3.31/hour

B. Constant $: 1972 = 100



SOURCES: (chemicals) Chemical Marketing Reporter
(wages) Employment and Earnings, US Department of Labor, BLS
(lumber) Wholesale Prices and Price Indexes, US Department of Labor, BLS
(GNP deflator) Economic Indicators, Council of Economic Advisors

DRAFT

TABLE II-13

SELECTED OPERATING RATIOS FOR
THE WOOD PRESERVING INDUSTRY: 1964 TO 1976

Year	Cost of materials per dollars of shipments (dollars)	Cost of materials & payrolls per dollar shipments (dollars)	Value added per employee (dollars)	Payrolls as percent of value added (percent)
1964	.63	.81	8,788	49
1965	.64	.81	9,050	48
1966	.63	.80	10,479	45
1967	.62	.80	11,103	46
1968	.61	.79	11,540	45
1969	.64	.81	11,818	47
1970	.63	.81	12,017	51
1971	.64	.82	13,800	48
1972	.64	.80	15,557	42
1973	.67	.80	18,446	40
1974	.63	.75	30,783	29
1975	.64	.78	24,548	38
1976	.68	.81	23,608	41

SOURCE: U.S. Department of Commerce, Bureau of the Census, Census of Manufactures, 1967, 1972, and Annual Survey of Manufacturers, 1973, 1974, 1975, 1976; and Arthur D. Little, Inc., estimates.

Naturally, the most significant raw material cost is that for wood, which represents from 40 - 75% of the selling price of the preserved wood product. The selling prices of untreated ties and piles (shown in Figure II-3A) and lumber (shown in Figure II-4) have respectively increased 12.4%, 8.8%, and 13.7% annually in the 1970-78 period, or faster than the rate of overall inflation. The higher rate of increase for ties versus piles is attributable in part to favorable demand levels for railroad ties. The proportion of wood cost to total sales dollars has remained roughly constant over the 1970-78 period and except for the 1974-75 recession, the combined cost of all raw materials has been a stable proportion of the sales dollar as shown in Table II-13.

Thus, producers have been able to pass on increased costs of wood in the form of increased selling prices. This relationship is apparent in the Figure II-4 where selling prices closely track wood costs.

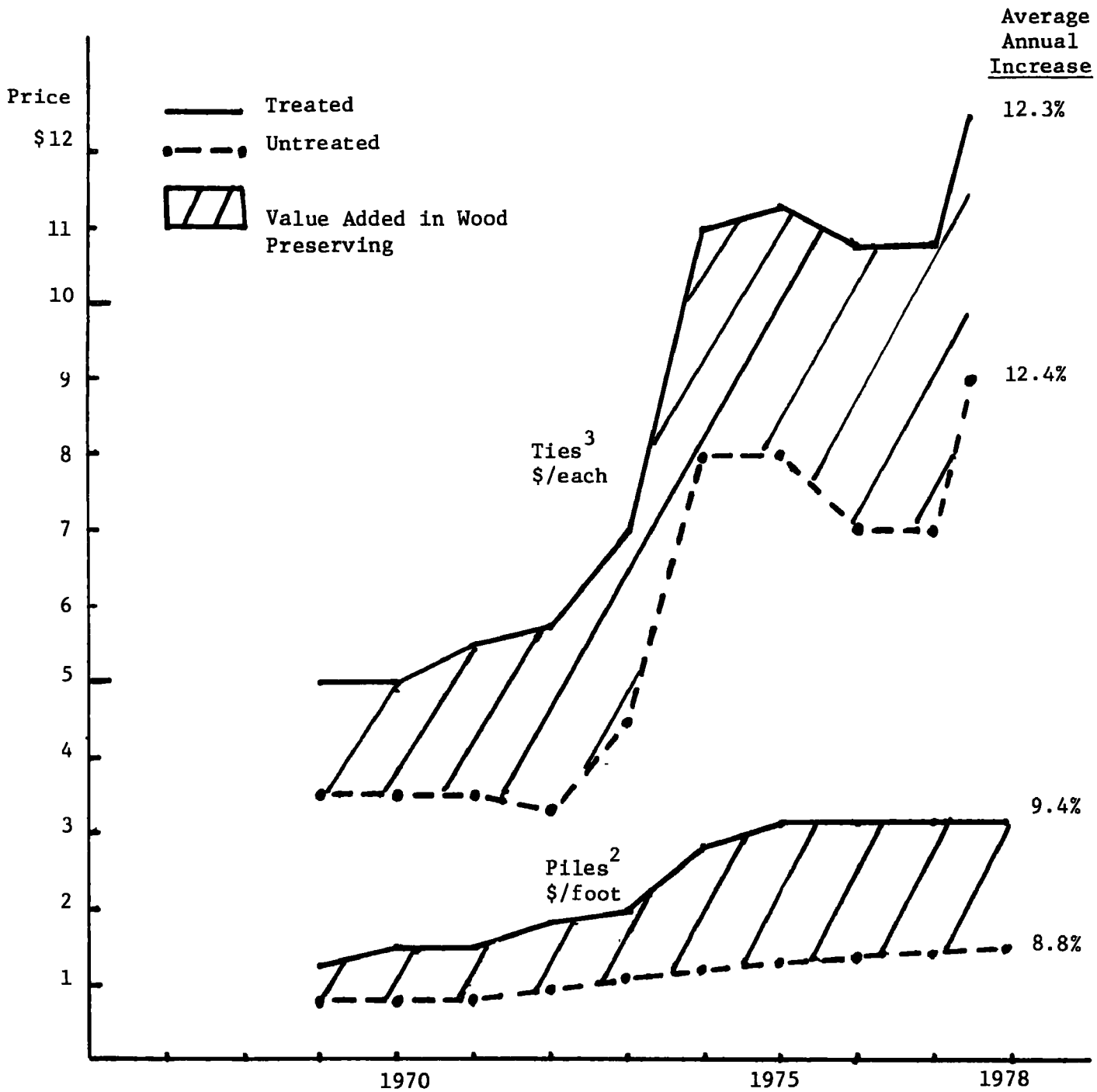
After years of relatively constant prices, the price of major chemical preservatives, pentachlorophenol and particularly creosote oil, have increased dramatically since 1973. The price increase for these chemical preservatives over the 1970-78 period, 11.1 and 12.6% respectively, is greater than that of the final products. This indicates their increased importance as an input cost, although still a smaller portion of the total than are wood or labor.

The previous discussion of potential industry growth suggests that future demand will be weaker, and the industry will have a more difficult time in passing along increased costs in the form of price increases. However, the nature of the pollution abatement cost is predominantly fixed rather than variable. A change in fixed cost represents a change in long-run average total cost, and therefore it is likely that the cost per unit of production for a larger, more efficient plant will set the maximum amount of price increase assuming the historic supply/demand balance. Since the effluent abatement cost per unit of production will be greater for smaller plants, smaller plants

DRAFT

FIGURE II-4

LIST PRICES OF SELECTED PRESERVED WOOD PRODUCTS[1]



[1]List prices are given because they provide a comparable basis for analysis over an extended period of time. The majority of contracts specify prices which provide substantial discounts from list prices.

[2]Piles: Points: 12" - 3 ft. from butt 7 in.; Length: 40 to 50 ft., truck lots, New York

[3]Ties: 6" x 8" x 8'6", Chicago, Red Oak, Carload lots

SOURCE: Engineering News Record.

may not recover the entire cost increase through higher prices. Market factor will determine whether this cost increase may be passed along through price increases or will be absorbed by reducing profits.

H. FINANCIAL PROFILES

1. Income and Asset Analysis

In assessing the economic impact of an EPA regulation upon a specific industry, the impacted industry is examined on a stand-alone basis without regard to the other businesses associated with it or to resources available to the parent companies of industry plants. For this reason, it is important to have an accurate picture of the revenues and expenses associated with the plant operations in the impacted industry as well as the assets used by the plants. The source of financial profile data is the Environmental Protection Agency 308 Letter.

Table II-14 contains pro-forma income statements developed for seven sales and service categories of wood preserving plants. Sales level categories were selected to represent the distribution of plant sales, profit and loss, and cash flow. There are sales categories in Table II-15 that could be grouped if one were interested in the pro-forma distribution of expenses alone. Pro-forma income statements were developed for five categories of plants treating owned-wood products (TOWP) and two categories of plants providing a treating service only (TSO). The number of plants providing TSO represents 13% of the total respondents to the EPA Financial 308. Two sales categories were sufficient to adequately represent this group for the purpose of an economic impact assessment.

Some cost elements vary with the size of plant and service offered. Wood cost as a percent of sales increases as sales increase for plants treating owned-wood products. The reasons for this could be that the larger plants tend to have greater portion of their sales derived from items such as ties and poles whereas smaller plants tend to treat more specialty

TABLE II-14

PRO-FORMA INCOME STATEMENTS
WOOD PRESERVING PLANTS

	Plants Treating Owned-Wood Products					Treating Service Only	
Sales ($000)	200	700	1,800	3,500	7,500	250	1,000
% Sales	100%	100%	100%	100%	100%	100%	100%
Wood Cost	44%	44%	55%	50%	55%	8%	25%
Payroll Cost	19%	17%	13%	12%	19%	20%	19%
Other Expenses	18%	17%	15%	20%	12%	39%	34%
Depreciation	4%	2%	2%	2%	2%	5%	2%
Gross Margin	15%	20%	15%	16%	12%	28%	21%
G&A	11%	12%	11%	9%	5%	11%	15%
Interest	3%	2%	1%	1%	1%	2%	1%
Profit Before Tax	1%	6%	3%	6%	6%	12%	6%
Profit After Tax	.5%	3%	2%	3%	3%	6%	4%
Survey Plants (327 Responses)	50	81	40	50	50	6	37
% Total[1]	15%	25%	12%	15%	15%	2%	11%

[1] 13 plants (4%) had sales equally split between TSO and TOWP.

SOURCE: Derived by Arthur D. Little, Inc., from Environmental Protection Agency financial 308 Letter

DRAFT

TABLE II-15

WOOD PRESERVING PLANTS

ASSET TURNOVER BY SALES/SERVICE CATEGORY

Sales/Service Category ($000)	Total Plants[1]	Sales/ Total Assets	Sales/ Net Assets[2]	Sales Fixed Assets	1976 Return on Total Capital[3]
TOWP					
$ 200	50	2.5	3.8	5.0	1.9%
700	81	3.0	4.7	8.0	11.1
1,800	40	3.0	4.3	10.0	8.6
3,500	50	2.5	3.1	10.0	9.3
7,500	50	2.5	3.1	8.0	9.3
TSO					
$ 250	6	3.0	4.0	5.0	24.0
1,000	37	5.0	8.0	10.0	32.0

[1]Based on 327 responses; 13 plants were equally split between TSO and TOWP.

[2]Total assets less current liabilities.

[3]Profit After-Tax (Table II-14) = Margin
Sales/Net Assets = Turnover; Net Assets = Total Assets - Current Liability
Rate-of-Return on Total Capital = Margin x Turnover

SOURCE: Derived by Arthur D. Little, Inc, from Environmental Protection Agency Financial 308 Letter reponses.

DRAFT

lumber and timbers; ties and poles are more of a commodity product and thus price would be lower relative to cost of goods sold. Another reason is that plants with higher sales volume have a larger base over which to spread fixed cost (note that general and administrative expense are a lower percentage of sales for large plants) and thus can afford to have a higher ratio of wood cost to sales. As would be expected, plants primarily engaged in providing treating service only have low wood costs as a percent of sales.

Margin on sale increases with sales for plants treating owned-wood products while the reverse is true for plants providing a treating service only. However, as shown in Table II-15, sales turnover (Sales/Net Assets) decreases with sales. The net effect is that, with the exception of the smallest sales category, return on total capital (Margin x Turnover) is higher for smaller plants than for larger plants.

Plants engaged in treating service only have substantially higher rates of return on total capital, as calculated in Table II-15, than plants treating owned-wood products. This could be artificial if TSO plants have older, more fully-depreciated equipment and associated lower book values than comparably sized plants treating owned-wood products.

The distribution of assets at wood preserving plants (as opposed to parent companies) was analyzed to determine working capital requirements associated with compliance investment. The distribution of assets varies with size of plant, as shown in Table II-16. Fixed assets as a percent of total assets generally decline as sales level increases for plants engaged in treating owned-wood products. While the reverse is true for TSO plants in Table II-16, the variability and small total number of plants are such that the two plant sizes are not statistically different in the percentage of assets in plant and equipment.

TABLE II-16

WOOD PRESERVING PLANTS

DISTRIBUTION OF ASSETS

BY SALES AND SERVICE COMPANY

	Treating Owned-Wood Products					Treating Service Only	
Sales Category ($000)	$200	$700	$1,800	$3,500	$7,500	$250	$1,000
Accounts Receivable	35.0%	35.0%	30.0%	20.0%	20.0%	35.0%	26.0%
Other Current Assets	20.0	30.0	40.0	55.0	50.0	25.0	24.0
Total Current Assets	55.0	65.0	70.0	75.0	70.0	60.0	50.0
Fixed Assets	45.0	35.0	30.0	25.0	30.0	40.0	50.0
Total Assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average Value of Total Assets	270	320	617	1,805	3,710	1.3	751
Number of Plants in Sample[1]	50	81	40	50	50	6	37

[1]Based on 327 responses; 13 plants were equally split between TSO and TOWP.

SOURCE: Derived by Arthur D. Little, Inc., from Environmental Protection Agency Financial 308 Letter data.

DRAFT

The "other current asset" category in Table II-16 includes inventory items. As expected, plants treating owned-wood products, with the exception of the smallest plants, have a higher percentage of assets in this item than plants engaged in treating service only. For both plant categories, accounts receivable decrease as a percent of total assets as sales increase.

In recent years, over 85% of the industry's capital expenditures have been on new machinery and equipment to reduce labor costs, as shown in column 3 of Table II-17. This investment has resulted in a reduction of total employment and raising the level of industry productivity (shown as a real increase in value added per employee in 1967 dollars in column 7) by about 25% in the 1967-76 period. However, there are a number of firms which have not made the expenditures to reduce labor costs; their comparatively less favorable cost structure will make the financing of major capital expenditures for pollution control especially difficult.

2. Investment Criteria

As part of the Environmental Protection Agency Financial 308 Letter, wood preserving plants were asked to provide their criteria for investment in wood preserving plant and equipment. This information is used in the economic impact assessment to estimate the required price increase to recover the cost of pollution control investment. A total of 119 (35%) of the plants indicated an investment criterion; 22% provided target internal rate-of-return values, and 6% provided payback criteria.

Plants providing rates-of-return criteria represented a cross section of the wood preserving plants responding. There were too few responses to the question to subcategorize the rate-of-return by plant characteristics. However, respondents to the question were distributed similarly to the total sample with respect to sales level, current discharge status and type of preserved wood product. The distribution of target rates of return was used to represent the total industry.

TABLE II-17

CAPITAL EXPENDITURES AND PRODUCTIVITY IN WOOD PRESERVING INDUSTRY

Year	(1) Total New Expenditures (millions of current dollars)	(2) New Structures and Additions to Plants (millions of current dollars)	(3) New Machinery and Equipment (millions of current dollars)	(4) Total Employment (000s)	(5) Production Workers of % of Total Employment (percent)	(6) Value Added Per Man Hrs. of Production Workers (current $)	(7) Value Added Per Man Hrs. of Production Worker (1967 $)
1967	10.7	1.4	9.3	12.2	84	6.25	6.25
1968	9.3	1.4*	7.9*	12.6	84	6.58	6.03
1969	13.2	NA	NA	12.1	83	6.78	5.77
1970	8.4	1.4	7.0	12.0	81	7.14	5.78
1971	10.4	.5	9.9	11.3	82	7.94	5.94
1972	14.8	2.2	12.6	11.3	81	9.35	6.35
1973	11.6	2.0	9.6	10.1	83	10.41	6.34
1974	28.1	3.9	24.2	10.6	81	17.63	9.94
1975	27.5	4.9	22.6	9.3	80	14.54	7.57
1976	22.3	2.4*	19.9	9.7	79	14.87	7.74

*Indicates the standard error is greater than 15%.

NA - Means not available.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Annual Survey of Manufacturers--1967-1976.

DRAFT

The distribution of target pre-tax rates-of-return is shown in Table II-18. The average and median pre-tax rates of return are in the 20-24% category. Using midpoints of the categories, the weighted average after tax rate-of-return is about 12%, assuming a 48% tax rate. The impact assessment in Chapter IV was done using the weighted average value and a sensitivity analysis was done to determine the impact of different rate-of-return on the results. (See Chapter V).

DRAFT

TABLE II-18

TARGET RATE OF RETURN FOR
INVESTMENTS MADE BY WOOD PRESERVING INDUSTRY

Pre-Tax Rate of Return	#	% of Respondents
0-4%	0	0%
5-9	2	4
10-14	7	13
15-19	11	21
20-24	8	15
25-29	12	25
30-40	8	15
40 or more	4	7
	52	100%

Distribution of Sample	% Total	# Respondents
Plants Using Rate-of-Return Criteria:	22%	75
Plants Using Payback Criteria:	6	21
Plants Using Other Methods	7	23
Not Answering Question	65	218
	100%	337

SOURCE: Environmental Protection Agency Financial 308 Survey.

DRAFT

III. COST OF COMPLIANCE

A. PURPOSE

The costs of compliance for a number of alternative BAT regulations has been developed by the EPA Technical Contractor, Environmental Science and Engineering, Inc.[1]. The purpose of this Chapter is to summarize the costs of compliance associated with each option, review the current status of the industry, and describe the investment and operating costs that will be incurred under each alternative.

B. CURRENT EFFLUENT STATUS

Table III-1 describes the current effluent status of wood preserving plants by type of process. Ten plants currently discharge into navigable waters (direct discharge), while 42 discharge into municipal systems (indirect discharge). Inorganic plants are currently required to be at no discharge; all remaining organic plants do not discharge. The plants that will be required to make expenditures represent a minority of the industry. In total, the 52 potentially impacted plants represent 15% of the respondents.

All ten direct discharge plants are primarily steaming plants. An additional 31 plants in the organic category and 11 Boulton plants discharge into municipal systems.

The cost of compliance developed by the EPA technical contractor were developed based upon a separate EPA Technical 308 Letter as well as on plant visits and sampling data. The technical contractor was in the process of developing cost of compliance data for two of the plants at the time this report was written; therefore, the cost of compliance for those facilities was based on plants for which cost data were available. In addition, the technical contractor developed cost data for 5 plants that did not provide economic data. Costs of compliance are based upon plants for which costs were available at the time, using extrapolation for plants for which cost data were lacking.

[1] Reference 1

DRAFT

TABLE III-1

CURRENT DISCHARGE STATUS
BY TYPE OF PROCESS

Indirect Discharges	Technical Contractor	Financial 308 Survey	Composite #	Composite %
Steaming	29 *	29	31	9%
Boulton	11	11	11	3
Direct Discharges				
Steaming	10	7	10	3
No Discharge		290	290	85
TOTAL		337	342	100

SOURCE: Environmental Protection Agency Financial 308 Survey, and follow-up calls by the EPA Technical Contractor.

* Number of plants for which cost was available at the time of writing. Costs for the two additional plants were in the process of preparation.

C. CONTROL OPTIONS

At the time of writing, costs of compliance were available individually for 50 of the 52 impacted plants identified by the economic and technical contractors. Types of compliance treatment differ somewhat by plant. The treatment subcategories used were:

- Organic - Boulton Process
- Organic - Steaming Process, indirect discharge
- Organic - Steaming Process, direct discharge.

All impacted Boulton plants are indirect dischargers.

Three categories of control options were developed for indirect dischargers (steaming process):

- Option 1: Enhanced biological treatment
- Option 2: Enhanced biological treatment with heavy metals removal
- Option 3: Total recycle/no discharge.

Under Option 1, all but three of the steaming indirect dischargers will incur additional compliance costs, while nine of eleven Boulton plants will be affected. If Option 2 (heavy metals removal) is required, eight steaming and three Boulton plants will be affected. Under Option 3, more than one method is feasible to achieve "no discharge" for some plants and the low cost option has been used in the analysis.

Three control options were also developed for direct dischargers:

- Option 1: Enhanced biological treatment
- Option 2: Enhanced biological treatment with carbon absorption
- Option 3: No discharge

Only two plants of the ten would incur additional cost under Option 1, and only one of the two would incur additional costs under Option 2. Under Option 3 (no-discharge) all ten direct discharges will incur costs.

The cost of effluent monitoring were generated by the EPA and not the technical contractor. These costs will add $5,000 to $10,000 per year to operating costs.

D. COST OF COMPLIANCE FOR EXISTING INDUSTRY

Tables III-2 through III-4 contain the investment and operating costs associated with each of the three levels of control. The land investment has been broken out separately because it enables a comparison of the relative amount of land required for each of the control options studied. A cost of $5,000 per acre was used as the cost of land and, thus, the number of acres required for each can readily be determined. Land investment was separated from other investment in the economic impact assessment because land is not a depreciable asset and, therefore, must be treated separately.

Since costs of compliance were generated for 50 individual plants, a range of costs of compliance is shown in Tables III-2 to III-4 for each sales category where costs of compliance apply. As can be seen from the tables, considerable variability exists from plant to plant in compliance cost. The source of variablility relates to volume of water effluent.

For indirect discharge steaming plants the cost of compliance, in terms of both investment and monitoring cost, increases with the stringency of the pollution control requirement. In contrast, for most Boulton plants, the cost of Option 3, no discharge, is lower than the cost of Option 1 or Option 2. (The obvious exception to this are the two Boulton plants who would incur zero cost under Options 1 or 2).

TABLE III-2

COST OF COMPLIANCE

OPTION 1: ENHANCED BIOLOGICAL TREATMENT

($000)

Plant Type/ Sales	# of Plants	Middle Cost Plant				High Cost Plant				Low Cost Plant			
		Investment			Annual Operating Costs	Investment			Annual Operating Costs	Investment			Annual Operating Costs
		Total	Land	Other Investment		Total	Land	Other Investment		Total	Land	Other Investment	
ORGANIC-STEAMING-INDIRECT													
$ 700	3	45.4	0.7	44.8	16.0	54.2	0.8	53.4	17.5	XX	XX	XX	XX
1800	4	69.1	1.1	68.1	19.2	236.3	3.9	232.4	34.5	64.1	1.0	67.2	18.5
3500	11	108.4	1.8	106.7	23.4	207.5	3.4	204.1	42.3	48.6	1.7	48.0	16.3
7500	9	117.5	1.9	115.6	34.2	322.3	3.8	118.4	52.5	42.6	—	42.6	4.7
N/A	2												
TOTAL	29												
ORGANIC-STEAMING-DIRECT													
$3500	1	68.8	0	68.8	22.8	XX	XX	XX	XX	XX	XX	XX	XX
N/A	1	54.2	1.0	53.2	15.5	XX	XX	XX	XX	XX	XX	XX	XX
TOTAL	2												
ORGANIC-BOULTON													
$ 200	1	81.0	1.3	79.8	22.9	XX	XX	XX	XX	XX	XX	XX	XX
700	1	60.3	0.9	59.4	17.1	XX	XX	XX	XX	XX	XX	XX	XX
1800	1	102.3	1.7	101.7	23.3	XX	XX	XX	XX	XX	XX	XX	XX
3500	2	171.1	2.8	168.4	29.0	XX	XX	XX	XX	102.3	1.7	101.7	23.3
7500	4	234.0	4.0	230.0	34.7	956.0	20.0	936.0	93.1	132.3	2.2	130.2	25.7
TOTAL	9												

SOURCE: Environmental Science and Engineering, Inc.

DRAFT

TABLE III-3

COST OF COMPLIANCE

OPTION 2*

($000)

PLANT TYPE/ Sales	# of Plants	Middle Cost Plant Investment Total	Middle Cost Plant Investment Land	Middle Cost Plant Investment Other Investment	Middle Cost Plant Annual Operating Costs	High Cost Plant Investment Total	High Cost Plant Investment Land	High Cost Plant Investment Other Investment	High Cost Plant Annual Operating Costs	Low Cost Plant Investment Total	Low Cost Plant Investment Land	Low Cost Plant Investment Other Investment	Low Cost Plant Annual Operating Costs
ORGANIC-STEAMING-INDIRECT													
$ 700	2	128.7	0.7	127.1	27.8	XX	XX	XX	XX	XX	XX	XX	XX
1800	1	166.0	1.0	165.1	33.1	XX	XX	XX	XX	XX	XX	XX	XX
3500	4	306.0	2.6	303.4	55.9	366.2	3.4	362.8	73.8	190.6	1.3	189.5	36.8
7500	1	289.1	2.0	286.7	53.6	389.1	—	389.1	65.1	XX	XX	XX	XX
TOTAL	8												
ORGANIC-STEAMING-DIRECT													
N/A	1	112.8	2.0	110.8	27.9	XX	XX	XX	XX	XX	XX	XX	XX
ORGANIC-BOULTON													
$ 700	1	159.1	1.7	157.5	32.1	XX	XX	XX	XX	XX	XX	XX	XX
3500	2	176.2	1.7	172.6	51.7	318.3	4.0	314.3	59.1	XX	XX	XX	XX
7500	3	400.9	5.3	395.7	70.3	528.3	7.8	520.6	87.6	270.1	3.4	266.7	52.4
TOTAL	6												

*Option 2: Incremental costs of heavy metals removal for organic steaming, indirect discharger and Boulton plants were added to Option 1 costs. Costs for direct discharges represent a higher level of biological treatment than Option 1. Costs for impacted plants only.

SOURCE: Environmental Science and Engineering, Inc.

DRAFT

TABLE III-4

COST OF COMPLIANCE

OPTION 3: ZERO DISCHARGE

($000)

Plant Type/ Sales ($000)	# of Plants	Middle Cost Plant Investment Total	Middle Cost Plant Investment Land	Middle Cost Plant Investment Other Investment	Middle Cost Plant Annual Operating Costs	High Cost Plant Investment Total	High Cost Plant Investment Land	High Cost Plant Investment Other Investment	High Cost Plant Annual Operating Costs	Low Cost Plant Investment Total	Low Cost Plant Investment Land	Low Cost Plant Investment Other Investment	Low Cost Plant Annual Operating Costs
ORGANIC-STEAMING-INDIRECT													
$ 700	4	98.7	1.3	97.5	15.9	188.8	1.9	186.9	19.4	27.1	—	27.1	0.6
1800	4	128.5	—	128.5	16.5	312.4	10.4	302.8	22.0	26.4	—	26.4	0.6
3500	11	183.3	4.8	178.4	17.9	287.3	9.3	278.0	32.5	68.8	—	68.8	22.8
7500	10	122.2	—	122.2	18.0	403.4	—	403.4	34.9	78.3	0.8	77.6	15.4
N/A	2												
TOTAL	31												
ORGANIC-STEAMING-DIRECT													
$ 700	5	72.7	—	72.7	1.6	134.9	—	134.9	3.1	27.1	—	27.1	0.6
1800	1	26.4	—	26.4	0.6	XX	XX	XX	XX	XX	XX	XX	XX
3500	1	176.6	—	176.6	15.3	XX	XX	XX	XX	XX	XX	XX	XX
N/A	3	109.2	—	109.2	2.5	XX	XX	XX	XX	XX	XX	XX	XX
TOTAL	10												
ORGANIC-BOULTON													
$ 200	1	62.1	—	62.1	25.7	XX	XX	XX	XX	XX	XX	XX	XX
700	1	50.6	—	50.6	23.5	XX	XX	XX	XX	XX	XX	XX	XX
1800	1	71.9	—	71.9	28.4	XX	XX	XX	XX	XX	XX	XX	XX
3500	2	92.0	—	92.0	35.8	127.0	—	127.0	23.2	XX	XX	XX	XX
7500	6	110.4	—	110.4	42.3	178.2	—	178.2	89.2	81.6	—	81.6	31.1
TOTAL	11												

Source: Environmental Science and Engineering, Inc.

DRAFT

Most direct dischargers incur no cost under Options 1 and 2. However, for the two plants that are impacted, Option 1 is less costly than Option 3. For the one plant affected by Option 2, the no-discharge Option 3 is less costly than Option 2.

Table III-5 shows the total costs of compliance that will be incurred by the direct and indirect dischargers in the wood preserving industry. In addition, for Option 2, (heavy metals removal, for indirect dischargers; carbon absorption for direct), the cost of that component was included only for the estimated 15 plants requiring it, while all other plants impacted incur Option 1 costs. Total investment cost, based on the 42 plants evaluated will be $4.2 million for Option 1, $7.1 million for Option 2, and $6.8 million for Option 3. The total investment costs for direct dischargers under each of the three options are $128,000, $240,000, and $742,000, respectively.

The cost shown in Table III-5 are on a worse case basis, assuming plants install the control technology related to the stated option. Since "no discharge" is generally less expensive for Boulton plants and steaming plants than heavy metals removal, the six Boulton plants would presumably install the Option 3 control equipment under Option 2. Table III-6 illustrates the total cost of compliance assuming plants will install Option 3 (no discharge) control equipment where Option 1 or 2 are more costly. Total compliance costs assuming installation of the least cost treatment, are shown in Table III-6. Under Option 1, indirect dischargers will incur investment costs of $3.8 million or 27% less than that of strictly applying Option 1 technology; likewise, costs under Option 2 for indirect dischargers are $4.2 million or 41% less. Costs for direct dischargers decrease only sightly, from $184,000 to $178,000 when the least cost treatment is utilized.

DRAFT

TABLE III-5

TOTAL COST OF COMPLIANCE
WOOD PRESERVING INDUSTRY
INSTALLING OPTION TECHNOLOGY
(000s)

INDIRECT DISCHARGES	# Plants	Investments Total	Land	Other Investment	Annual Operating Costs
OPTION 1					
Enhanced Biological Treatment					
Organic-Steaming	29	2,986	35	2,951	663
Organic-Boulton	9	2,190	40	2,150	300
TOTAL	38	5,176	75	5,101	963
OPTION 2					
Heavy Metals Removal					
Organic-Steaming	29	3,876	35	3,841	820
Organic-Boulton	9	3,180	95	3,085	450
TOTAL	38	7,056	130	6,926	1,270
OPTION 3					
Total Recycle					
Organic-Steaming	31	5,691	95	5,596	602
Organic-Boulton	11	1,110	--	1,110	290
TOTAL	42	6,801	95	6,706	892
DIRECT DISCHARGES					
OPTION 1: Enhanced Biological Treatment	2	128	1	127	35
OPTION 2: Enhanced Biological Treatment with Carbon Absorption	2	240	4	236	51
OPTION 3: No Discharge	10	742	--	742	43

SOURCE: Estimated by Arthur D. Little, Inc. using cost of compliance data developed by Environmental Science and Engineering, Inc.

DRAFT

TABLE III-6

TOTAL COST OF COMPLIANCE

WOOD PRESERVING INDUSTRY

INSTALLING LEAST COST TECHNOLOGY

(000s)

INDIRECT DISCHARGES	# Plants	Investment Total	Investment Land	Investment Other Investment	Annual Operating Costs
OPTION 1					
Enhanced Biological Treatment					
Organic-Steaming	29	2,986	35	2,951	663
Organic-Boulton	9	862	--	862	340
TOTAL	38	3,848	35	3,813	1,003
OPTION 2					
Heavy Metals Removal					
Organic-Steaming	29	3,348	35	3,314	585
Organic-Boulton	9	885	--	885	450
TOTAL	38	4,223	35	4,199	1,035
OPTION 3					
Total Recycle					
Organic-Steaming	31	5,690	95	5,596	602
Organic-Boulton	11	1,110	--	1,110	290
TOTAL	42	6,880	95	6,706	892
DIRECT DISCHARGES					
OPTION 1: Enhanced Biological Treatment	2	128	1	124	35
OPTION 2: Enhanced Biological Treatment with Carbon Absorption	2	178	--	178	25
OPTION 3: No Discharge	10	742	--	742	43

SOURCE: Estimated by Arthur D. Little, Inc. using cost of compliance data developed by Environmental Science and Engineering, Inc.

DRAFT

E. COST OF COMPLIANCE FOR NEW SOURCES

Costs of compliance for new sources were generated by the technical contractor for organic plants using the Boulton process and organic steaming methods. New wood preserving plants using inorganic processes are required to have zero discharge under BPT guidelines and thus were not analyzed.

The treatment technology for new Boulton plants consists of:[1]

- Primary gravity oil-water separation;
- Flocculation followed by rapid sand filtration; and
- Evaporation in cooling tower, with provisions for additional heat input through a heat exchanger.

The treatment technology for a new steaming plant consists of:[2]

- Primary gravity oil-water separation;
- Flocculation followed by rapid sand filtration; and
- Containment and spray evaporation.

Cost of compliance estimates were based upon the plant types and sizes shown in Table III-7. Two sizes of Boulton plant are shown (one with two 130' x 7' cylinders, and the larger with five cylinders), each treating Douglas fir poles, which require a long residence time in a retort. Costs were also developed for two sizes of organic steaming plants treating southern pine poles. Boulton plants treating southern oak railwood ties would have production rate and wastewater flows similar to those for the organic steaming plants, but the treatment technology shown for the Boulton plant.

The cost of compliance with the new source treatment technology is shown in Table III-8 for each model plant. The compliance investment and operating costs reflect only one half of the cost of primary oil-water separation and the remainder has been included in the new plant baseline data described

---

[1] Reference 1

[2] Ibid.

DRAFT

in Chapter II and included in Chapter IV. The total cost of primary oil-water separation is also shown in Table III-8; these costs differ by size of plant but not by treatment method.

DRAFT

TABLE III-7

MODEL PLANTS FOR NEW SOURCE PERFORMANCE STANDARDS

Plant Type	Design Production Cubic Feet/ Day	Design Production Product Type	Wastewater Flow (Gal./Day)
Boulton Process			
Plant A	3,200	Douglas Fir Poles	4,000
Plant B	8,000	"	10,000
Organic Steaming Plants			
Plant C	6,000	Southern Pine Poles	2,500
Plant D	15,000	"	7,000

SOURCE: Environmental Science and Engineering, Inc.

DRAFT

TABLE III-8

COST OF COMPLIANCE

NEW WOOD PRESERVING PLANTS

Model Plant Type	Total Investment	Operating Cost	Acres of Land Required
Boulton Plant A[1]	$163,530	66,260	1.0
Boulton Plant B[1]	227,560	99,260	1.5
Organic Plant C[1]	274,140	73,640	2.0
Organic Plant D[1]	437,750	105,300	.8
Total Requirement Primary Oil-Water Separation			
2-Cylinder Plant	80,000	8,000	--
5-Cylinder Plant	113,500	9,500	--

[1]Half the investment and operating cost of primary oil/water separation has been excluded.

SOURCE: Environmental Science and Engineering, Inc.

DRAFT

IV. ECONOMIC IMPACT ASSESSMENT

This chapter discusses the results of the economic impact assessment of the costs of complying with the BAT options studied. It also contains a description of plants that will be required to install or modify equipment (thus incurring higher costs of operation) to comply with the studied control options, and compares these plants with those that currently have self-contained or no discharge.

A. ECONOMIC CHARACTERISTICS OF IMPACTED PLANTS

As described in Chapter III, only 15% of the plants in the wood preserving industry will be impacted by the BAT alternatives studied because the remaining 85% of the industry is currently not discharging a liquid waste into navigable water or into a municipal system. The impacted plants were compared with the balance of the industry in several areas important to determining the impact of the alternatives on the industry:

- Sales
- Process
- Profitability
- Profit Mix
- Location

With the exception of plant sales, size, and location, impacted plants are not significantly different from non-impacted plants. (See Tables A-11 through A-14 in Appendix A.) In general, plants impacted by BAT requirements are larger than non-impacted plants.

Impacted plants also tend to be more highly concentrated in urban areas than the no discharge plants (71% versus 21%) which are more likely to be found in a suburban area, as shown in Table IV-1. The impacted plants located in urban areas account for nearly all of the respondents which cited a lack of available adjacent land for an effluent treatment system (18 out of 42 impacted respondents). Hence, land availability does not appear to be a problem in suburban or rural locations.

TABLE IV-1

LAND AVAILABILITY FOR

DISCHARGING PLANTS

Type of Location	DISCHARGING PLANTS								No Discharge Plants	
	Land Availability									
	Available		Unavailable		No Answer		Total			
	#	%	#	%	#	%	#	%	#	%
Urban	12	52	21	95	5	50	38	60	60	21
Suburban	7	30	0	0	2	20	9	16	76	27
Rural	4	18	1	5	2	20	7	13	146	52
No Answer	--	--	--	--	1	10	1	2	--	--
Total	23	100%	22	100%	10	100%	55	100%	282	100%
% of Total Sample (337 Respondents)		7%		7%		3%		16%		84%

SOURCE: EPA Financial 308 Letter.

NOTE: This table includes three plants as "DISCHARGING PLANTS" which the EPA has learned are "No Discharge" plants.

DRAFT

B. ECONOMIC IMPACT ON EXISTING INDUSTRY

The economic impacts of the compliance costs for each studied alternative were analyzed with respect to:

- Price impacts
- Demand reduction/shifts
- Financial effects
- Plant closures, and market structure

A discussion of the sensitivity of the economic impact assessment to assumptions used is contained in Chapter V, Limitations of Analysis.

1. Price Impacts

The question of potential long-run price impacts resulting from the control alternatives studied was addressed by estimating the long-run price increases associated with the costs for each control alternative. The term "long-run price increase" is used to describe that price increase necessary to recover all costs associated with a control option, including a normal rate-of-return on investment. As discussed in Chapter II, the rate-of-return on investment used was the average value found for the plants responding to the rate-of-return criteria question posed in the EPA financial 308 Letter. Chapter V contains a discussion of the sensitivity of the results to rate-of-return criteria.

Rather than allocate compliance costs and impact among the wood preserving industry's products, an estimate was made of the revenue required for the plant to recover the total cost of compliance. Tables IV-2 through IV-4 contain the revenue required to recover the costs associated with each of the control options studied.[1] Since the costs of compliance were developed by plant, the required revenue for each option is shown for middle cost, high cost, and low cost plants in each category. The relative increase in revenue required to recover compliance costs varies with size of plant. In Tables IV-2 through IV-4, the X's indicate that there are no relevant

[1] See Chapter III for a discussion of the components of each control option.

TABLE IV-2

PRICE INCREASES REQUIRED

TO RECOVER COSTS OF COMPLIANCE

OPTION 1: ENHANCED BIOLOGICAL TREATMENT

PLANT TYPE/ Sales ($000)	# Plants	MIDDLE COST IMPACT $000	MIDDLE COST IMPACT % Revenue	HIGH COST IMPACT $000	HIGH COST IMPACT % Revenue	LOW COST IMPACT $000	LOW COST IMPACT % Revenue
INDIRECT STEAMING							
$ 700	3	36.7	5%	43.9	6%	XX	XX
1800	4	54.1	3	137.5	8	54.1	3%
3500	11	75.1	4	139.8	8	42.3	1
7500	9	88.2	1	207.4	3	36.7	1
N/A	2	N/A	N/A	XX	XX	XX	XX
TOTAL	29						
BOULTON							
$ 200	1	59.4	30%	XX	XX	XX	XX
700	1	41.0	6	XX	XX	XX	XX
1800	1	70.8	4	XX	XX	XX	XX
3500	2	110.2	3	XX	XX	70.8	2%
7500	4	151.5	2	618.2	8	85.6	1
TOTAL	9						
DIRECT STEAMING							
$3500	1	56.4	2%	XX	XX	XX	XX
Not Available	1	41.1	XX	XX	XX	XX	XX
TOTAL	2						

Source: Arthur D. Little, Inc. estimates

DRAFT

TABLE IV-3

PRICE INCREASES REQUIRED
TO RECOVER COSTS OF COMPLIANCE
OPTION 2

PLANT TYPE/ Sales ($000)	# Plants	MIDDLE COST IMPACT $000	MIDDLE COST IMPACT % Revenue	HIGH COST IMPACT $000	HIGH COST IMPACT % Revenue	LOW COST IMPACT $000	LOW COST IMPACT %Revenue
INDIRECT- HEAVY METALS							
$ 700	2	$88.4	13%	$265.8	38%	XX	XX
1800	1	107.8	6	XX	XX	XX	XX
3500	4	167.9	5	200.0	6	124.2	4%
7500	1	185.1	2	247.0	3	XX	XX
TOTAL	8						
BOULTON							
$ 200	0	XX	XX	XX	XX	XX	XX
700	1	103.8	15%	XX	XX	XX	XX
1800	0	XX	XX	XX	XX	XX	XX
3500	2	113.5	3	219.8	6%	XX	XX
7500	3	257.9	3	340.3	5	173.7	2
TOTAL	6						
DIRECT-CARBON ABSORPTION							
N/A	1	78.4	XX	XX	XX	XX	XX

* Shown for plants impacted by Option 2, only, assuming installation of Option 2 treatment technology.

Source: Arthur D. Little, Inc. estimates

DRAFT

TABLE IV-4

PRICE INCREASES REQUIRED TO RECOVER COSTS OF COMPLIANCE

OPTION 3: TOTAL RECYCLE/NO DISCHARGE

PLANT TYPE/ Sales ($000)	# Plants	MIDDLE COST IMPACT $000	MIDDLE COST IMPACT % Revenue	HIGH COST IMPACT $000	HIGH COST IMPACT % Revenue	LOW COST IMPACT $000	LOW COST IMPACT % Revenue
INDIRECT-STEAMING							
$ 700	4	54.2	8%	135.2	19%	41.5	6%
1800	4	69.5	4	146.9	8	XX	XX
3500	11	97.8	3	154.6	4	55.5	2
7500	10	68.8	1	191.6	3	51.6	1
Not Available	2	N/A	N/A	XX	XX	XX	XX
TOTAL	31						
BOULTON							
$ 200	1	48.0	24%	XX	XX	XX	XX
700	1	43.9	6	XX	XX	XX	XX
1800	1	66.4	4	XX	XX	XX	XX
3500	2	57.5	2	88.0	3	XX	XX
7500	6	75.1	1	114.9	2	61.0	1
TOTAL	11						
DIRECT							
$ 700	5	23.7	3	44.2	6	8.8	1
1800	1	8.6	<1	XX	XX	XX	XX
3500	1	75.7	2	XX	XX	XX	XX
Not Available	3	9.7	N/A	35.7	N/A	4.9	N/A
TOTAL	10						

Source: Arthur D. Little, Inc. estimates

DRAFT

plants in that sales/control option category. Also, monitoring costs used in the analysis were $5,000 and $10,000 per plant per year, as suggested by the Environmental Protection Agency; since EPA has not finalized its requirements, these costs are likely to change.

The revenue required to recover compliance costs can be viewed as the average price increase across all products required by a plant in a given sales category. Obviously, small plants have a higher revenue requirement due to the fact that compliance costs for a given option are disproportionately higher for small plants than for large plants.

Since only 15% of the plants in the industry will be impacted by the regulation, the price increases expected from the regulation are likely to range from 0% to that for the larger plants. The rationale for this is the fact that the wood preserving industry is competitive and while the industry demand curve for most preserved wood products is relatively inelastic, the demand curve facing individual firms is quite elastic. There are some factors and circumstances which may enable these plants to obtain price increases to recover cost including:

- The impacted plants are generally larger than the industry average
- Impacted plants may be in isolated geographic markets
- The general price level inflation in the U.S. (6-8% per year) may facilitate partial cost recovery.

Prices of preserved wood products have outpaced general price inflation during the 1970's. Given "customary", inflation related, price increases of 6-8%, impacted wood preservers may be able to recover an additional 1-2% of increased cost associated with pollution control. Also, larger plants are often associated with multi-plant companies which have some market power and may be able to obtain a price increase to recover a portion of the cost of compliance. Finally, plants in locations where there are few or no competing firms may be able to raise prices, limited by the cost of transporting products from the nearest plant that is not impacted.

2. Demand Shifts

The future growth rates in the demand for preserved wood products affect the ability of impacted plants to obtain price increases. Plants predominantly producing poles will be unlikely to obtain higher prices for this product than the industry in the face of a declining demand. Shifting from poles to other products will increase capacity for other products which will, in turn, further inhibit the impacted firms' ability to increase price.

While the selection of preserved wood versus steel or concrete materials is predominantly based upon structural requirements, this could change for railroad ties in the future. If concrete ties prove out technically and can be produced economically, a portion of the market expansion forecast for ties could be captured by concrete substitutes, especially if the life cycle costs become more competitive. While this may not be a factor until the mid-1980's, that would coincide with the deadline for BAT compliance and would further prevent the impacted plants from recovering costs of compliance through price increases.

3. Financial Impact

It is unlikely that the impacted plants as a group will be able to recover the costs of complying with BAT regulations through higher prices. If they elect to install the pollution control equipment, profitability is likely to decline. Table IV-5 shows the impact of increased operating costs and investment upon profitability in the absence of price increases. The analysis considered the impact on operating costs due to out-of-pocket expenditures; i.e., while potential interest payments on debt are included as a cost, the total cost of capital is not included in the figures in Table IV-4. Also, the lowest-cost means of achieving compliance was used in the Table IV-15; i.e., if Option 3 is less expensive than Option 2 for a plant, it is assumed the plant will install Option 3.

TABLE IV-5

WOOD PRESERVING PLANTS

PROFITABILITY WITH NO PRICE INCREASES

BEFORE AND AFTER COMPLIANCE

Sales ($000)	$200		$700		$1,800		$3,500		$7,500	
Precompliance Profit Before Tax (% Sales)	1%		6%		3%		6%		7%	
	Post-Compliance Profit Before Tax									
OPTION/PLANT TYPE	Middle Value	Low Value	Middle Value	Low Value	Middle Value	Low Value	Middle Value	Low Value	Middle Value	Low Value
Option 1										
Steaming-Indirect	XX	XX	3%	--	1%	4%	5%	4%	6%	--
Boulton*	(14%)	--	2	--	1	--	5	--	6	--
Steaming-Direct**	XX	XX	XX	XX	XX	XX	5%	--	XX	XX
Option 2										
Steaming-Indirect*	XX	XX	3%	1%	1%	--	5%	4%	7%	6%
Boulton*	XX	XX	2	--	XX	XX	5	--	6	--
Steaming-Direct**	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
Option 3										
Steaming-Indirect	XX	XX	3%	1%	1%	--	5%	4%	7%	6%
Boulton	(14%)	--	2	--	1	--	5	--	6	--
Steaming-Direct	XX	XX	4	5	3	--	4	--	XX	XX

* Option 3 cost of compliance used where less expensive than Option 1 or Option 2.

** Sales data not available.

SOURCE: Arthur D. Little, Inc. estimates

DRAFT

Since the costs of compliance are relatively higher for small plants, small firms will suffer the greatest decline in profitability as a result of compliance. The small plants with lowest sales volume would be in a negative profit situation under all of the control options studied. Plants in the other sales categories would suffer a decline in profitability but would still be profitable under each alternative.

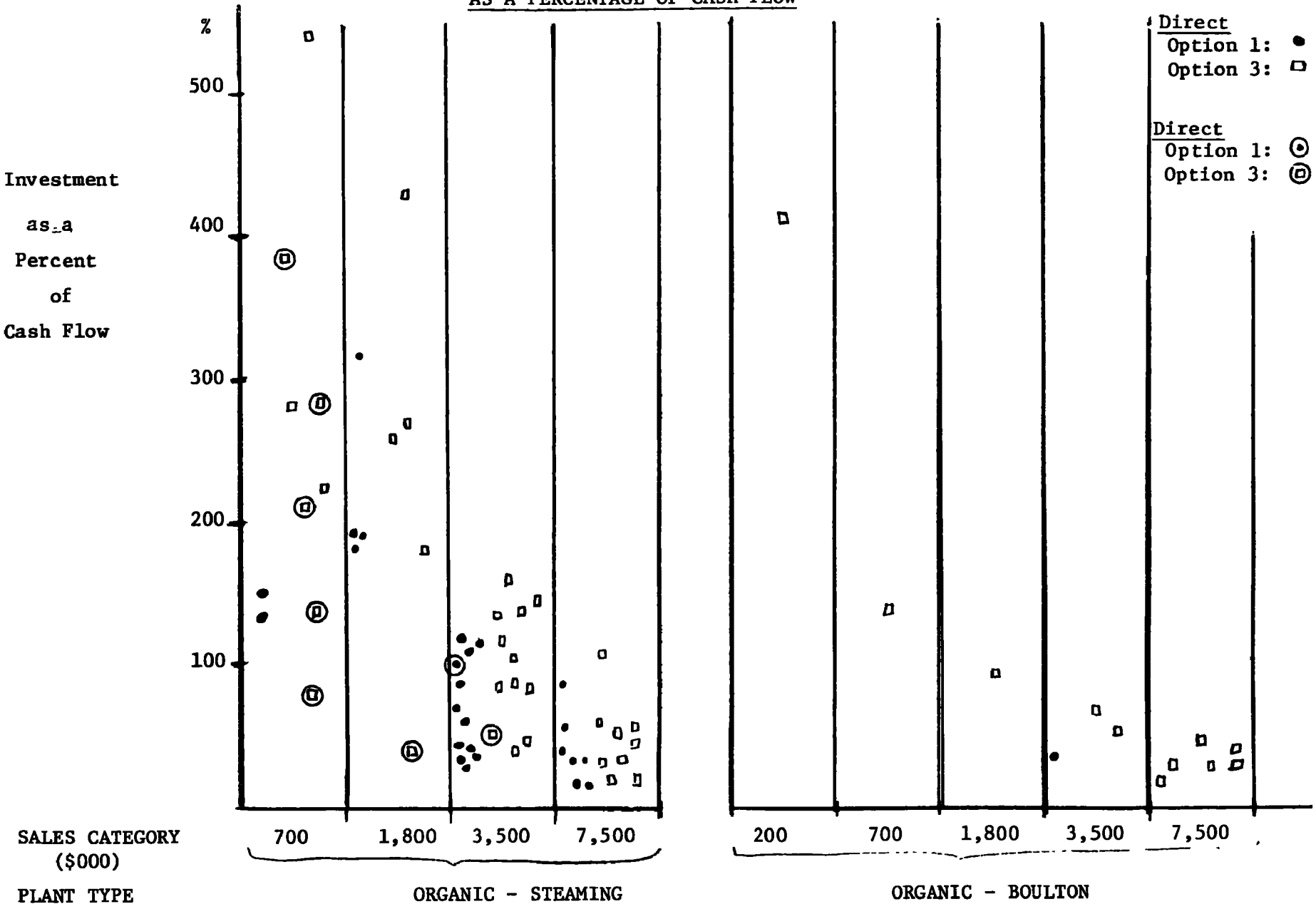
The average plant with sales from $700,000 to $3.5 million would not be subject to as great a reduction in profitability. Further, any price increases the impacted plants are able to obtain would mitigate the reduction in profitability for small and medium size plants. However, as discussed above, price increases that do occur (barring a tight market) will reflect the cost structure of the larger plants. Even with price increases, many plants with less than $1.8 million in sales are likely to become unprofitable if they make the compliance expenditures.

Reduction in profitability is not the only financial impact of the regulation. If one were to assume that all impacted plants could recover the pollution control expenditures through price increases, it is still likely that a number of impacted plants would be unable to finance the required investment.

Figure IV-1 depicts the investment required for each of the control options studied relative to cash flow. For small plants in the $700,000 category, the investment required for all options studied exceeds annual plant cash flow for all but one plant. Even for larger plants, the studied alternatives require investment exceeding a single year's cash flow. Considering the fact that a portion of the plant's cash flow must be used for expenditures other than associated with BAT regulations, impacted plants will not generate sufficient cash flow to self-finance compliance with these regulations.

FIGURE IV-1

INVESTMENT REQUIRED FOR BAT ALTERNATIVES
AS A PERCENTAGE OF CASH FLOW



SOURCE: Arthur D. Little, Inc. estimates.

DRAFT

This statement can be placed in perspective by referring to the discussion of financial characteristics in Chapter II. The impacted plants generate an annual cash flow equivalent to approximately 4% of sales.[1] Table II-5 indicated that about 3% of sales is reinvested to maintain industry assets, leaving about 1% of sales for dividends, retained earnings, and other purposes. Wood preservers would be required to accumulate four years cash flow in excess of maintenance investment requirements to have available the equivalent of one year's cash to invest in pollution control. Therefore, any plant with a pollution control investment requirement in excess of one year's cash flow will probably have to obtain external financing between 1979 and 1983 to fund pollution control expenditures if BAT regulations are required in 1984.

Assuming a plant is viable--i.e., prices will eventually increase to cover the BAT investment expenditures--a plant will be required to seek financing from a parent company or the financial community. As seen in Table IV-6, the wood preserving industry is dominated by privately-held corporations (78% of all plants) and a minority of plants (22%) are publicly-held. Many of the privately-held corporations and proprietorships are one-plant corporations and effectively the plant and corporate cash flows are one and the same. Plants that will be impacted by BAT regulations are similar in form of ownership to the industry overall, with 36 (58%) of the direct and indirect dischargers organized as privately-held corporations.

It is more likely that the privately-held corporations will require external financing to a greater extent than the publicly-held corporations. In either case, it is less likely that the financial community or parent corporations would be willing to make investments in financially-nonviable plants. Based on the financial criteria, any but the larger impacted plants would make the investment required to satisfy BAT requirements.

[1] Based upon responses to the EPA Financial 308 Survey.

TABLE IV-6

FORM OF BUSINESS ORGANIZATION BY DISCHARGE STATUS

Primarily Organic Preservatives	Discharging Plants Number	Discharging Plants Percent	Total Plants Number	Total Plants Percent
Proprietorship	1	2%	23	10%
Co-op			1	0
Privately-held Corporation	27	53	158	65
Publicly-held Corporation	22	45	59	25
Total	50	100%	241	100%
Total				
Proprietorship	*	*	31	9%
Co-op	*	*	1	0
Privately-held Corporation	36	58	230	69
Publicly-held Corporation	25	40	72	22
	62	100%	334	100%

NOTE: Totals do not add due to non-response on one question.

This table includes three plants as "DISCHARGING PLANTS" which the EPA has learned are "No Discharge" plants.

SOURCE: Derived from EPA Financial 308 Survey.

DRAFT

4. Plant Closures

The impacted wood preserving plants (especially the small ones) will be unable to fully recover costs through price increases. Further, a number of plants will have cash flow shortfalls relative to pollution control investment requirements. These factors point to the likelihood of plant shutdowns in the wood preserving industry.

An evaluation of whether or not a plant will shut down rather than make the investment required to comply with pollution control regulations is imprecise. In the first place, the evaluation is made externally to the corporate environment and without knowledge or consideration of corporate goals and objectives. Secondly, the evaluation is based on financial criteria and,while they are based upon industry data and a distribution of wood preserving plant rate-of-return criteria, the criteria may not reflect the actual parameters that will be used in the individual decision-making process, especially since few plants provided information on financial decision criteria. With those caveats in mind, the analysis indicates that a number of plants are likely to shut down rather than make the investment required for compliance.

Table IV-7 shows the number of plants impacted by the BAT alternatives studied that are likely to close down rather than make the required compliance investments. The closure candidates can be characterized as having:

- Low Sales
- Low Profitability
- Negative Cash Flow

The profitability and cash flow of each discharging plant, derived from the EPA Financial 308 Letter, was used as the basis for the plant closure evaluation. The change in operating cost and relationship of investment required to cash flow was examined under each control option. In this analysis plants were assumed to install the least costly treatment technology that would achieve compliance, and thus Option 3 (no discharge) costs were used if less costly than Options 1 or 2 costs.

DRAFT

TABLE IV-7

POTENTIAL PLANT CLOSURES UNDER BAT ALTERNATIVES

PLANT TYPE/ SALES	Total Plants	Probability of Closure: Option 1 High	Option 1 Moderate	Option 2 High	Option 2 Moderate	Option 3 High	Option 3 Moderate
ORGANIC-STEAMING-INDIRECT							
$ 700	4	--	2	1	1	1	2
1800	4	1	1	1	1	2	1
3500	11	1	3	4	1	5	2
7500	10	--	--	--	--	--	1
N/A	2	--	--	--	--	--	--
TOTAL	31	2	6	6	3	8	6
ORGANIC-STEAMING-DIRECT							
$ 700	5	--	--	--	--	2	2
All Others	5	--	--	--	--	--	--
	10					2	2
ORGANIC-BOULTON							
$ 200	1	1	--	1	--	1	--
700	1	--	1	--	1	--	1
1800	1	--	--	--	--	--	--
3500	2	--	--	--	1	--	1
7500	6	--	--	--	--	--	--
TOTAL	11	1	1	1	2	1	2

*Assuming inorganic total recycle option will apply, regardless of organic options.
Source: Arthur D. Little, Inc. Estimates

If a plant could finance the pollution control investment from cash flow and maintain a positive profit margin in the absence of price increases then the plant was judged likely to remain open. A plant was designated as a high probability of closure where required investment was on the order of 200% of annual cash flow and/or post-compliance profit margins would be negative. Plants judged to have a moderate probability of closure were those whose investment was 100% to 200% of annual cash flow but which would still have a positive profit after tax.

Since compliance costs fall disproportionately on smaller plants, plants with low sales volumes are more highly impacted. Under the control options studied, up to 12 plants with sales under $3.5 million would be unlikely to make the investment in control equipment for financial reasons--i.e., the plant is likely to incur operating losses as a result of compliance costs or be unable to finance the investment. Under Option 1, a total of 3 indirect discharge plants have a high probability of closure and an additional 7 plants have a moderate probability of closure. Under Option 3 (no discharge) 11 plants would most likely close down and a potential shut down of 10 others could occur.

5. Employment Effects

Table IV-8 shows the impact on the employment in the wood preserving industry due to plant closures under the three compliance options. The decrease in the number of production workers due to plants with a high probability of closure under each of the options are 68, 136, and 308, production workers (0.9%, 1.8%, and 4.0% of the industry total) respectively. The estimated loss in production employment if both plants with high and moderate probabilities of closure were to shut down are 219, 335, and 618 workers, respectively, or a reduction of 2.9%, 4.4%, and 8.0% in production worker employment for the industry as a whole.

DRAFT

TABLE IV-8

WOOD PRESERVING INDUSTRY

EMPLOYMENT LOSSES FROM PLANT CLOSURES

	CONTROL OPTION/CLOSURE PROBABILITY					
	1		2		3	
	Moderate	High	Moderate	High	Moderate	High
Steaming	137	54	158	122	215	253
	14	14	41	14	41	14
Direct	0	0	0	0	54	41
Total Decrease in Production Workforce	151	68	199	136	310	308
Combined Moderate and High		219		335		618
% Reduction for Industry						
High Probability Only		0.9%		1.8%		4.0%
Moderate plus High		2.9%		4.4%		8.0%

SOURCE: Based upon 7,700 production workers in 1976, Department of Commerce, Bureau of Census, Annual Survey of Manufacturers: General Statistics. Plant production employment data from EPA Financial 308 survey.

DRAFT

C. ECONOMIC IMPACT UPON NEW SOURCES AND CAPACITY EXPANSIONS

1. Potential for New Plants

The wood treating industry is not capital intensive compared with the average manufacturing industry; the sales turnover ratios for existing plants in 1976 was found to range from 3.0 to 10.0[1] or more while the ratio of sales to assets for most process industries is on the order of 1.0 to 2.5.[2] While considerable excess capacity exists among existing plants, based upon maximum operating capacities, transportation and other factors make it likely that new capacity will be built in growing regions (e.g., the South) before excess capacity is fully utilized in others.

While most new capacity may take the form of incremental expansion (e.g., the addition of a new retort at an existing site), some 17% (or 56 out of 338) of the respondents to the financial 308 letter indicated that their wood treating plant have begun operation since 1970.

2. Impact Upon New Plants

As described in Chapter II, a number of new wood preserving plant models were developed to evaluate the impact of new source performance standards. Process economic models were developed for four different plant types:

- Boulton plants treating Douglas fir poles in the Northwest;
- Organic steaming plants treating southern pine poles;
- Boulton plants treating oak railroad ties in the South;
- Inorganic plants treating southern pine lumber.

Two plant sizes were created for each type: one with two cylinders and one with five (See Chapter II). As mentioned in Chapter III, existing standards for new inorganic plants will have no incremental costs of compliance from BAT revisions. Further, costs of compliance for Boulton

---

[1] Financial 308 letter.

[2] Based on data from FTC-SEC, Quarterly Financial Reports.

plants treating oak railroad ties were not generated by the technical contractor.

Table IV-9 depicts the baseline revenues on each model plant as well as the incremental revenue required to recover costs of compliance (where available). The model plants are large by industry standards, with production and revenue levels at the upper end of the spectrum. The revenue required to recover costs of compliance in the long run is similar to that for existing plants for Option 3 in the higher sales categories displayed in Table IV-2 through IV-4 which is the no discharge option. The cost of pollution control equipment per se would not appear to hinder the addition of new capacity.

If the existing industry BAT requirements are defined as Option 1, then it is possible that incremental expansion will be favored as a means of capacity expansion, especially given the incremental land requirements of a no discharge new source standard.

DRAFT

TABLE IV-9

IMPACT OF BAT REQUIREMENTS UPON LONG-RUN REVENUE

REQUIRED TO SUPPORT NEW SOURCES

	Plant Type/ Product	Annual Production (000 Cubic ft.)	Baseline Revenues ($000)	Revenue Required for BAT Compliance Costs ($000)	% Baseline
A.	Boulton/Douglas Fir Poles	$ 960	$ 7,834	$154	2%
B.	Boulton/Douglas Fir Poles	2,400	19,328	226	1
C.	Steaming/Southern Pine Poles	1,800	11,345	198	2
D.	Steaming/Southern Pine Poles	4,500	28,082	298	1
E.	Boulton/Oak R.R. Ties	960	6,487	Not Available	
F.	Boulton/Oak R.R. Ties	2,400	15,962	Not Available	
G.	Inorganic/Southern Pine Lumber	1,800	13,413	Not Available	
H.	Inorganic/Southern Pine Lumber	4,500	33,276	Not Available	

SOURCE: Arthur D. Little, Inc. estimates.

DRAFT

V. LIMITATIONS OF ANALYSIS

The results of economic impact assessment are subject to certain limitations. The factors to which the results are sensitive or which limit their application include:

1. EPA regulations which affect waste disposal;
2. Return-on-investment criteria;
3. Cost variation from plant to plant;
4. Future growth in demand;
5. Local conditions of impacted plants.

Consideration of the first item was beyond the scope of the technical contractor's or economic contractor's work. It is discussed here because the economics contractor has developed information in conjunction with another study that could potentially be useful to the EPA in its evaluation of the alternatives studied.

Items 2 through 5 are limiting factors in every analysis of this type, but the importance of these factors in influencing the results of a study varies from case to case, and thus requires discussion.

A. EPA REGULATION AFFECTING WASTE DISPOSAL

Subtitle C of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA), creates a regulatory framework to control hazardous wastes. Section 3004 addresses standards for owners and operators of hazardous waste treatment, storage and disposal facilities. The regulation impacts the analysis of alternative control options since it specifies the technical and monitoring requirements for each disposal method, as well as restrictions on disposal of waste by method. These in turn, may limit the application of some of the control options studied, or result in higher costs for an alternative than indicated by the technical contractor in this report. Further, wood preserving plants which dispose on-site (28%) may be impacted, in that the current method of disposal may no longer be environmentally adequate.

The application of both no-discharge and discharge options studied in this report will be affected by RCRA regulations. The lagoons associated with enhanced biological treatment and the impoundment associated with spray evaporation will both be considered methods of hazardous waste disposal or storage, and thus plants will be required to monitor groundwater and surface water as well as to install leachate collection and monitoring systems.

A leachate collection and monitoring system is not included in the cost of compliance. Assuming the two aerated lagoon cells combined, or an impoundment, are analogous to small landfills (5,000M^3/year) in size, then the incremental compliance cost per plant could be as follows:[2]

Initial Investment:	$129,000
Annual Operating Costs:	$ 42,200

Another source of additional cost are monitoring requirements. The cost of analysis for soil and water samples would be on the order of $60,000 per year.

Consideration of whether or not the sludge and effluent of wood preserving plants were hazardous wastes was beyond the scope of the technical contractor's report,[1] although it was discussed in the draft report. For off-site disposers, the costs of disposal are expected to double or triple as a result of Section 3004.[2] Therefore, that component of the technical contractor's operating cost (amounting to about 3% of operating costs) will be two to three times as high, but this cost component will not change the results of the economic impact assessment.

B. RETURN ON INVESTMENT CRITERIA

Table V-1 illustrates that the use of a higher or lower target rate of return than the median value (12%) produces noticeably higher or lower required revenue to cover cost of compliance. Table V-1 compares the revenue increase requirement for the low and high ROR scenarios for the sampled plants. The change in requirement from 12% to 5% is relatively

[1]Reference 1.
[2]Reference 5.

DRAFT

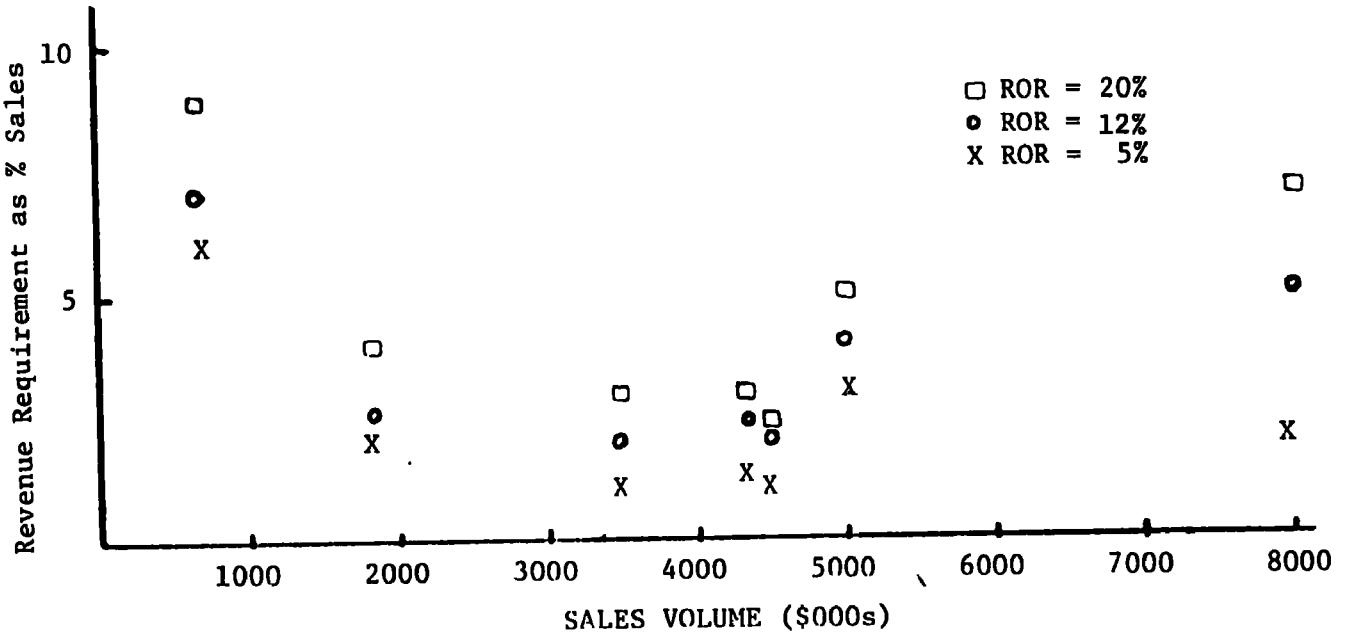
TABLE V-1

REVENUE REQUIRED BY DISCOUNT RATE
($000s)

	Discount Rate				
	(1) 12%	(2) 5%		(3) 20%	
	$	$	% Change	$	Change
Revenue Required	5	3	-40%	7	133 %
	39	30	-23	52	73
	75	52	-31	113	117
	89	59	-22	121	75
	108	78	-28	156	100
	173	118	-32	258	119
	178	130	-27	255	96
	434	300	-31	643	114

FIGURE V-1

REVENUE REQUIREMENT AS PERCENT OF SALES
BY ROR FOR SAMPLE PLANTS



constant for most sample plants, a decrease of 25%. There is more variation in the change of requirements from 12% to 20%, the average being an increase of 120%.

Figure V-2 shows that there is relatively little variation in the revenue requirement as a percent of sales due to ROR target. The requirement seems to be higher for either plants of smallest size or after very large plants with high expenditures, but even these requirements are less than 10% of sales. The bulk of the increases in revenue to maintain target ROR are within the 1-5% range; on the average, they differ 1% point by ROR scenario. Therefore the economic impact assessment is insensitive to the return on investments.

C. COST VARIATIONS FROM PLANT TO PLANT

In any study of this type, the costs of compliance estimated by the technical contractor will overstate or understate the costs applicable to an individual plant by virture of plant-specific conditions. The technical contractor indicated that cost estimates could vary for an individual plant between 75% and 150% of the costs for the control options presented in Chapter III. Sources of the cost difference could include usable treatment in place, land availability, cost of controls and additional plant-specific conditions which apply. The cost of compliance is based upon land cost/acre and this cost will vary considerably depending upon the plant location (see responses to Question 7f in Appendix C). Those plants with lower costs will be less severely impacted by the alternatives studied. In addition to the understatement of compliance cost caused by EPA regulations on hazardous waste, there could be plant-specific conditions (e.g., terrain) which contribute to higher costs. Plants with higher costs will be more severely impacted by the regulation.

D. FUTURE GROWTH IN DEMAND

If the future growth forecast for railroad ties and timbers does not materialize or if the rate of decline in poles is greater than forecast, the number of potential closure candidates will increase. If, on the

other hand, demand growth is greater by virtue of a strong housing market growth and accellerated repair of railroads, then the number of plant closures will be fewer than indicated. This happens because the supply/demand balance is such that high cost plants (including plants impacted by the regulation) determine price and therefore can recover costs of pollution control investment.

E. LOCAL CONDITIONS OF IMPACTED PLANTS

The analysis of plant closures in Chapter IV is subject to the limitations of any plant closure analysis (described in Chapter IV). In addition, local market conditions of some impacted plants will determine to a significant extent whether a plant will shut down rather than comply with a regulation. For example, if an impacted plant were in a market area where there were virtually no competing firms, it may be able to increase its price and recover the cost of installing control equipment, limited by the cost of transportation of the closest competing firm. This would also be the case if all the plants in an area were required to make equivalent expenditures to comply with pollution control requirements. Local conditions could produce a worse impact than described in Chapter IV, if for example, most of the firms in the area are not impacted and thus the impacted plant would have very little chance in recovering costs of a pollution contol.

DRAFT

APPENDIX A

SUPPLEMENTARY DISCUSSION

1. Industry Characterization

2. Pro Forma New Source Models

3. Characteristics of Impacted and Non-Impacted Plants

DRAFT

A-1. INDUSTRY CHARACTERIZATION

(Supplement to Chapter II)

Product Diversification

It is primarily the largest companies in the industry which produce a wide range of products. Most firms in the industry operate only one plant. In these cases, the plant produces organically treated products or inorganically treated products, although some single plant firms produce both organically and inorganically treated products. Furthermore, smaller firms tend to specialize on particular preserved wood products. For example, a firm may produce only preserved railroad ties or posts or pilings or dimensional lumber. For many of the smaller firms, wood preserving is a service offered by a company in the lumber and wood products business.

Imports and Exports

Import and export statistics do not distinguish preserved wood products from other wood products. However, piling, utility poles, and railway crossties are likely to be preserved when imported or exported. Table A-1 and A-2 show U.S. imports and exports of these products for the period 1970 through 1977. Imports, primarily from Canada, have been in the range of $10 million to $15 million per year in recent years. Exports, primarily to wood poor regions such as the Middle East and Japan, have totaled $20 million to $35 million in recent years. It is estimated that 10% to 15% of the U.S. production of utility poles are exported. With this exception, imports and exports do not constitute a sizeable portion of any other preserved wood markets.

TABLE A-1

U.S. IMPORTS OF PRESERVED WOOD PRODUCTS[1]

	Timber, Poles, Piling, Posts, and Other Wood in the Rough	Railroad Ties		Total
	Value[2] ($1,000)	Quantity (MBF)	Value[2] ($1,000)	Value[2] ($1,000)
1970	7,733	8,418	717	8,450
1971	8,633	3,363	385	9,018
1972	9,369	7,924	757	10,126
1973	8,654	11,308	1,505	10,159
1974	15,069	13,916	2,566	17,635
1975	9,868	12,475	2,625	12,493
1976	10,615	8,164	2,314	12,929
1977	10,011	7,367	1,370	11,381

[1]U.S. import statistics do not distinguish preserved wood products from other wood products, but the products shown are predominantly preserved wood products.

[2]Values shown are f.a.s. (free alongside ship) values.

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Imports - Schedule A, Commodity by Country, FT 135.

DRAFT

TABLE A-2

U.S. EXPORTS OF PRESERVED WOOD PRODUCTS[1]

Year	Piling		Utility Line Poles		Railway Crossties & Mine Ties-Softwood		Railway Crossties & Mine Ties-Hardwood		Total
	Quantity (LFT)	Value[2] ($1,000)	Quantity (Number)	Value[2] ($1,000)	Quantity (MBF)	Value[2] ($1,000)	Quantity (MBF)	Value[2] ($1,000)	Value[2] ($1,000)
1970	5,055,702	1,935	160,526	5,526	4,052	353	11,626	2,065	9,879
1971	3,119,931	1,646	71,717	2,385	4,343	509	7,486	1,320	5,860
1972	2,231,276	1,355	102,869	3,935	6,027	1,131	11,568	1,937	8,358
1973	3,210,603	1,931	151,661	6,631	4,209	631	4,979	858	10,051
1974	7,802,427	5,730	169,602	12,163	33,113	3,900	21,617	3,977	25,770
1975	4,104,573	4,090	202,012	15,872	28,224	3,196	47,319	9,636	32,794
1976	2,599,684	2,251	298,439	16,350	15,903	1,859	15,003	3,242	23,702
1977	3,096,484	3,124	250,936	16,708	9,355	1,015	9,855	2,423	23,270

[1]U.S. export statistics do not separate preserved wood products from other wood products, but the products shown are predominantly preserved wood products.

[2]Values shown are f.a.s. (free alongside ship) values at U.S. port.

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Exports - Schedule B, Commodity by Country, FT 410.

DRAFT

DRAFT

A-2. PRO-FORMA NEW SOURCE MODELS

DRAFT

TABLE A-3

PLANT A-1

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 2 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $2,165,000 (1978)

Location: South Central

Production: 2000 cubic feet per charge; 30 hours per charge (Boultonizing) 3 shifts per day, 300 days per year.

Product: 960,000 cubic feet per year of Railroad Ties

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$2.15	1.0	2.15	2,064
Creosote	Gallons	$0.70	1.0	0.70	672
Total Raw Materials				2.85	2,736
Processing:					
Labor, Operating	Man hours	$6.00		0.324	311
Labor, Maintenance	Man hours	$6.50		0.090	86
Maintenance Supplies				0.090	86
Consumable Supplies				0.046	46
Fuel and Power				0.135	132
Plant Overhead	50% of Labor			0.207	199
Taxes and Insurance	4% of Capital			0.090	87
Total Processing				0.982	943
Total Cost, F.O.B. Plant				3.832	3,683

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

TABLE A-4

PLANT A-2

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 5 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $4,557,000 (1978)

Location: South Central

Production: 2000 cubic feet per charge; 30 hours per charge (Boultonizing) 3 shifts per day, 300 days per year.

Product: 2,400,000 cubic feet per year of Railroad Ties

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$2.15	1.0	2.15	5,160
Creosote	Gallons	$0.70	1.0	0.70	1,680
Total Raw Materials				2.85	6,840
Processing:					
Labor, Operating	Man hours	$6.00	0.012	0.324	778
Labor, Maintenance	Man hours	$6.50	0.003	0.090	216
Maintenance Supplies				0.090	216
Consumable Supplies				0.046	110
Fuel and Power				0.135	326
Plant Overhead	50% of Labor			0.207	497
Taxes and Insurance	4% of Capital			0.075	182
Total Processing				0.967	2,325
Total Cost, F.O.B. Plant				3.817	9,165

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

TABLE A-5

PLANT B-1

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 2 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $2,165,000 (1978)

Location: South Central

Production: 2000 cubic feet per charge; 16 hours per charge (Steaming) 3 shifts per day, 300 days per year.

Product: 1,800,000 cubic feet per year of Southern pine poles

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$3.00	1.0	3.00	5,400
Pentachlorophenol	Pounds	$0.42	0.5	0.21	378
Total Raw Materials				3.21	5,778
Processing:					
Labor, Operating	Man hours	$6.00		0.173	311
Labor, Maintenance	Man hours	$6.50		0.048	86
Maintenance Supplies				0.048	86
Consumable Supplies				0.024	46
Fuel and Power				0.072	132
Plant Overhead	50% of Labor			0.111	199
Taxes and Insurance	4% of Capital			0.048	87
Total Processing				0.524	947
Total Cost, F.O.B. Plant				3.734	6,725

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

TABLE A-6

PLANT B-2

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 5 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $4,557,000 (1978)

Location: South Central

Production: 2000 cubic feet per charge; 16 hours per charge (Steaming) 3 shifts per day, 300 days per year.

Product: 4,500,000 cubic feet per year of Southern pine poles

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$3.00	1.0	3.00	13,500
Pentachlorophenol	Pounds	$0.42	0.5	0.21	945
Total Raw Materials				3.21	14,445
Processing:					
Labor, Operating	Man hours	$6.00		0.173	778
Labor, Maintenance	Man hours	$6.50		0.048	216
Maintenance Supplies				0.048	216
Consumable Supplies				0.024	110
Fuel and Power				0.072	326
Plant Overhead	50% of Labor			0.111	497
Taxes and Insurance	4% of Capital			0.041	182
Total Processing				0.517	2,325
Total Cost, F.O.B. Plant				3.727	16,770

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

TABLE A-7

PLANT C-1

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 2 cylinders, each 7' diameter x 130'long, 5000 cubic feet

Capital Cost: $2,382,000 (1978)

Location: West Coast

Production: 2000 cubic feet per charge; 30 hours per charge (Boultonized) 3 shifts per day, 300 days per year.

Product: 960,000 cubic feet per year of Douglas fir poles

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$3.40	1.0	3.40	3,264
Pentachlorophenol	Pounds	$0.42	0.75	0.32	307
Total Raw Materials				3.72	3,571
Processing:					
Labor, Operating	Man hours	$6.00		0.324	311
Labor, Maintenance	Man hours	$6.50		0.090	86
Maintenance Supplies				0.090	86
Consumable Supplies				0.046	46
Fuel and Power				0.135	132
Plant Overhead	50% of Labor			0.207	199
Taxes and Insurance	4% of Capital			0.099	95
Total Processing				0.991	955
Total Cost, F.O.B. Plant				4.711	4,526

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

TABLE A-8

PLANT C-2

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 5 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $5,013,000 (1978)

Location: West Coast

Production: 2000 cubic feet per charge; 30 hours per charge (Boultonized) 3 shifts per day, 300 days per year.

Product: 2,400,000 cubic feet per year of Douglas fir poles

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$3.40	1.0	3.40	8,160
Pentachlorophenol	Pounds	$0.42	0.75	0.32	768
Total Raw Materials				3.72	8,928
Processing:					
Labor, Operating	Man hours	$6.00		0.324	778
Labor, Maintenance	Man hours	$6.50		0.090	216
Maintenance Supplies				0.090	216
Consumable Supplies				0.046	110
Fuel and Power				0.135	326
Plant Overhead	50% of Labor			0.207	497
Taxes and Insurance	4% of Capital			0.084	200
Total Processing				0.976	2,343
Total Cost, F.O.B. Plant				4.696	11,271

Source: Arthur D. Little, Inc., estimates based on industry interviews.

TABLE A-9

PLANT D-1

DRAFT

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 2 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $2,165,000 (1978)

Location: South Central

Production: 2000 cubic feet per charge; 16 hours per charge (Steaming)
3 shifts per day, 300 days per year.

Product: 1,800,000 cubic feet per year of Southern pine lumber

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$3.60	1.0	3.60	6,480
CCA	Pounds	$1.00	0.33	0.33	594
Total Raw Materials				3.93	7,074
Processing:					
Labor, Operating	Man hours	$6.00		0.173	311
Labor, Maintenance	Man hours	$6.50		0.048	86
Maintenance Supplies				0.048	86
Consumable Supplies				0.024	46
Fuel and Power				0.072	132
Plant Overhead	50% of Labor			0.111	199
Taxes and Insurance	4% of Capital			0.048	87
Total Processing				0.524	947
Total Cost, F.O.B. Plant				4.454	8,021

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

TABLE A-10

PLANT D-2

ESTIMATED OPERATING COSTS FOR THE MANUFACTURE OF PRESERVED WOOD - ORGANIC TREATMENT

Cylinder Size: 5 cylinders, each 7' diameter x 130' long, 5000 cubic feet

Capital Cost: $4,557,000 (1978)

Location: South Central

Production: 2000 cubic feet per charge; 16 hours per charge (Steaming)
3 shifts per day, 300 days per year.

Product: 4,500,000 cubic feet per year of Southern pine lumber

Item	Units	Unit Cost	Units Per Cubic Foot	Dollars Per Cubic Foot	Thousand Dollars Per Year
Raw Materials:					
Wood	Cubic feet	$3.60	1.0	3.60	16,200
CCA	Pounds	$1.00	0.33	0.33	1,485
Total Raw Materials				3.93	17,685
Processing:					
Labor, Operating	Man hours	$6.00		0.173	778
Labor, Maintenance	Man hours	$6.50		0.048	216
Maintenance Supplies				0.048	216
Consumable Supplies				0.024	110
Fuel and Power				0.072	326
Plant Overhead	50% of Labor			0.111	497
Taxes and Insurance	4% of Capital			0.040	182
Total Processing				0.516	2,325
Total Cost, F.O.B. Plant				4.446	20,010

Source: Arthur D. Little, Inc., estimates based on industry interviews.

DRAFT

A-3 CHARACTERISTICS OF IMPACTED AND NON-IMPACTED PLANTS

(Supplement to Chapter IV)

The impacted plants were compared with the balance of the industry in several areas important to determining the impact of the alternatives on the industry. Table A-11 depicts the distribution of wood preserving plants by sales level, type of preservative, and current water effluent status. As described in Chapter III, direct discharge plants predominantly use organic preservatives. Additionally, they are larger, with 55% of the direct discharge plants in the highest sales category compared with 14% of the "no discharge" plants in the organic category. Indirect discharge plants in the organic category also tend to have a higher sales volume than the average "no discharge" plant in the industry ($3.8 million versus $2.1 million).

DRAFT

TABLE A-11

SALES LEVEL AND PRESERVATIVE CATEGORY

BY CURRENT WATER EFFLUENT STATUS

Sales ($000)	Direct Discharge #	Direct Discharge %	Indirect Discharge #	Indirect Discharge %	No Discharge/ Other #	No Discharge/ Other %	Total #	Total %
ORGANIC*								
Under $300	--	--	1	3%	42	23%	43	18%
$301-$1,200	6	54%	5	13	58	32	69	29
$1,201-$2,400	1	10	4	10	26	14	31	13
$2,401-$4,800	2	18	11	29	31	17	44	19
Over $4,800	2	18	17	45	27	14	46	21
TOTAL	11	100%	38	100%	184	100%	233	100%
INORGANIC*								
Under $300	--	--	3	75%	20	34%	23	36
$301-$1,200	--	--	--	--	23	39	23	36
$1,201-$2,400	--	--	1	25	9	15	10	16
$2,401-$4,800	--	--	--	--	4	7	4	6
Over $4,800	--	--	--	--	3	5	3	6
TOTAL	--	--	4	100%	59	100%	63	100%
TOTAL								
Under $300	--	--	4	10%	62	26%	66	22
$301-$1,200	6	54%	5	12	81	33	92	31
$1,201-$2,400	1	10	5	12	35	14	41	14
$2,401-$4,800	2	18	11	26	35	14	48	17
Over $4,800	2	18	17	40	30	13	49	16
TOTAL	11	100%	42	100%	243	100%	296	100%

*Plants classified according to predominant category of preservative used.

NOTE: Totals in this and following tables may not add to number of responses (337) as some respondents did not answer every question.

This table includes three plants as "DISCHARGING PLANTS" which the EPA has learned are "No Discharge" plants.

SOURC: EPA Financial 308 Letter.

Table A-12 contains the distribution of wood preserving plants by profitability and discharge status. Indirect dischargers' profit before tax is comparable to the "no discharge" group. Direct discharge and Boulton plants, though few in number, are less profitable than all plants in their industry and other plants at comparable sales levels. A lower cash flow than average is generally associated with lower profitability.

Analysis of historic data[1] and other reports on the wood preserving industry[2] led to the conclusion that poles are a declining product. Table A-13 contains the distribution of direct and indirect discharge plants by the portion of their sales derived from treating poles. Seventeen plants that will be impacted by the BAT alternatives derive under 30% of their sales from poles while 6 plants have between 30 and 70% of their sales derived from poles. Twenty impacted plants derive over 70% of their sales from poles.

Since the name and location of respondents to the Environmental Protection Agency Financial 308 Letter were unknown in this analysis, the plant locations cannot be directly ascertained. Therefore, the origin of the predominant portion of wood treated has been used as a proxy for location. As seen in Table A-14, wood origin for discharging plants is distributed similarly to that for "no discharge" plants and it is dispersed over all regions.

---

[1] Reference 2

[2] Reference 3,4

TABLE A-12

PROFIT BEFORE TAX

BY CURRENT WATER EFFLUENT STATUS

1976 Profit Before Tax as a Percent of Sales	Steaming				Boulton		No Discharge		Total**	
	Direct		Indirect							
	#	%	#	%	#	%	#	%	#	%
Under 1%	4	58%	4	15%	3	43%	64	28%	76	28%
1% - 4%	*	*	6	23	3	43	53	23	63	23
5% - 8%	*	*	6	23	*	*	48	21	56	21
9% - 12%	*	*	8	31	*	*	34	15	45	16
Over 12%	*	*	2	8	*	*	30	13	33	12
TOTAL	7	100%	26	100%	7	100%	229	100%	273	100%

* Not broken out to prevent disclosure of confidential information.
**Includes five inorganic plants currently not in compliance with BPT.

SOURCE: Derived by Arthur D. Little, Inc., from Environmental Protection Agency Financial 308 Letter.

DRAFT

DRAFT

TABLE A-13

PORTION OF TOTAL SALES

CONTRIBUTED BY POLES AND PILINGS

IN PLANTS USING ORGANIC PRESERVATIVES*

% of Sales in Poles & Pilings	Discharging Plants		No Discharge Plants		Total	
	#	%	#	%	#	%
Under 30%	17	39%	36	32%	53	34%
31-70%	6	14	30	27	36	24
Over 70%	20	47	45	41	65	42
Total Respondents	43	100%	111	100%	154	100%

*None of the impacted plants in the inorganic category derived more than 30% of their sales from poles.

SOURCE: Derived by Arthur D. Little, Inc., from Environmental Protection Agency Financial 308 Letter.

DRAFT

TABLE A-14

WOOD ORIGIN

BY CURRENT WATER EFFLUENT STATUS

	Impacted Plants		Total	
	#	%	#	%
Northeast	1	2	15	4%
Northwest	8	15	65	20
Southeast	31	57	146	45
Southwest	7	13	39	12
Midwest	4	7	40	12
Other	4	6	24	7
TOTAL	55	100%	330	100%

SOURCE: Derived by Arthur D. Little, Inc., from Environmental Protection Agency Financial 308 Letter data.

DRAFT

APPENDIX B

RESPONSES TO EPA FINANCIAL 308 SURVEY

DRAFT

RESPONSES TO EPA FINANCIAL 308 SURVEY

	#	%*
Total Mailed	601	--
Total Responses	451	--
less duplicates	27	--
Net Responses	424	87.1%
Total Applicable Responses	337	69.2%
Total Non-Applicable Responses	87	--
No Answer	150	30.8%

*Based on sum of "Total Applicable" and "No Answers" (487)

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

DRAFT

APPENDIX C

REFERENCES

DRAFT

REFERENCES

1. Revised Technical Review of Best Available Technology, Best Demonstrated Technology and Best Demonstrated Technology and Pretreatment Technology for the Timber Products Point Source Category, report to the Environmental Protection Agency, Project No. 78-052, September 1, 1978.

2. Annual Survey of Manufactures, U.S. Department of Commerce, various years.

3. The Analysis of Existing Wood Preserving Techniques and Possible Substitutes, report to the U.S. Environmental Protection Agency, Contract No. 68-01-4310, The MITRE Corporation, June 1977.

4. Wood Preservation Statistics, 1976, Ernst and Ernst.

5. Trend Impact Analysis Study of the Wood Preserving Market, Dow Marketing Research Reports, February 1976.

6. Economic Impact of Section 3004 of the RCRA upon Hazardous Waste Management Facilities, draft report to the U.S. Environmental Protection Agency, Office of Solid Waste, March 1978.

7. Subpart D, Standards for Owners and Operators of Treatment, Storage, and Disposal Facilities, Resource Conservation and Recovery Act, draft regulations, U.S. Environmental Protection Agency, Hazardous Waste Management Division, September 1978.

DRAFT

APPENDIX D

EPA FINANCIAL 308 SURVEY

DRAFT

308 QUESTIONNAIRE

WOOD PRESERVING

Company Code # _____
(for EPA use)

NOTE: Upon receipt by EPA, this page will be separated from the remainder of the questionnaire so that data processing and use of the data is conducted on a coded basis by its contractor.

i. Name of Plant _____

ii. Plant Site Address _____
Street

_____
City State Zip

iii. Name of Respondent* _____

iv. Address of Respondent _____
Street City State Zip

v Telephone of Respondent _____

vi. Parent Company _____

vii. Total number of wood treating wood plants owned by parent _____

viii. Is this plant engaged in treating wood products?

Yes ☐ Continue with Questionnaire

No ☐ Do not fill out the questionnaire but return after completing this page, through Question viii with a cover letter describing the nature of your business.

ix. To assert your claim of confidentiality, please check off the box corresponding to the questions, which, in the company's opinion, require confidential treatment.

1 ☐	5 ☐	10 ☐	14 ☐	18 ☐	22 ☐	26 ☐
2 ☐	7 ☐	11 ☐	15 ☐	19 ☐	23 ☐	
3 ☐	8 ☐	12 ☐	16 ☐	20 ☐	24 ☐	
4 ☐	9 ☐	13 ☐	17 ☐	21 ☐	25 ☐	

*Person to be contacted in case of questions.

DRAFT

308 QUESTIONNAIRE

WOOD PRESERVING

Company Code _____
(for EPA use)

A. GENERAL INFORMATION

1. What is the form of business organization of this plant?

   Proprietorship or Partnership ☐
   Co-op ☐
   Privately-held Corporation ☐
   Publically-held Corporation ☐

2. Is this wood treating plant a stand-alone operation or part of a multi-plant complex at this location?

   Stand-alone ☐
   Multi-plant complex ☐

3. Approximately what percent of total sales at this complex or plant was from wood treating in FY 1976? _____%

4. Is this plant at an urban, suburban, or rural location?

   Urban ☐
   Suburban ☐
   Rural ☐

5. What year did the wood treating plant begin operation? _____

DRAFT

B. EFFLUENT INFORMATION

6. How does this plant dispose of liquid process waste?

   a. Discharge into navigable water ☐
   b. Discharge into municipal sewer ☐
   c. Disposed on plant site ☐
   d. Disposed off plant site ☐
   e Process waste is recycled (no discharge) ☐
   f. This plant does not generate liquid process waste ☐
   g. Other ☐ Please specify _____

   IF THE ANSWER TO QUESTION 6 IS (c), (d), (e), OR (f), YOU MAY OMIT ANSWERS TO THE FOLLOWING QUESTIONS

   7, 10, 20, 21b, 22, 25

7.a If you do not discharge liquid *process waste* into a municipal sewer, do you have the option to connect?

   Yes ☐ No ☐ Don't Know ☐

   b. If you do have the option to connect to a municipal sewer, what is the initial capital investment cost?

   $ _____ Don't Know ☐

   c. If you discharge any wood treating *process waste* into a sewer system, on what basis are your sewer charges made?

   Flat annual fee ☐
   Gallon of effluent ☐
   Other ☐ Please Specify _____

   d. If you discharge into a municipal sewer, what were your total sewer charges in 1976? $ _____

   e If you discharge liquid process waste into navigable waters, do you have an *NPDES permit*?

   Yes ☐ No ☐ Don't Know ☐

   f. Do you own or have available for purchase about one acre of land at or adjacent to this facility that could be used for an effluent treatment system?

   Yes ☐ No ☐

   If yes, what is the current market value per acre? $ _____

C. SALES AND PRODUCT MIX

8. Fiscal year 1976 wood treating plant sales (thousands of dollars).

Under 70	☐	301-700	☐	1,801-2,400	☐	4,801-7,200	☐
71-155	☐	701-1,200	☐	2,401-3,200	☐	7,201-11,500	☐
156-300	☐	1,201-1,800	☐	3,201-4,800	☐	More than 11,500	☐

DRAFT

9. Which of the following product types are treated at this plant

Treated Wood Products	Treated at Plant	As a percent of Plant Sales					
		Under 10	11-30	31-50	51-70	71-90	Over 90
a. Organic (Oil or Dual Oil and Salt Treatment)							
(1) Railroad Ties	☐	☐	☐	☐	☐	☐	☐
(2) Pilings, Poles	☐	☐	☐	☐	☐	☐	☐
(3) Timber, Lumber, and Other	☐	☐	☐	☐	☐	☐	☐
b. Inorganic (Salt Based)							
(1) Pilings, Poles	☐	☐	☐	☐	☐	☐	☐
(2) Timber, Lumber, and Other	☐	☐	☐	☐	☐	☐	☐

10 a. Are any changes (other than normal business fluctuations) planned in production process or product mix?

Yes ☐ No ☐ (If No, Go to Part D)

b. Process change towards·

More Organic ☐ More Inorganic ☐

Less Organic ☐ Less Inorganic ☐

c. Product Mix Change

More Ties ☐ More Poles ☐ More Other ☐

Less Ties ☐ Less Poles ☐ Less Other ☐

d. Other, please specify nature of change _____.

D. PLANT CAPACITY AND PRODUCTION

11. What is your *peak design capacity* (or *peak capacity as modified*)? _____ cu. ft. Cubic Feet/24 hour period*

12.a. What region of the country is the origin of *most* of the wood treated at this facility?

Northeast ☐ Southeast ☐ Midwest ☐

Northwest ☐ Southwest ☐ Other ☐

b. Is the wood mostly:

Hardwood ☐ or Softwood ☐

*If unable to calculate peak (design) capacity by the formula shown in "DEFINITIONS" attach a separate sheet describing the radius and length of each cylinder.

DRAFT

13 Typical number of production days per week?

1-4 ☐ 5 ☐ 6 ☐ 7 ☐

14. Number of weeks at each shift level (total should add to 52 weeks):

No. of Weeks

a. _____ at 0 shifts (shut down or no wood preserving)

b. _____ at 1 shift

c. _____ at 2 shifts

d. _____ at 3 shifts

e. _____ at 4 shifts

52 Weeks **TOTAL OF (a) + (b) + (c) + (d) + (e)**

15. 1976 Production (Thousands of cubic feet) _____

16. Typical number of *production workers* in 1976:

1-3	☐	7-9	☐	20-34	☐	49-75	☐	100-125	☐
4-6	☐	10-19	☐	35-48	☐	76-99	☐	Over 125	☐

17. This facility is primarily engaged in (a) treating service only (TSO), and or (b) treating owned wood products for sale to others

		Approximate Percent of Sales				
		Under 10	10-25	26-50	51-75	Over 75
a.	Treating Service Only	☐	☐	☐	☐	☐
b.	Treating Owned Wood Products	☐	☐	☐	☐	☐

18. What proportion of owned wood is from company-owned timberland?

Approximate Percent of Owned Wood Supply				
None	1-24	25-49	50-74	75-100
☐	☐	☐	☐	☐

DRAFT

E. FINANCIAL STATEMENT

19. Revenue and Expenses

Check the box for each item which most closely approximates your 1976 fiscal year expenses as a percent of sales.

	Cost as a Percent of Plant Sales							
	Under 10	10-15	16-21	22-28	29-38	39-48	49-60	Over 60
a. *Wood Cost*	☐	☐	☐	☐	☐	☐	☐	☐
b. *Other Materials Cost*	☐	☐	☐	☐	☐	☐	☐	☐
c. *Payroll Cost*	☐	☐	☐	☐	☐	☐	☐	☐

	Under 1	1-2	3-5	6-8	Over 8
d. *Depreciation*	☐	☐	☐	☐	☐
	Under 10	11-15	16-25	26-30	Over 30
e. *Gross Margin*	☐	☐	☐	☐	☐
	Under 1	1-5	6-10	11-15	Over 15
f. *General and Administrative Cost*	☐	☐	☐	☐	☐
	Under 1	1-4	5-8	9-12	Over 12
g. *Interest Expense*	☐	☐	☐	☐	☐
	Under 1	1-4	5-8	9-12	Over 12
h. *Profit Before Tax*	☐	☐	☐	☐	☐
	Under 1	1-2	3-4	5-7	Over 7
i. *Profit After Tax*	☐	☐	☐	☐	☐

20. How representative was this plant's 1976 profit before tax experience versus the average for 1971-1975?

About the same ☐
Better than Average ☐
Worse than Average ☐

DRAFT

21. Factors related to Revenues and Expenses

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

	Leases/ Rental ☐	Wood Contracts ☐	Debt Payment ☐	Other* ☐
(1) Average Annual Charge:	$_____	$_____	$_____	$_____
(2) Commitment Expires:	19_____	19_____	19_____	19_____

(*if other commitments attach separate sheet)

b. What *Depreciation* Method is Used:

	Equipment	Buildings
(1) Book Basis:		
Straight-Line	☐	☐
Double-Declining Balance	☐	☐
Sum of Year's Digits	☐	☐
Other	☐	☐
(Please Specify) _____		
(2) Tax Basis:		
Straight Line	☐	☐
Double-Declining Balance	☐	☐
Sum of Year's Digits	☐	☐
Other:	☐	☐
(Please Specify) _____		

(3) Pollution Control Equipment Amortization:

Accelerated Over 5 Years ☐

Same method as other equipment ☐

22. Unusual Production Costs

Are there any circumstances peculiar to this plant which result in unusual production costs?

Yes ☐ No ☐

If Yes, please describe: _____

_____

DRAFT

23. Historical/Annual Cost of Pollution Control and Other Environmental Regulations:

	Don't Know	None	Fiscal Year Ending 1975	Fiscal Year Ending 1976
(1) Water Pollution Regulations:				
(a) Annual Operating Costs	☐	☐	$_____	$_____
(b) Annual Depreciation Charges	☐	☐	$_____	$_____
(2) Solid Waste Disposal (including waste water sludge and wood waste, contract hauling):				
(a) Annual Operating Costs	☐	☐	$_____	$_____
(b) Annual Depreciation Charges	☐	☐	$_____	$_____
(3) Other Environmental Regulations Affecting Production Processes and Production Costs (Please Specify): _____		Air ☐	OSHA ☐	
(a) Annual Operating Costs	☐	☐	$_____	$_____
(b) Annual Depreciation Charges	☐	☐	$_____	$_____
(4) Other Administrative Costs: Environmental department, research, litigation, consultants, additional administrative costs.	☐	☐	$_____	$_____

24. Value of wood treating plant Assets and Liabilities (as of the end of the most recent fiscal year).

a. Net *Fixed Assets* (Gross *Fixed Assets* less cumulative depreciation) $ _____ Don't Know ☐

b. Total Assets: (Net *Fixed Assets*, Cash receivables, inventory, other assets) $ _____ Don't Know ☐

c. What was the value of this wood treating plant's accounts receivable? $ _____

d. What was the value of this wood treating plant's accounts payable? $ _____

e. Current Plant Debt (i.e., debt maturing in current year or payable on demand). $ _____

f. Long-Term Plant Debt (debt maturing beyond the current year [1977]) $ _____

g. Total Plant Liabilities (long-term debt, accounts payable, deferred taxes, other debt, etc.) $ _____

DRAFT

25. Capital Investment Criteria for the Plant

a. What investment criteria do you use?

Return on Investment (ROI) ☐
Payback ☐
Discounted Cash Flow ☐
Other ☐

b. If you use return on investment criteria:

(1) What is the target internal pre-tax rate of return on capital required for investment in this plant? _____.

(2) At what ROI would you consider plant shutdown? _____.

c. If you use *payback period* criteria, what is the required payback period for investment?

_____ years

d. What is the current long term interest rate you must pay for new capital?

_____ percent per year

26. Capital Investment for the Plant (not including capitalized operating or maintenance expenses).

	(1) Total Capital Investment	(2) Water Pollution Control	(3) Other Environmental Regulation (State or Federal) Impacting Production Processes
(Actual) 1971-76	$ _____	$ _____	$ _____
(Planned) 1977	$ _____	$ _____	$ _____

DRAFT

STRAIGHT TABULATION OF WOOD PRESERVING INDUSTRY RESPONSES

A. GENERAL INFORMATION

1. What is the form of business organization of this plant?

	Number	Percent
Proprietorship or Partnership	31	9.28
Co-op	1	.30
Privately-held Corporation	230	68.86
Publically-held Corporation	72	21.56
Total	334	100.00

2. Is this wood treating plant a stand-alone operation or part of a multi-plant complex at this location?

	Number	Percent
Stand-alone	268	80.00
Multi-plant complex	67	20.00
Total	335	100.00

DRAFT

3. Approximately what percent of total sales at this complex or plant was from wood treating in FY 1976?

0	1-9%	10-19%	20-29%	30-39%	40-49%
1	21	10	5	6	5
0.297	6.231	2.967	1.484	1.780	1.484
1	21	10	5	6	5
0.297	6.231	2.967	1.484	1.780	1.484

50-59%	60-69%	70-79%	80-89%	90-99%	
17	2	15	22	58	number
5.045	0.593	4.451	6.528	17.211	percentage
17	2	15	22	58	number
5.045	0.593	4.451	6.528	17.211	percentage

100%	NO ANSWER	ROW SUMS
155	20	337
45.994	5.935	100.000
155	20	337
45.994	5.935	100.000

DRAFT

4. Is this plant at an urban, suburban, or rural location?

	Number	Percent
Urban	98	29.38
Suburban	85	25.22
Rural	153	45.40
Total	336	100.00

5. What year did the wood treating plant begin operation?

BEFORE 1930	1931-1940	1941-1950	1951-1960	
58	13	46	83	number
17.456	3.846	13.609	24.556	percentage
59	13	46	83	
17.456	3.846	13.609	24.556	

1961-1970	1971-1977	OTHER	NO ANSWER	ROW SUMS	
76	56		5	337	number
22.485	16.568		1.479	100.000	percentage
76	56		5	337	number
22.485	16.568		1.479	100.000	percentage

DRAFT

B. EFFLUENT INFORMATION

6. How does this plant dispose of liquid process waste?

	Number	Percent
Direct discharge	10	2.9
Indirect-steaming	30	7.8
Indirect-Boulton	10	2.7
Disposed on plant site	98	26.2
Disposed off plant site	18	4.8
No discharge (recycled)	126	33.8
No liquid waste	60	16.1
Inorganic	5	1.3
Other	7	1.9
No entry	9	2.4
Total	337	100.0

IF THE ANSWER TO QUESTION 6 is (c), (d), (e) OR (f), YOU MAY OMIT ANSWERS TO THE FOLLOWING QUESTIONS:

7, 10, 20, 21b, 22, 25

7.(a) If you do not discharge liquid process waste into a municipal sewer, do you have the option to connect?

	Number	Percent
Yes	2	6.67
No	19	63.33
Don't Know	9	30.00
Total	30	100.00

DRAFT

7 (b) If you do have the option to connect to a municipal sewer, what is the initial capital investment cost?

	0-5,000	5,000-10,000	10,000-15,000	15,000-20,000	20,000-25,000
number		1			
percentage		0.296			
		1			
		0.296			

	25,000-30,000	30,000-35,000	35,000-40,000	40,000-45,000	45,000-50,000	> 50,000
number						
percentage						

	DONT KNOW	NO ANSWER	KOW SUMS
number	11	325	337
percentage	3.254	96.450	100.000
	11	325	337
	3.254	96.450	100.000

7.(c) If you discharge any wood treating process waste into a sewer system, on what basis are your sewer charges made?

	Number	Percent
Flat annual fee	7	17.07
Gallon of effluent	21	51.22
Other	13	31.71
Total	41	100.00

DRAFT

7.(d.) If you discharge into a municipal sewer, what were your total sewer charges in 1976? $_____.

7.(e) If you discharge liquid process waste into navigable waters, do you have an NPDES permit?

	Number	Percent
Yes	10	62.50
No	4	25.00
Don't Know	2	12.50
Total	16	100.00

DRAFT

7. (f) Do you own or have available for purchase about one acre of land at or adjacent to this facility that could be used for an effluent treatment system?

	0-500	500-1,000	1,000-1,500	1,500-2,000	2,000-2,500	
	2	1	2	2	2	number
	0.592	0.296	0.592	0.592	0.592	percentage
	2	1	2	2	2	number
	0.592	0.296	0.592	0.592	0.592	percentage

	2,500-3,000	3,000-3,500	3,500-4,000	4,000-4,500	4,500-5,000	> 5,000	
	3			2	2	12	number
	0.888			0.592	0.592	3.846	percentage
	3			2	2	13	number
	0.888			0.592	0.592	3.846	percentage

	NO LAND	NO ANSWER	ROW SUMS	
	32	277	337	number
	9.467	81.953	100.000	percentage
	32	277	337	number
	9.467	81.953	100.000	percentage

DRAFT

C. SALES AND PRODUCT MIX

8. Fiscal year 1976 wood treating plant sales (thousands of dollars).

	Number	Percent
Under 70	25	7.86
71 - 155	25	7.86
156 - 300	29	9.12
301 - 700	48	15.09
701 - 1,200	50	15.72
1,200 - 1,800	21	6.60
1,801 - 2,400	21	6.60
2,401 - 3,200	26	8.18
3,201 - 4,800	24	7.55
4,801 - 7,200	30	9.43
7,201 - 11,500	13	4.09
More than 11,500	6	1.89
Total	318	100.00

9. Which of the following product types are treated at this plant:

a. Organic (Oil or Dual Oil and Salt Treatment)

(1) Railroad Ties	Number	Percent
Under 10	35	34.65
11 - 30	19	18.81
31 - 50	7	6.93
51 - 70	10	9.90
71 - 90	10	9.90
Over 90	20	19.80
Total	101	100.00

DRAFT

(2) Pilings, Poles	Number	Percent
Under 10	23	15.43
11 - 30	30	20.13
31 - 50	21	14.10
51 - 70	15	10.07
71 - 90	25	16.78
Over 90	35	23.49
Total	149	100.00

(3) Timber, Lumber, and Other	Number	Percent
Under 10	64	30.77
11 - 30	48	23.07
31 - 50	33	15.86
51 - 70	14	6.73
71 - 90	19	9.13
Over 90	30	14.42
Total	208	100.00

9b. Inorganic (Salt Based)

(1) Pilings, Poles	Number	Percent
Under 10	33	70.21
11 - 30	11	23.40
31 - 50	0	.00
51 - 70	0	.00
71 - 90	1	2.13
Over 90	2	4.25
Total	47	100.00

(2) Timber, Lumber, and Other	Number	Percent
Under 10	13	9.92
11 - 30	26	19.85
31 - 50	13	9.92
51 - 70	6	4.58
71 - 90	14	10.68
Over 90	59	15.04
Total	131	100.00

DRAFT

	Number	Percent
9c. Other	1	100.00

10a. Are any changes (other than normal business fluctuations) planned in production process or product mix?

	Number	Percent
Yes	11	8.21
No	123	91.79
Total	134	100.00

10b. Process changes towards:

	Number	Percent
More Organic	1	10.00
Less Organic	6	60.00
More Inorganic	3	30.00
Less Inorganic	0	.00
Total	10	100.00

10c. Product Mix Change

	Number	Percent
More Ties	2	33.33
Less Ties	0	.00
More Poles	0	.00
Less Poles	0	.00
More Other	4	66.67
Less Other	0	.00
Total	6	100.00

DRAFT

D. PLANT CAPACITY AND PRODUCTION

12a. What region of the country is the origin of most of the wook treated at this facility?

	Number	Percent
Northeast	15	4.55
Northwest	65	19.75
Southeast	146	44.37
Southwest	39	11.85
Midwest	40	12.16
Other	24	7.29
Total	329	100.00

12b. Is the wood mostly:

	Number	Percent
Hardwood	62	18.84
Softwood	267	81.16
Total	329	100.00

13. Typical number of production days per week?

	Number	Percent
1 - 4 days	32	9.79
5 days	252	77.06
6 days	26	7.95
7 days	17	5.20
Total	327	100.00

DRAFT

14. Number of weeks at each shift level (total should add to 52 weeks):
at 0 shifts (shut down or no wood preserving)

0-9	10-19	20-29	30-39	
281	12	10	6	number
83.136	3.550	2.959	1.775	percentage
281	12	10	6	number
83.136	3.550	2.959	1.775	percentage

40-49	50-52	POOR DATA	ROW SUMS	
1	1	27	338	number
0.296	0.296	7.983	100.000	percentage
1	1	27	338	number
0.296	0.296	7.988	100.000	percentage

DRAFT

14. Number of weeks at each shift level (total should add to 52 weeks):
(cont)

at 1 shift

	0-9	10-19	20-29	
	96	10	17	number
	30.868	3.215	5.466	percentage
	96	10	17	number
	30.868	3.215	5.466	percentage

	30-39	40-49	50-52	ROW SUMS	
	16	19	153	311	number
	5.145	6.109	49.196	100.000	percentage
	16	19	153	311	number
	5.145	6.109	49.196	100.000	percentage

DRAFT

14. Number of weeks at each shift level (total should add to 52 weeks):
(cont)
at 2 shifts

	0-9	10-19	20-29	
	261	19	8	number
	83.923	6.109	2.572	percentage
	261	19	8	number
	83.923	6.109	2.572	percentage

30-39	40-49	50-52	ROW SUMS	
5	4	14	311	number
1.608	1.286	4.502	100.000	percentage
5	4	14	311	number
1.608	1.286	4.502	100.000	percentage

DRAFT

14. Number of weeks at each shift level (total should add to 52 weeks):
(cont) at 3 shifts

	0-9	10-19	20-29	
	231	4	5	number
	74.277	1.286	1.608	percentage
	231	4	5	number
	74.277	1.286	1.608	percentage

30-39	40-49	50-52	ROW SUMS	
5	7	59	311	number
1.608	2.251	18.971	100.000	percentage
5	7	59	311	number
1.608	2.251	18.971	100.000	percentage

DRAFT

14. Number of weeks at each shift level (total should add to 52 weeks):
(cont) at 4 shifts

0-9	10-19	20-29	
307	2		number
98.714	0.643		percentage
307	2		number
98.714	0.643		percentage

30-39	40-49	50-52	ROW SUMS	
		2	311	number
		0.643	100.000	percentage
		2	311	number
		0.643	100.000	percentage

DRAFT

15. 1976 Production (Thousands of cubic feet).

	0	< 250,000	250,000- 500,000	
		120	56	number
		35.61	16.617	percentage
		120	56	number
		35.61	16.617	percentage

	500,000- 750,000	750,000- 1,000,000	> 1,000,000	NO ANSWER	
	30	17	59	55	number
	8.902	5.044	17.751	16.320	percentage
	30	17		55	number
	8.902	5.044	17.751	16.320	percentage

	ROW SUMS	
	337	number
	100.000	percentage
	337	number
	100.000	percentage

DRAFT

16. Typical number of production workers in 1976:

	Number	Percent
1 - 3	73	22.32
4 - 6	39	11.93
7 - 9	26	7.95
10 - 19	56	17.12
20 - 34	55	16.92
35 - 48	27	8.26
49 - 75	35	10.70
76 - 99	8	2.45
100 - 125	6	1.83
Over 125	2	.61
Total	327	100.00

17. This facility is primarily engaged in (a) treating service only (TSO), and/or (b) treating owned wood products for sale to others:

a. Treating Service Only	Number	Percent
Under 10	134	52.55
10 - 25	49	19.22
26 - 50	30	11.76
51 - 75	14	5.49
Over 75	28	10.98
Total	256	100.00

b. Treating Owned Wood Products	Number	Percent
Under 10	21	6.80
10 - 25	20	6.47
26 - 50	17	5.50
51 - 75	39	12.12
Over 75	212	68.61
Total	309	100.00

DRAFT

18. What proportion of owned wood is from company-owned timberland?

	Number	Percent
None	256	77.81
1 - 24	59	17.93
25 - 49	3	.91
50 - 74	2	.61
75 - 100	9	2.74
Total	329	100.00

E. FINANCIAL STATEMENT

19. Revenue and Expenses

a.

Wood Cost	Number	Percent
Under 10	17	5.67
10 - 15	10	3.34
16 - 21	10	3.34
22 - 28	15	5.02
29 - 38	49	16.39
39 - 48	59	19.73
49 - 60	69	23.08
Over 60	70	23.41
Total	299	100.00

b.

Other Materials Cost	Number	Percent
Under 10	65	21.60
10 - 15	74	24.50
16 - 21	72	23.92
22 - 28	44	14.62
29 - 38	27	8.97
39 - 48	13	4.32
49 - 60	1	.33
Over 60	5	1.66
Total	301	100.00

DRAFT

c.

Payroll Cost	Number	Percent
Under 10	103	33.66
10 - 15	102	33.23
16 - 21	45	14.71
22 - 28	36	11.76
29 - 38	13	4.24
39 - 48	4	1.30
49 - 60	1	.33
Over 60	2	.65
Total	306	100.00

d.

Depreciation	Number	Percent
Under 10	59	19.22
10 - 15	117	38.11
16 - 21	85	27.69
22 - 28	26	8.47
29 - 38	20	6.51
39 - 48	0	.00
49 - 60	0	.00
Over 60	0	.00
Total	307	100.00

e.

Gross Margin	Number	Percent
Under 10	102	33.33
10 - 15	53	17.32
16 - 21	87	28.43
22 - 28	27	8.82
29 - 38	37	12.09
39 - 48	0	.00
49 - 60	0	.00
Over 60	0	.00
Total	306	100.00

DRAFT

f. General and Administrative Cost	Number	Percent
Under 10	18	6.10
10 - 15	88	29.83
16 - 21		31.52
22 - 28	48	16.27
29 - 38	48	16.27
39 - 48	0	.00
49 - 60	0	.00
Over 60	0	.00
Total	295	100.00

g. Interest Expense	Number	Percent
Under 10	171	59.37
10 - 15	84	29.01
16 - 21	24	8.33
22 - 28	5	1.73
29 - 38	4	1.38
39 - 48	0	.00
49 - 60	0	.00
Over 60	0	.00
Total	288	100.00

h. Profit Before Taxes	Number	Percent
Under 10	68	23.53
10 - 15	83	28.72
16 - 21	61	21.11
22 - 28	46	15.92
29 - 38	31	10.73
39 - 48	0	.00
49 - 60	0	.00
Over 60	0	.00
Total	289	100.00

DRAFT

i. Profit After Tax	Number	Percent
Under 10	76	27.84
10 - 15	63	23.08
16 - 21	56	20.51
22 - 28	45	16.42
29 - 38	33	12.04
39 - 48	0	.00
49 - 60	0	.00
Over 60	0	.00
Total	273	100.00

20. How representative was this plant's 1976 profit before tax experience versus the average for 1971-1975?

	Number	Percent
About the Same	70	40.69
Better than Average	36	20.93
Worse than Average	66	38.37
Total	172	100.00

DRAFT

21. Factors related to Revenues and Expenses

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

Leases/Rental

(1) Average Annual Charge: $_____

0	< 25,000	25,000-50,000	50,000-75,000	75,000-100,000	
247	68	10	4	1	number
73.077	20.118	2.959	1.183	0.296	percentage
247	68	10	4	1	number
73.077	20.118	2.959	1.183	0.296	percentage

100,000-125,000	125,000-150,000	150,000-175,000	175,000-200,000	200,000-225,000	225,000-250,000	
3	2	3				number
0.888	0.592	0.888				percentage
3	2	3				number
0.888	0.592	0.888				percentage

> 250,000	ROW SUMS	
	338	number
	100.000	percentage
	338	number
	100.000	percentage

DRAFT

21. Factors related to Revenues and Expenses
(cont)

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

Wood Contracts

(1) Average Annual Charge; $_____

	0	< 25,000	25,000-50,000	50,000-75,000	75,000-100,000
number	325	5	1		3
percentage	96.154	1.479	0.296		0.888
number	325	5	1		3
percentage	96.154	1.479	0.296		0.888

	100,000-125,000	125,000-150,000	150,000-175,000	175,000-200,000	200,000-225,000	225,000-250,000
number		1	3			
percentage		0.296	0.888			
number		1	3			
percentage		0.296	0.888			

	> 250,000	RCW SUMS
number		338
percentage		100.000
number		338
percentage		100.000

DRAFT

21. Factors related to Revenues and Expenses
(cont)

a. Fixed Costs: If the plant faces lease, rental or mortage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

(1) Average Annual Charge: Debt Payment $_____

	0	< 25,000	25,000-50,000	50,000-75,000	75,000-100,000	
	257	31	24	11	2	number
	76.036	9.172	7.101	3.254	0.592	percentage
	257	31	24	11	2	number
	76.036	9.172	7.101	3.254	0.592	percentage

100,000-125,000	125,000-150,000	150,000-175,000	175,000-200,000	200,000-225,000	225,000-250,000	
5	1	3		1		number
1.479	0.296	0.888		0.296		percentage
5	1	3		1		number
1.479	0.296	0.888		0.296		percentage

> 250,000	ROW SUMS	
3	338	number
0.888	100.000	percentage
3	338	number
0.888	100.000	percentage

DRAFT

21. Factors related to Revenues and Expenses
(cont)

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

Other

(1) Average Annual Charge: $_____

	0	< 25,000	25,000-50,000	50,000-75,000	75,000-100,000
number	333	2		1	
percentage	98.521	0.592		0.296	
number	333	2		1	
percentage	98.521	0.592		0.296	

	100,000-125,000	125,000-150,000	150,000-175,000	175,000-200,000	200,000-225,000	225,000-250,000
number						
percentage						

	> 250,000	ROW SUMS
number	2	338
percentage	0.592	100.000
number	2	338
percentage	0.592	100.000

DRAFT

21. (cont) Factors related to Revenues and Expenses

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

Leases/Rental

(2) Commitment Expires: 19_____

BEFORE 1985	1985-1995	AFTER 1995	NO ANSWER	ROW SUMS	
55	14	4	265	338	number
16.272	4.142	1.183	78.402	100.000	percentage
55	14	4	265	338	number
16.272	4.142	1.183	78.402	100.000	percentage

DRAFT

21. Factors related to Revenues and Expenses

(cont) a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

Wood Contracts

(2) Commitment Expires: 19_____

BEFORE 1985	1985-1995	AFTER 1995	NO ANSWER	ROW SUMS	
11			327	338	number
3.254			96.746	100.000	percentage
11			327	338	number
3.254			96.746	100.000	percentage

DRAFT

21. Factors related to Revenues and Expenses
(cont)

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

Debt Payment

(2) Commitment Expires: 19_____

BEFORE 1985	1985-1995	AFTER 1995	NO ANSWER	ROW SUMS	
54	20	3	261	338	number
15.976	5.917	0.888	77.219	100.000	percentage
54	20	3	261	338	number
15.976	5.917	0.888	77.219	100.000	percentage

DRAFT

21. Factors related to Revenues and Expenses
(cont)

a. Fixed Costs: If the plant faces lease, rental or mortgage commitments beyond 1976, (for buildings or equipment), indicate the average annual charges and the year the commitments expire.

(2) Commitment Expires: Other 19_____

	BEFORE 1985	1985-1995	AFTER 1995	NO ANSWER	ROW SUMS	
	6	1		331	338	number
	1.775	0.296		97.929	100.000	percentage
	6	1		331	338	number
	1.775	0.296		97.929	100.000	percentage

DRAFT

b. What Depreciation Method is Used:

(1) Book Basis	Equipment Number	Equipment Percent	Buildings Number	Buildings Percent
Straight-Line	109	73.65	121	87.60
Double-Declining Balance	35	23.65	13	9.48
Sum of Year's Digits	2	1.34	2	1.46
Other	2	1.35	2	1.46
Total	148	100.00	137	100.00

(2) Tax Basis	Equipment Number	Equipment Percent	Buildings Number	Buildings Percent
Straight-Line	81	52.26	99	72.26
Double-Declining Balance	68	43.87	31	22.63
Sum of Year's Digits	4	2.58	4	2.92
Other	2	1.29	3	2.19
Total	155		138	100.00

(3) Pollution Control Equipment Amortization

	Number	Percent
Accelerated Over 5 Years	13	11.92
Same method as Other Equipment	96	88.08
Total	109	100.00

22. Unusual Production Costs--Are there any circumstances peculiar to this plant which result in unusual production costs?

	Number	Percent
Yes	17	9.77
No	157	90.23
Total	174	100.00

DRAFT

23. Historical/Annual Cost of Pollution Control and Other Environmental Regulations

(1) Water Pollution Regulations

a. Annual Operating Costs	Number	Percent
Don't Know	145	63.60
None	83	36.40
Total	228	100.00

b. Annual Depreciation Charges	Number	Percent
Don't Know	125	57.07
None	94	42.93
Total	219	100.00

(2) Solid Waste Disposal (including waste water sludge and wood waste, contract hauling)

a. Annual Operating Costs	Number	Percent
Don't Know	134	56.07
None	105	43.93
Total	239	100.00

b. Annual Depreciation Charges	Number	Percent
Don't Know	126	51.63
None	118	48.37
Total	242	100.00

(3) Other Environmental Regulations Affecting Production Processes and Production Costs

	Number	Percent
Air	49	40.83
OSHA	33	27.50
Both	38	31.67
Total	120	100.00

DRAFT

a. Annual Operating Costs	Number	Percent
Don't Know	129	64.82
None	70	35.18
Total	199	100.00

b. Annual Depreciation Charges	Number	Percent
Don't Know	122	58.94
None	85	41.06
Total	207	100.00

(4) Other Administrative Costs: Environmental department, research litigation, consultants, additional administrative costs.

	Number	Percent
Don't Know	126	59.43
None	86	40.57
Total	212	100.00

DRAFT

24. Value of wood treating plant Assets and Liabilities (as of the end of the most recent fiscal year).

a. Net FIXED ASSETS (Gross FIXED ASSETS less cumulative depreciation). $_____

0	1	2	3	4
86	42	32	15	17
25.444	12.426	9.467	4.438	5.030
86	42	32	15	17
25.444	12.426	9.467	4.438	5.030

5	6	7	8	9	1,000,000-2,000,000
11	4	7	4	3	19
3.254	1.183	2.071	1.183	1.183	5.621
11	4	7	4	3	19
3.254	1.183	2.071	1.183	1.183	5.621

> 2,000,000	NO ANSWER	KOW SUMS
7	90	337
2.071	26.627	100.000
7	90	337
2.071	26.627	100.000

DRAFT

24. (cont) Value of wood treating plant Assets and Liabilities (as of the end of the most recent fiscal year).

b. Total Assets: (Net FIXED ASSETS, Cash receivables, inventory, other assets) $_____

0	1	2	3	4
32	26	19	11	22
9.467	7.692	5.621	3.254	6.509

5	6	7	8	9	1,000,000-2,000,000
7	8	7	8	3	35
2.071	2.367	2.071	2.367	0.888	10.355

> 2,000,000	NO ANSWER	ROW SUMS
40	119	337
12.130	35.207	100.000

DRAFT

24. Value of wood treating plant Assets and Liabilities (as of the end of the (cont) most recent fiscal year).

c. What was the value of this wood treating plant's accounts receivable? $_____

< 25,000	25,000- 50,000	50,000- 75,000	75,000- 100,000
47	18	23	18
13.905	5.325	6.805	5.325

100,000- 125,000	125,000- 150,000	> 150,000	NO ANSWER	ROW SUMS
14	13	98	106	337
4.142	3.846	29.290	31.361	100.000

DRAFT

24. (cont) Value of wood treating plant Assets and Liabilities (as of the end of the most recent fiscal year).

d. What was the value of this wood treating plant's accounts payable? $_____

< 25,000	25,000-50,000	50,000-75,000	75,000-100,000
68	28	14	15
20.118	8.284	4.142	4.438
68	28	14	15
20.118	8.284	4.142	4.438

100,000-125,000	125,000-150,000	> 150,000	NO ANSWER	ROW SUMS
13	4	70	127	337
3.846	1.183	20.414	37.574	100.000
13	4	70	127	337
3.846	1.183	20.414	37.574	100.000

DRAFT

24. (cont) Value of wood treating plant Assets and Liabilities (as of the end of the most recent fiscal year).

e. Current Plant Debt (i.e., debt maturing in current year or payable on demand) $_____

< 25,000	25,000- 50,000	50,000- 75,000	75,000- 100,000
50	24	12	8
14.793	7.101	3.550	2.367
50	24	12	8
14.793	7.101	3.550	2.367

100,000- 125,000	125,000- 150,000	> 150,000	NO ANSWER	ROW SUMS
9	1	47	186	337
2.663	0.296	13.905	55.325	100.000
9	1	47	186	337
2.663	0.296	13.905	55.325	100.000

DRAFT

24. Value of wood treating plant Assets and Liabilities (as of the end of the
(cont) most recent fiscal year).

f. Long-Term Plant Debt (debt maturing beyond the current year [1977]) $_____

0	1	2	3	4
65	25	5	7	9
19.231	7.396	1.479	2.071	2.663
65	25	5	7	9
19.231	7.396	1.479	2.071	2.663

5	6	7	8	9	1,000,000-2,000,000
5		1			2
1.479		0.296			0.592
5		1			2
1.479		0.296			0.592

> 2,000,000	NO ANSWER	ROW SUMS
1	217	337
0.296	64.497	100.000
1	217	337
0.296	64.497	100.000

DRAFT

24. Value of wood treating plant Assets and Liabilities (as of the end of the
(cont) most recent fiscal year).

g. Total Plant Liabilities (long-term debt, accounts payable, deferred taxes, other debt, etc.) $_____

0	1	2	3	4
63	29	18	14	9
18.639	8.580	5.325	4.142	2.663
63	29	18	14	9
18.639	8.580	5.325	4.142	2.663

5	6	7	8	9	1,000,000-2,000,000
8	5	4	3	2	13
2.367	1.479	1.183	0.888	0.592	3.846
8	5	4	3	2	13
2.367	1.479	1.183	0.888	0.592	3.846

> 2,000,000	NO ANSWER	ROW SUMS
4	165	337
1.183	49.112	100.000
4	165	337
1.183	49.112	100.000

DRAFT

25. Capital Investment Criteria for the Plant

a. What investment criteria do you use?

	Number	Percent
Return on Investment (ROI)	75	63.02
Payback	21	17.64
Other	23	19.34
No Answer	218	
Total	337	100.00

DRAFT

26. Capital Investment Criteria for the Plant
(cont)

b. If you use return on investment criteria:

(1) What is the target internal pre-tax rate of return on capital required for investment in this plant?_____

0-4%	5-9%	10-14%	15-19%	20-24%
	2	7	11	8
	0.592	2.071	3.254	2.367
	2	7	11	8
	0.592	2.071	3.254	2.367

25-29%	30-34%	35-39%	40-44%	45-49%	50% OR GREATER
12	8	1	3		1
3.846	2.367		0.888		0.296
12	8		3		1
3.846	2.367		0.888		0.296

NOT APPLIC	NO ANSWER	ROW SUMS
265	20	333
78.402	5.917	100.000
265	20	339
78.402	5.917	100.000

DRAFT

26. Capital Investment Criteria for the Plant
(cont)

b. If you use return on investment criteria:

(2) At what ROI would you consider plant shutdown?_____

0-4%	5-9%	10-14%	15-19%	20-24%
5	8	6	6	7
1.479	2.367	1.775	1.775	2.367
5	8	6	6	7
1.479	2.367	1.775	1.775	2.367

25-29%	30-34%	35-39%	40-44%	45-49%	50% OR GREATER
		1			1
		0.296			0.296
		1			1
		0.296			0.296

NOT APPLIC	NO ANSWER	ROW SUMS
265	38	337
78.402	11.243	100.000
265	38	337
78.402	11.243	100.000

DRAFT

26. Capital Investment Criteria for the Plant
(cont)

c. If you use payback period criteria, what is the required payback period for investment?_____years

< 2 YRS	2	3	4	5
1	2	2	2	6
0.296	0.592	0.592	0.592	2.071
1	2	2	2	6
0.296	0.592	0.592	0.592	2.071

6	7	8	9	10	> 10 YRS
				3	3
				0.888	0.888
				3	3
				0.888	0.888

NOT APPLIC	NO ANSWER	ROW SUMS
317	1	337
93.787	0.296	100.000
317	1	337
93.787	0.296	100.000

DRAFT

26. Capital Investment Criteria for the Plant

(cont) d. What is the current long term interest rate you must pay for new capital?_____percent per year

< 7%	7	8	9	10
3	1	11	20	25
0.888	0.296	3.550	5.917	7.396

11	12	> 12%	NO ANSWER	ROW SUMS
3	5	17	252	337
0.888	1.479	5.030	74.556	100.000

DRAFT

26. (cont) Capital Investment for the Plant (not including capitalized operating or maintenance expenses).

(1)
Total Capital Investment

(Actual) 1971-76 $_____

ZERO ENTRY	1-250,000	250,000-500,000
	113	56
	33.432	16.568
	113	56
	33.432	16.568

500,000-750,000	750,000-1,000,000		NO ANSWER
24	34		110
7.101	10.355		32.544
24	34		110
7.101	10.355		32.544

	ROW SUMS
	337
	100.000
	337
	100.000

DRAFT

26. (cont) Capital Investment for the Plant (not including capitalized operating or maintenance expenses).

(1)
Total Capital Investment

(Planned) 1977 $_____

ZERO ENTRY	0	1	2
3	93	32	9
0.888	27.515	9.467	2.663
3	93	32	9
0.888	27.515	9.467	2.663

3	NO ANSWER	ROW SUMS
13	188	337
3.846	55.621	100.000
13	183	337
3.846	55.621	100.000

DRAFT

26. Capital Investment for the Plant (not including capitalized operating or
(cont) maintenance expenses).

(2)
Water Pollution Control

(Actual) 1971-76 $_____

ZERO ENTRY	0	1	2
	101	16	1
	29.882	4.734	0.296
	101	16	1
	29.882	4.734	0.296

3	NO ANSWER	ROW SUMS
5	215	337
1.479	63.609	100.000
5	215	337
1.479	63.609	100.000

DRAFT

26. Capital Investment for the Plant (not including capitalized operating or maintenance expenses). (cont)

(2)

Water Pollution Control

(Planned) 1977 $_____

ZERO ENTRY	0	1	2
3	67	3	
0.888	19.822	0.888	
3	67	3	
0.888	19.822	0.888	

3	NO ANSWER	ROW SUMS
1	264	338
0.296	78.107	100.000
1	264	338
0.296	78.107	100.000

DRAFT

26. Capital Investment for the Plant (not including capitalized operating or
(cont) maintenance expenses).

(3)
Other Environmental Regulation (State or Federal) Impacting Production Processes

(Actual) 1971-76 $_____

ZERO ENTRY	0	1	2
1 0.296	43 12.722	3 0.888	1 0.296
1 0.296	43 12.722	3 0.888	1 0.296

3	NO ANSWER	ROW SUMS
1 0.296	289 85.503	338 100.000
1 0.296	289 85.503	338 100.000

DRAFT

26. Capital Investment for the Plant (not including capitalized operating or maintenance expenses).
(cont)

(3)

Other Environmental Regulation (State or Federal) Impacting Production Processes

(Planned) 1977 $_____

ZERO ENTRY	0	1	2
5	26	2	
1.479	7.692	0.592	

3	NO ANSWER	ROW SUMS
1	304	338
0.295	89.941	100.000
1	304	338
0.296	89.941	100.000