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EASTERN WHITE PINE  
Timber Resources, Utilization, and Market Outlets  
in the Southern Appalachian Area

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## Summary

In the southern Appalachian area of Georgia, North Carolina, South Carolina, and Tennessee, eastern white pine sawtimber volume is estimated at 1,747 million board feet, or 8% of the U. S. total in 1962. Of the four-state volume, Georgia accounts for 14%, North Carolina 46%, Tennessee 32%, and South Carolina 8%. The annual sawtimber growth in the area is six to nine times the annual cut. In a 50-mile radius of Blairsville, Georgia, eastern white pine sawtimber is estimated at 820 million board feet, net annual growth at 54 million board feet, annual cut at 9 million board feet, and available annual volume for new uses at 45 million board feet.

The sawtimber sold by the national forests in the four-state area increased from four million board feet in 1957 to seven million board feet in 1964. However, the stumpage price declined during this period because of the lack of demand. Eastern white pine is not acceptable to the Federal Housing Administration for use as sheathing and framing material because of its lack of strength; it is used very little in pulp mills because of its low fiber yield. Major outlets for the species in the area are 2 x 4 studs, paneling, and boxes and crates. Other uses, such as furniture, flashing, and molding, are minor.

The manufacture of eastern white pine lumber in the area is besieged with many problems, such as improper drying, sap stains, loose knots, improper grading, and mixed handling with southern yellow pine. As a result, the lumber has been unable to compete successfully with ponderosa pine, which is similar in appearance and properties to eastern white pine. In order to regain the lost market, it is suggested that the producers of eastern white pine lumber in the area form a "Southern Appalachian Eastern White Pine Lumber Producers Cooperative." Major functions of this organization would be (1) to set up production standards, (2) to enforce these production standards, (3) to start a promotional campaign for the lumber, (4) to keep members informed on new wood technology, and (5) to solicit members and financial support.

Possible new outlets for eastern white pine in the area are improved solid lumber panels, overlaid lumber, irradiated wood-plastic material, and wood trusses for vacation homes. The demand for solid lumber panels has been declining. However, the commercial attractiveness of solid lumber panels

could be improved by reducing the standard thickness from three-fourths inch to one-half inch and standardizing panel dimensions. The market for solid lumber panels is estimated at over 19 million board feet in six southeastern states.

The overlaying of low-grade lumber to improve its surface characteristics and salability is a recently developed technique, and only a few lumber companies have as yet gone into commercial production. Overlaid lumber is used largely as exterior siding for houses. The amount of lumber siding used in single-family houses in the six southeastern states is estimated to be nearly 11 million square feet a year.

Irradiated wood-plastic material is a new wood product promoted by the U. S. Atomic Energy Commission for commercial utilization. After treatment, some of the physical and chemical properties are greatly improved, while the aesthetic qualities of natural wood are maintained. Eastern white pine is one of the few wood species successfully tested for use in this new process.

Eastern white pine has been used in roof trusses for vacation homes in the southern Appalachian area. The second-home market, currently 9,000 units a year in the Southeast, is increasing because of the rising level of economic prosperity in the nation.

## INTRODUCTION

Eastern white pine (Pinus strobus) was the mainstay of lumber production in the United States for over 250 years. In 1899, production reached a peak of 9.4 billion board feet a year and then declined to about one billion board feet annually in the 1950's. Current production is about 500 million to 750 million board feet a year. The production decline is attributed mainly to the exhaustion of the original forests. The supply of this timber in the future must come from second growth.

Eastern white pine grows in the Appalachian area, the New England states, the Great Lakes region, and Canada. However, this report is concerned with only the southern Appalachian area in Georgia, the Carolinas, and Tennessee because of the proximity of the area to northern Georgia. The distribution of the species in the area is confined to several close-together narrow strips.

Although the four-state southern Appalachian area is at the southern end of the species' botanical range, it contains over 8% of the eastern white pine sawtimber in the nation. Furthermore, sawtimber volume in the area is increasing at a much faster rate than in the nation as a whole.

Eastern white pine has a unique nature -- moderate in all major properties. It is moderate in strength, moderate in uniformity of texture, moderate in shrinkage, moderate in splitting tendency, and moderate in nail-holding ability. It is easy to work with, holds paint well, and dries easily. The principal uses are for containers, millwork, boot and shoe findings, patterns, and furniture. However, it is considered unsuitable in two major fields which traditionally are the major outlets for softwoods. The Federal Housing Administration rejects it as house framing material on the ground that it is lacking in strength. Pulp mills use very little eastern white pine because of its low fiber yield.

Because of the lack of demand, eastern white pine lumber has not been produced in quantity in the four-state area. In processing, the lumber generally is mixed with southern yellow pine, although the differences between the two species in terms of such characteristics as density, moisture content, texture, and resin require separate treatment.

The purpose of this report is to provide information regarding eastern white pine in the area where Georgia, North Carolina, South Carolina, and Tennessee converge. The timber resources in the area are examined first, followed by an analysis of major outlets for the species in the area. Finally, possible new outlets for the timber are recommended. The ultimate purpose is to promote new manufacturing operations in north Georgia based on utilization of eastern white pine.

## EASTERN WHITE PINE TIMBER RESOURCES IN THE SOUTHERN APPALACHIAN AREA

### Botanical Distribution by State and by County

The four-state area of Georgia, the Carolinas, and Tennessee is in the southern end of the botanical range of eastern white pine. The range extends from northeast to southwest along the North Carolina-Tennessee border and ends in extreme north Georgia near the western tip of South Carolina. It appears to follow the Appalachian Mountain ranges. (See Map 1.)

According to the latest available information, the four-state area contained about 1,747 million board feet of eastern white pine sawtimber in 1962. Of this total, Georgia accounted for 243 million board feet or 14%, North Carolina for 802 million board feet or 46%, Tennessee for 568 million board feet or 32%, and South Carolina for 134 million board feet or 8%.

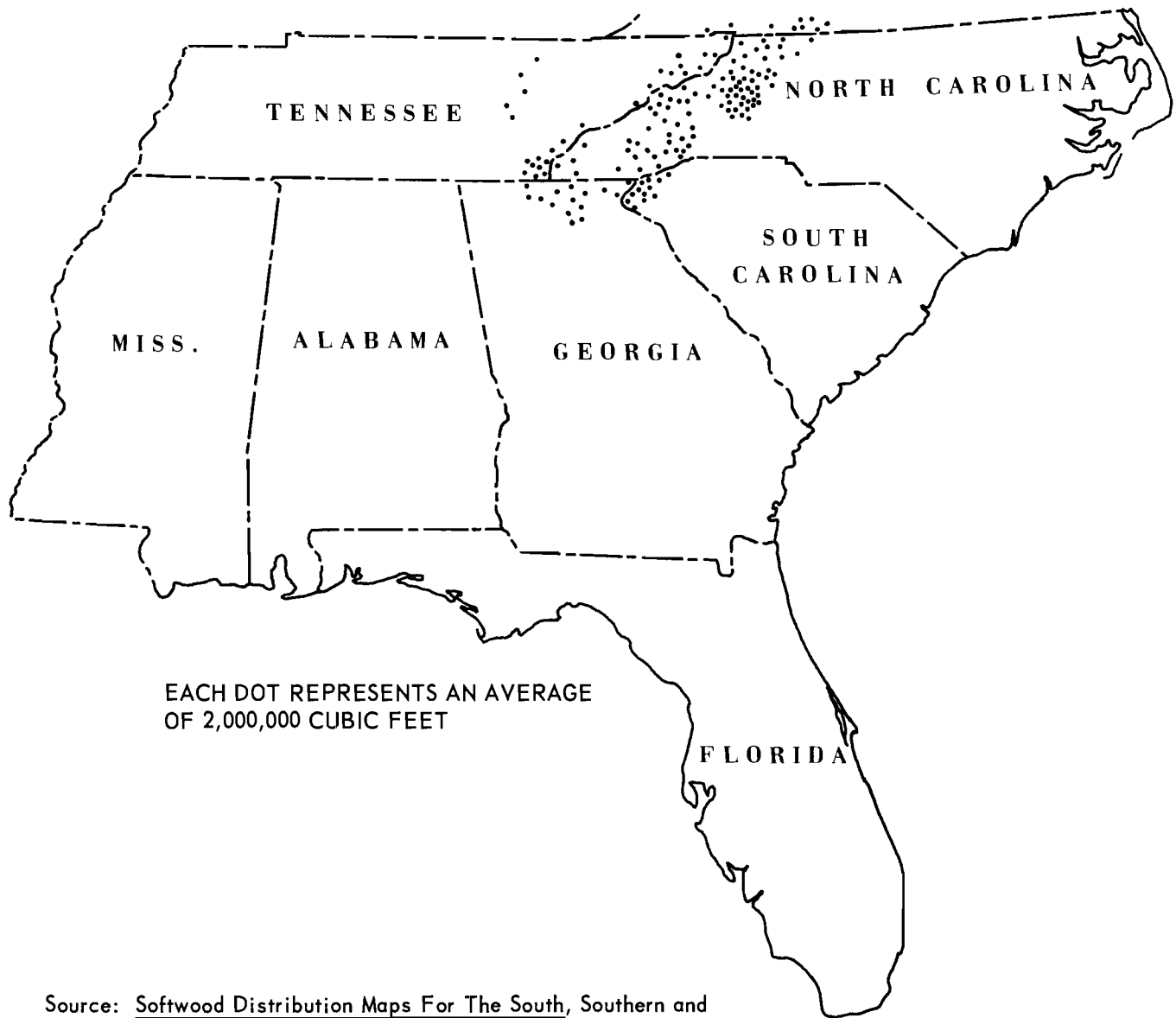
The distribution of eastern white pine sawtimber in the area is delineated in Table 1 and Map 2. The species is found in eight Georgia counties, 20 North Carolina counties, two South Carolina counties, and eight Tennessee counties. Gilmer, Lumpkin, and Union in Georgia; Buncombe, Burke, Caldwell, Henderson, and Jackson in North Carolina; Oconee in South Carolina; and Carter, Monroe, Polk, and Unicoi in Tennessee are those counties with large volumes of eastern white pine sawtimber.

### Growth-Cut Relationship

The growth-cut relationship for eastern white pine in the four-state area can be represented by available data for Georgia and for the 13 counties bordering the state lines of Georgia, North Carolina, and Tennessee. Both Georgia and the 13 counties indicate a 6.6% net annual growth for eastern white pine sawtimber. Annual cut is about 0.7% of the standing sawtimber in Georgia and 1.1% in the 13 counties. Net annual growth ranges from six to nine times the annual cut. Annual increase in sawtimber volume is 5.9% of the standing sawtimber in Georgia and 5.5% in the 13 counties. The growth-cut relationships for the two areas, in terms of both volume and percentage, are given in Table 2.

The rapid increase in eastern white pine sawtimber volume in the four-state area is further documented in Table 3, which compares U. S. Forest Service estimates for 1945 and 1962. In a period of 17 years, the volume of eastern white

MAP 1  
THE DISTRIBUTION OF EASTERN WHITE PINE (PINUS STROBUS)  
IN GEORGIA, THE CAROLINAS, AND TENNESSEE



Source: Softwood Distribution Maps For The South, Southern and Southeastern Forest Experiment Stations, Forest Service, U.S. Department Of Agriculture, 1960

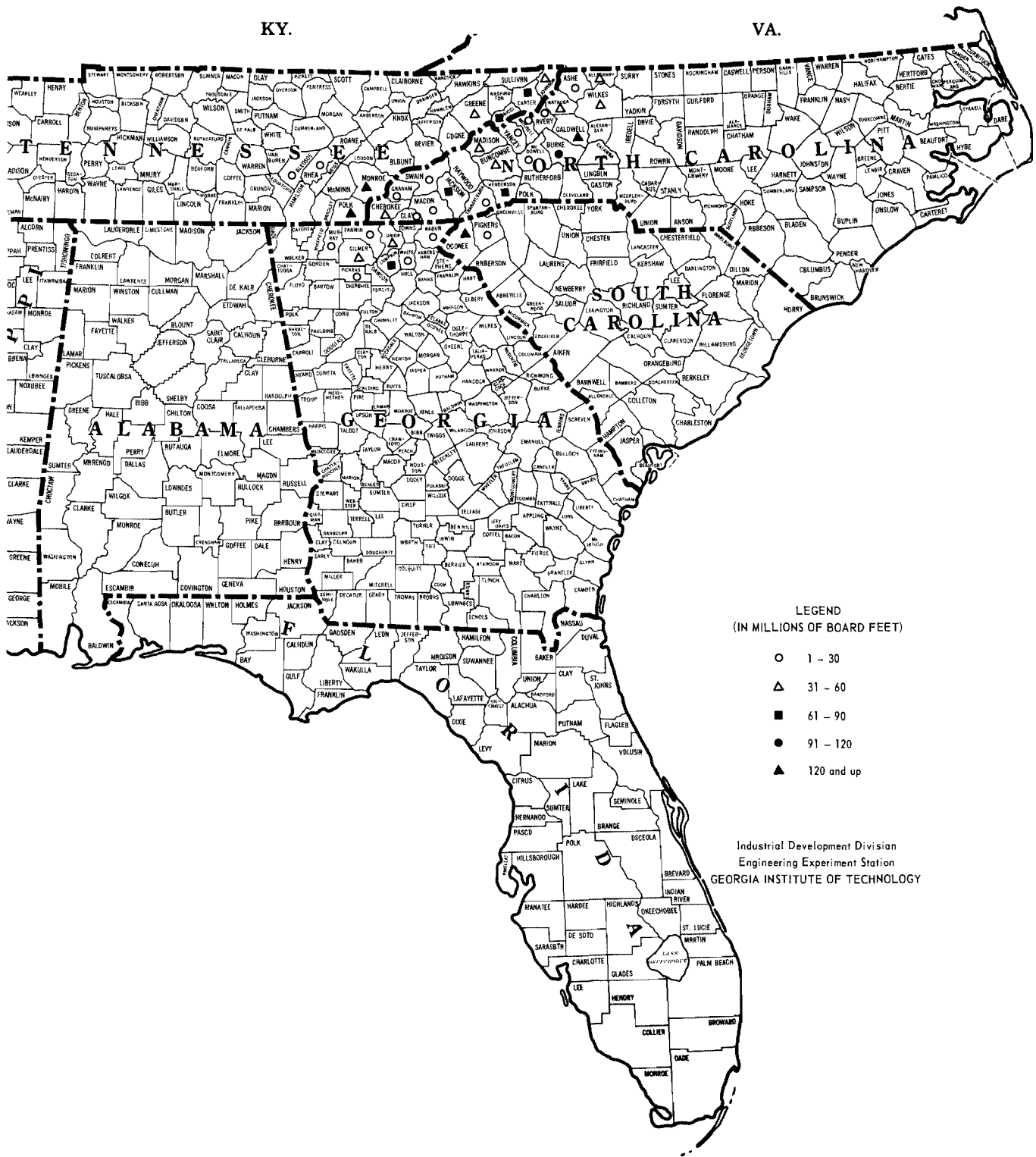
Table 1

THE DISTRIBUTION OF EASTERN WHITE PINE SAWTIMBER  
 BY COUNTY IN THE FOUR-STATE AREA, 1962  
 (in millions of board feet)

<u>Georgia</u>		<u>North Carolina</u>		<u>South Carolina</u>		<u>Tennessee</u>	
<u>County</u>	<u>Volume</u>	<u>County</u>	<u>Volume</u>	<u>County</u>	<u>Volume</u>	<u>County</u>	<u>Volume</u>
Fannin	24	Alleghany	40	Oconee	112	Bledsoe	7
Gilmer	49	Ashe	20	Pickens	22	Carter	84
Lumpkin	67	Avery	21			Greene	42
Murray	21	Buncombe	58			Johnson	42
Pickens	4	Burke	106			Monroe	159
Rabun	24	Caldwell	158			Polk	150
Union	49	Cherokee	34			Rhea	21
White	6	Clay	1			Unicoi	63
		Graham	7				
		Henderson	82				
		Jackson	68				
		McDowell	2				
		Macon	7				
		Madison	46				
		Mitchell	10				
		Swain	2				
		Transylvania	22				
		Watauga	43				
		Wilkes	46				
		Yancey	<u>29</u>				
Total	<u>243</u>		<u>802</u>		<u>134</u>		<u>568</u>

Sources: Total volumes for the states were provided by the U. S. Forest Service. The volumes in individual counties were estimated on the basis of data provided by the U. S. Forest Service and the Tennessee Valley Authority.

MAP 2  
 THE DISTRIBUTION OF EASTERN WHITE PINE SAWTIMBER  
 BY COUNTY IN THE FOUR-STATE AREA, 1962



LEGEND  
 (IN MILLIONS OF BOARD FEET)

- 1 - 30
- △ 31 - 60
- 61 - 90
- 91 - 120
- ▲ 120 and up

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Table 2

THE GROWTH-CUT RELATIONSHIP FOR EASTERN WHITE PINE SAWTIMBER  
IN GEORGIA AND IN 13 COUNTIES, 1960

<u>Eastern White Pine Sawtimber</u>	<u>Georgia<sup>a/</sup></u>		<u>13 Counties<sup>b/</sup></u>	
	<u>Million Bd. Ft.</u>	<u>Percentage</u>	<u>Million Bd. Ft.</u>	<u>Percentage</u>
Standing timber	231.3	100.0	366.5	100.0
Net annual growth	15.3	6.6	24.1	6.6
Annual cut	1.6	0.7	4.1	1.1
Annual increase	13.7	5.9	20.0	5.5

Sources: a/ Georgia's Timber, Resource Bulletin SE-1, U. S. Forest Service, Southeastern Forest Experiment Station, Asheville, North Carolina, 1963.

b/ Data provided by Division of Forestry Development, Tennessee Valley Authority, Norris, Tennessee, 1965.

Note: The 13 counties include (1) Georgia: Fannin, Murray, Rabun, Towns, and Union; (2) North Carolina: Clay, Cherokee, Graham, Jackson, Macon, and Transylvania; and (3) Tennessee: Monroe and Polk.

pine sawtimber increased by 79% in Georgia, 102% in North Carolina, 737% in South Carolina, and 133% in Tennessee, compared with a mere 43% increase in the United States as a whole. The 737% increase in South Carolina may be attributed to a sampling error in the forest survey in that state.

The fact that the rate of increase in eastern white pine sawtimber volume in the four states is two to three times that of the United States indicates a faster rate of growth for this soft-textured species in the southern climate than in the rest of the nation as well as the lack of demand for the timber in the region. The rapid growth and the lack of demand create many problems for timber management personnel in the area. A comment by the management of the Cherokee National Forest illustrates the problem:

White pine utilization is one of the big problems of the South and of the Cherokee National Forest. Most sawtimber operators cut white pine, even high-quality old growth, reluctantly. Pulp manufacturers don't want it because of the low fiber yield. Since we can't commercially thin pole stands and can only sell sawtimber with difficulty we have been worried about the place of this species in our management program.

Table 3

INCREASE IN EASTERN WHITE PINE SAWTIMBER VOLUME  
IN THE FOUR SOUTHERN APPALACHIAN STATES  
AND IN THE UNITED STATES BETWEEN 1945 AND 1962

	<u>1945</u> Million Bd. Ft. <sup>a/</sup>	<u>1962</u> Million Bd. Ft. <sup>b/</sup>	<u>Per Cent</u> <u>Increase</u>
Georgia	136	243	79
North Carolina	397	802	102
South Carolina	16	134	737
Tennessee	<u>244</u>	<u>568</u>	<u>133</u>
Four-state Total	793	1,747	120
United States	14,831	21,255	43

## Sources:

a/ Eastern White Pine, Forest Service, U. S. Department of Agriculture, Revised February 1954.

b/ Data provided by Forest Service, U. S. Department of Agriculture, Washington, D. C., 1965.

Available Sawtimber in a 50-mile Radius of Blairsville, Georgia

The area in a 50-mile radius of Blairsville, Georgia, covers roughly the whole eastern white pine botanical range in Georgia and South Carolina, seven North Carolina counties (Jackson, Transylvania, Macon, Swain, Clay, Cherokee, and Graham), and two Tennessee counties (Monroe and Polk).

Based on the timber data given in Table 1, the area within the radius is estimated to contain 827 million board feet of eastern white pine sawtimber, about 47% of that in the four-state region. Given a 6.6% net annual growth and a 1.1% annual cut (Table 2), net annual growth for the area is 55 million board feet and annual cut is 9 million board feet, leaving a favorable balance of 45 million board feet annually available for new uses. The estimates are given in Table 4.

Table 4

ESTIMATED VOLUME OF EASTERN WHITE PINE SAWTIMBER AVAILABLE  
IN A 50-MILE RADIUS OF BLAIRSVILLE, GEORGIA

<u>Eastern White Pine Sawtimber</u>	<u>Volume (board feet)</u>	<u>Percentage</u>
Standing timber	827,000,000	100.0
Net annual growth	55,000,000	6.6
Annual cut	9,000,000	1.1
Available timber for new uses	45,000,000	5.5

## CURRENT UTILIZATION OF EASTERN WHITE PINE IN THE SOUTHERN APPALACHIAN AREA

### Stumpage Sold by National Forests

A major portion of the eastern white pine timber stand in the four southern Appalachian states is under public ownership. Of the 18,100 acres of white pine type forest in Georgia, 14,400 acres (80%) is under public ownership. Of the 84,600 acres of white-red-jack pine type forest in Tennessee, 17,900 acres (21%) is under public ownership. Although the forest ownership in the Carolinas is not broken down by species, it is believed that a substantial part of the eastern white pine forest land in these two states is also under public ownership.

National forests occupy a large part of the four-state area. Sales of eastern white pine sawtimber from national forests in the area constitute a major source of supply. The total sales of eastern white pine sawtimber from the national forests in the four-state area were four million board feet in 1957 and gradually increased to seven million board feet in 1964. (See Table 5.) Each state's share of total sales varied from year to year; Georgia's share varied from one fourth to over one half annually in this period.

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Table 5  
EASTERN WHITE PINE SOLD FROM NATIONAL FORESTS  
IN THE FOUR-STATE AREA, 1957-1964  
(in board feet)

<u>Year</u>	<u>Total</u>	<u>Georgia</u>	<u>N. Carolina</u>	<u>S. Carolina</u>	<u>Tennessee</u>
1957	4,019,000	1,130,000	1,988,000	216,000	685,000
1958	5,382,000	632,000	3,344,000	85,000	1,321,000
1959	4,051,740	1,953,280	805,130	345,000	948,330
1960	4,543,700	875,220	1,688,580	149,000	1,830,900
1961	4,856,190	912,340	1,473,140	74,000	2,396,710
1962	5,989,670	2,871,210	1,124,990	79,000	1,914,470
1963	6,508,280	2,259,440	1,539,870	59,930	2,649,040
1964	7,195,690	4,447,350	1,150,880	98,000	1,499,460

Source: Data provided by the Atlanta Regional Office, Forest Service, U. S. Department of Agriculture, 1965

The stumpage price of eastern white pine has been declining over the past decade, mainly because of lack of demand. The downward trend is most obvious in Georgia, North Carolina, and Tennessee. However, the stumpage price recovered somewhat in 1964 in all the border states except Georgia. The stumpage price generally is influenced by tree size, log grade, and topography of timber stands, as well as by demand which, in turn, affects the general price trend. The stumpage prices of eastern white pine in the four states from 1957 to 1964 are given in Table 6.

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Table 6  
 AVERAGE STUMPAGE PRICES ON SALES OF EASTERN WHITE PINE SAWTIMBER  
 FROM NATIONAL FORESTS IN THE FOUR-STATE AREA, 1957-1964  
 (per thousand board feet)

<u>Year</u>	<u>Four-state Average</u>	<u>Georgia</u>	<u>North Carolina</u>	<u>South Carolina</u>	<u>Tennessee</u>
1957	\$29.78	\$33.17	\$28.43	\$35.19	\$26.44
1958	26.38	29.82	24.35	31.60	29.57
1959	29.19	33.18	21.61	33.67	25.78
1960	26.93	30.52	26.90	29.33	23.97
1961	20.07	27.81	16.98	30.32	18.72
1962	20.06	24.27	12.39	30.52	17.81
1963	18.06	24.46	12.44	31.75	15.56
1964	25.14	22.76	14.53	43.43	24.33

Source: Data provided by the Atlanta Regional Office, Forest Service, U. S. Department of Agriculture, 1965

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The yields and grades of lumber produced are influenced by log grade and diameter size of timber. Based on the logging data of the national forests in the southern Appalachian area for 1962, a comparison of grade yields of eastern white pine logs of varying grades and sizes is given in Table 7. The relationships between log grade and lumber grade and between log diameter and lumber grade are vividly demonstrated in the table. The higher log grade produces a larger percentage of higher-grade lumber and the larger log diameter also produces a greater percentage of higher-grade lumber. According to the table, 54% of the lumber produced from log grade No. 1 was grade D and Better,

68% of the lumber from log grade No. 2 and 90% of the lumber from log grade No. 3 were grades No. 3 Common and No. 4 Common, and 88% of the lumber yield from log grade No. 4 was No. 4 Common and No. 5 Common.

Table 7  
COMPARISON OF LUMBER GRADE YIELDS OF EASTERN WHITE PINE LOGS  
IN THE SOUTHERN APPALACHIAN AREA, 1962  
(grade yield in percentage)

Log Grade	Diameter Class (inches)	D and Better	1 and 2 Common	3 Common	4 Common	5 Common
1	12-15	40	24	21	15	0
	16-20	44	11	17	26	2
	21-25	58	3	11	20	8
	26+	66	*	3	21	10
	All logs	54	7	12	21	6
2	6-10	2	53	32	13	0
	11-15	10	24	37	26	3
	16-20	13	10	31	42	4
	21-25	24	2	19	51	4
	26+	31	1	5	57	6
All logs	18	10	25	43	4	
3	6-10	*	12	67	20	1
	11-15	1	5	53	40	1
	16-20	4	3	44	46	3
	21-25	6	*	22	62	10
	26+	5	0	12	79	4
All logs	3	4	46	44	3	
4	6-10	0	2	15	57	26
	11-15	1	1	5	78	15
	16-20	3	*	5	73	19
	21-25	7	2	5	62	24
	26+	10	0	6	50	34
All logs	6	1	5	65	23	

\* Less than one half of 1%.

Source: Data provided by the Atlanta Regional Office, Forest Service, U. S. Department of Agriculture, 1965

Data on the percentage of logs in each log grade in a given timber stand are not available. However, the logs selected for the grade yields study by the U. S. Forest Service were 8% in grade No. 1, 15% in grade No. 2, 65% in grade No. 3, and 11% in grade No. 4. This distribution may not be a typical sample,

but it does provide a broad indication. Based on these data, percentage yields, together with estimated f.o.b. mill prices for each lumber grade, are given in Table 8.

Table 8  
LUMBER GRADE YIELDS FROM ALL LOG GRADES AND DIAMETERS,  
AND ESTIMATED MILL PRICE OF EACH LUMBER GRADE FOR EASTERN WHITE PINE

<u>Lumber Grade</u>	<u>Yield (per cent)</u>	<u>Estimated Mill Price, 1965 (per thousand board feet)</u>
D and Better	13	\$120 - \$150
1 and 2 Common	5	70 - 120
3 Common	31	60 - 85
4 Common	44	50 - 60
5 Common	7	35 - 50

The wide price range of the first two grades is due to the fact that they actually are a combination of grades. For example, D and Better consists of the grades of D, Panel, C, and B and Better. Other factors which would influence lumber price in a certain grade are dryness, finishing, and thickness.

Stumpage sales from the national forests in the four-state area generally go to local lumber mills, lumber concentration yards, or other types of wood-using concerns. These sales are administered by the forest supervisor's office in each national forest.

#### Major Outlets

A mail survey on the utilization of eastern white pine in the four-state area was conducted in January 1965. Ninety-four questionnaires were sent to all lumber mills in those counties in the area where a concentration of eastern white pine timber exists. Of the 55 mills (58%) which responded, 32 currently are processing eastern white pine for various uses.

The 32 mills produced 26,717,000 board feet of eastern white pine lumber in 1964. Table 9, which shows major outlets for the lumber sold by the 32 mills, by type of use and by volume, should give a broad indication of how this species is being used in the four-state area. Nearly 70% of the lumber

was sold for housing uses, such as studs, roofing, sheathing, decking, framing, and paneling. The rest was for furniture, molding, boxes and crates, and miscellaneous uses. Three main uses were for 2 x 4 studs, paneling, and boxes and crates; these three outlets accounted for nearly 80% of all uses. About 4% was sold as lumber only without an indication of specific uses.

Table 9  
 MAJOR OUTLETS FOR EASTERN WHITE PINE LUMBER  
 SOLD BY 32 SURVEY RESPONDENTS IN THE FOUR-STATE AREA, 1964  
 (in thousands of board feet)

Outlets	Georgia	North Carolina	South Carolina	Tennessee	Four-State Total	
					Volume	Per Cent
Lumber						
Rough	200	800	-	75	1,075	4.0
Clear	-	107	-	-	107	0.4
Housing						
2 x 4 studs	4,650	2,715	473	1,231	9,069	33.9
Roofing	-	-	135	-	135	0.5
Sheathing	-	-	-	40	40	0.1
Decking	-	-	40	-	40	0.1
Framing	840	57	900	-	1,797	6.7
Paneling	690	6,085	100	150	7,025	26.3
Furniture	-	489	-	441	930	3.5
Molding	-	400	-	2	402	1.5
Boxes and crates	-	4,225	-	478	4,733	17.7
Miscellaneous	<u>500</u>	<u>800</u>	<u>3</u>	<u>61</u>	<u>1,364</u>	<u>5.1</u>
Total	6,880	15,708	1,651	2,478	26,717	99.8 <sup>1/</sup>

<sup>1/</sup> Does not total 100% because of rounding of figures.

Profits from different uses varied. It is reported that eastern white pine used for furniture, caskets, flashing, molding, and wall panels brings a better return than other uses. However, these uses require a higher quality of lumber. Boxes and crates and 2 x 4 studs provide high-volume outlets and do not require a high grade of lumber, but these two uses are not considered particularly lucrative. A major portion of the lumber sold in Georgia was for 2 x 4 studs, with only a small volume for other uses, pointing up the need for diversification in Georgia.

Most small mills sold their lumber locally, while larger mills sold their more diversified items within a radius of 100 miles to 150 miles. Still larger firms engaged in interstate trade, with a shipping distance of 500 miles.

### Major Problems in Processing and Marketing

In connection with the processing and marketing of eastern white pine lumber, several major problems mentioned most frequently in the survey returns are listed below.

Drying. Only about one third of the mills surveyed kiln dry their clear-grade or furniture-grade lumber, and most lower-grade lumber is sold in a green and rough condition. Two thirds of the mills surveyed do not kiln dry any of their lumber before selling.

Eastern white pine lumber inclines to split and buckle when it is improperly dried or overdried; consequently, it should be handled carefully in the kiln-drying process.

Sap stains. When the lumber is green from the saw, it tends to become blue-stained during warm weather if it is not kiln dried soon enough. Also, the dry kiln should contain very little moisture in order to avoid brown stain.

Loose knots. Knots in eastern white pine tend to loosen when the timber ages. Pruning limbs of young timber will make stems straight and lumber clear, but the cost of pruning is high.

Grading. Eastern white pine lumber sold in the four-state area generally does not get proper grading, and there is no qualified timber grader in the area. Without proper grading, the lumber cannot be accepted by the Federal Housing Administration for housing material.

Processing with other species. Eastern white pine is most frequently mixed with southern yellow pine in such operations as sawing, planing, and kiln drying in the four-state area. Since the conditions or facilities adopted for southern yellow pine may not be suitable for eastern white pine, separate handling of eastern white pine lumber is recommended.

Inadequate demand for low grades. D and Better eastern white pine lumber constitutes only 13% to 15% of the total lumber output. These high grades are used for furniture, caskets, flashing, and molding. Adequate outlets have not

been found for the remaining 80% to 85% of the lumber. The housing industry could absorb a great portion of lower-grade eastern white pine if it were properly processed.

Competition from the West. Ponderosa pine from the West Coast, because of its similarity in appearance and properties, gives stiff competition to eastern white pine. The economic advantages of large trees and large-scale production have made it possible to offer ponderosa pine lumber in the eastern market at a competitive price. If eastern white pine is to regain its share of the market, an excellent job in processing and promotion will be required.

Eastern white pine is not the only species which has various marketing and processing problems. Southern yellow pine, the dominant species in the South, has had the same problems which have besieged eastern white pine manufacturers. However, the efforts made by the producers of southern yellow pine lumber have greatly improved the standing of the species in the market place. Practices adopted by the southern yellow pine producers can be adjusted to meet the needs of eastern white pine producers in the area. Some of these practices are incorporated in a proposal for an eastern white pine lumber producers cooperative which is outlined below.

Since the four-state area is at the southern tip of the Appalachian Mountain range, it constitutes a unique geographical identity. It is suggested that producers of eastern white pine lumber in the area form a "Southern Appalachian Eastern White Pine Lumber Producers Cooperative" for the purpose of improving production and marketing practices. The organization could be initiated by a number of large producers and be joined later by others when the merits of this organization were demonstrated.

Major functions of the cooperative are suggested below:

1. To set up production standards. In order to improve the economic position of eastern white pine lumber, it is important to improve the processing of the lumber in the area. Most important is the setting up of production standards. Lumber should be properly dried, graded, handled separately from other species, made to uniform and precise standards, and properly stored for delivery.
2. To enforce production standards. Finished lumber should be inspected by the cooperative and given an inspection mark on the lumber to distinguish it from uncertified or non-membership lumber.

3. To conduct a promotional campaign. Like walnut and oak, which have been successfully promoted, eastern white pine can be effectively promoted through such means as pamphlets, research papers, and advertisements.

4. To keep members informed on new developments. The cooperative can serve as a medium for providing market news to its members, as well as for informing them about any development in the woodworking field related to eastern white pine.

5. To solicit members and financial support. The cooperative should enlarge its membership annually in order to increase its effectiveness. Membership fee may be levied on the basis of volume sold.

## POSSIBLE NEW OUTLETS FOR EASTERN WHITE PINE IN THE FOUR-STATE AREA

### Improved Solid Lumber Panels

The national trend in new houses is toward more space, more comforts, and more luxuries. Dens, family rooms, or recreation rooms have become more common in recent years. As a result, the demand for wood panels in new houses has increased.

Three major types of wood panels used in housing are plywood, solid lumber, and factory pre-assembled panels. The demand for plywood and factory pre-assembled panels is rising, while the demand for solid lumber panels is diminishing. Solid lumber panels generally are regarded as too heavy and too expensive and are used mainly in high-priced houses or by "do-it-yourself" builders.

In order to regain the lost market, it has been suggested that the standard thickness of solid lumber panels be reduced from three-fourths inch to one-half inch and that the panel dimensions be standardized.

For the purpose of establishing a rough estimate of the market for solid-lumber panels in new-house construction in a six-state area, several assumptions are made:

1. The standard thickness of solid lumber panels for interior walls is given as one-half inch.
2. About 50% of all new houses built in the six-state area have a den, family room, or recreation room.
3. About 50% of these dens, family rooms, or recreation rooms use wood panels as interior walls.
4. About one third of the dens, family rooms, or recreation rooms built with wood panels use solid lumber panels.
5. About 400 square feet of wall area would be required to cover an average-sized den, family room, or recreation room.
6. The volume of wood panels used for dens, family rooms, and recreation rooms in new houses is about equal to the total volume used for other rooms, such as kitchens, dining rooms, living rooms, and bedrooms.

These assumptions are based on information supplied by available trade sources. Solid lumber panels used for dens, family rooms, or recreation rooms in new houses built in the six southeastern states are estimated at 6,267,000 square feet annually. Based on a panel thickness of one-half inch, this would

be equivalent to 3,133,000 board feet. Since the volume of panels used for rooms other than dens, family rooms, or recreation rooms is assumed to be the same, the total volume of solid lumber panels used in new houses in the six southeastern states is estimated at 6,267,000 board feet annually. The details of the estimates are given in Table 10.

The volume of wood panels used for remodeling, repairing, and "do-it-yourself" uses is reported to be 650 million square feet annually in the United States. By using the census distribution of all housing units in 1960, the amount of wood panels used for remodeling, repairing, and "do-it-yourself" uses in the six southeastern states is estimated at 78 million square feet, or 12% of the U. S. total. Solid lumber panels are estimated at 26 million square feet -- one third of all wood panels. If the thickness of solid lumber panels is one-half inch, this is equivalent to 13 million board feet a year. The estimates are given in Table 11.

The combined market for solid lumber panels used in new houses and in remodeling, repairing, and "do-it-yourself" uses is estimated at 38,533,000 square feet, or 19,266,000 board feet, annually in the six southeastern states. This market can be an attractive outlet for eastern white pine panels.

#### Overlaid Lumber

Overlaying low-grade lumber with resin-treated paper or vulcanized fiber to improve its surface characteristics and salability is an important result of recent wood research. Wood siding for the exterior walls of new houses is the major outlet for overlaid lumber. Other uses include signboards, boat hulls, stadium seats, shelving, and containers.

Common-grade lumber accounts for over 80% of eastern white pine lumber output and loose knots and blue stains are common defects. The adoption of the overlaying technique for eastern white pine lumber could upgrade product quality and greatly increase its marketability in the border area. Overlaid eastern white pine lumber could be adapted successfully for use as exterior-wall siding, since extreme strength is not required and new gluing techniques have eliminated the need for superior nail-holding ability.

Table 10  
ESTIMATED ANNUAL VOLUME OF SOLID LUMBER PANELS USED IN NEW HOUSES IN SIX SOUTHEASTERN STATES

State	Est. New Houses Built (1960-1970 annual average) <sup>a/</sup>	New Houses with Den, Family Room, or Recreation Room	New Houses with Den, Family Room, or Recreation Room Built of Wood Panels	Interior Wood Panels Used in Den, Family Room, or Recreation Room (sq. ft.)	Interior Solid Lumber Panels Used in Den, Family Room, or Recreation Room (sq. ft.)	(bd. ft.)	Interior Solid Lumber Panels Used in Other Rooms (bd. ft.)
Alabama	15,000	7,500	3,750	1,500,000	500,000	250,000	250,000
Florida	85,000	42,500	21,250	8,500,000	2,833,333	1,416,666	1,416,666
Georgia	26,000	13,000	6,500	2,600,000	866,666	433,333	433,333
North Carolina	30,000	15,000	7,500	3,000,000	1,000,000	500,000	500,000
South Carolina	14,000	7,000	3,500	1,400,000	466,666	233,333	233,333
Tennessee	18,000	9,000	4,500	1,800,000	600,000	300,000	300,000
Total	188,000	94,000	47,000	18,800,000	6,266,665	3,133,332	3,133,332

a/ Economic News Notes, National Association of Home Builders, May 10, 1963.

Table 11

ESTIMATED ANNUAL VOLUME OF SOLID LUMBER PANELS USED FOR REMODELING, REPAIRING,  
AND "DO-IT-YOURSELF" USES IN SIX SOUTHEASTERN STATES

State	All Housing Units, 1960 <sup>a/</sup> (number)	Percentage of All Housing Units, 1960 (per cent)	All-Wood Panels	
			Used for Remodeling, Repairing, and "Do-it- yourself" Uses (sq. ft.)	Solid Lumber Panels Used for Remodeling, Repairing, and "Do-it-yourself" Uses (sq. ft.) (bd. ft.)
United States	58,326,357	100.00	650,000,000	216,666,667 108,333,333
Alabama	967,466	1.66	10,790,000	3,596,667 1,798,333
Florida	1,776,961	3.05	19,825,000	6,608,333 3,304,167
Georgia	1,170,039	2.00	13,000,000	4,333,333 2,166,667
North Carolina	1,322,957	2.27	14,755,000	4,918,333 2,459,167
South Carolina	678,379	1.16	7,540,000	2,513,333 1,256,666
Tennessee	1,084,365	1.86	12,090,000	4,030,000 2,015,000
Six-state Total	7,000,167	12.00	78,000,000	26,000,000 13,000,000

a/ United States Housing 1960, U. S. Department of Commerce, Bureau of the Census, Washington, D. C.

Overlaid lumber has been produced by only a small number of lumber companies in the United States to date. Although efforts to improve machinery, glue material, and overlaying material are continuing, the economic feasibility of producing overlaid lumber is already evident. Currently available machinery with a capacity of 30 lineal feet per minute may require \$40,000 investment. A high-speed machine capable of producing 200 lineal feet per minute is under development.

Production costs are estimated at \$35 to \$40 per thousand board feet for overlaying and \$85 for purchase of No. 2 or No. 3 common-grade lumber. After overlayment, it could be sold as clear-grade lumber at a price of \$145 per thousand board feet. The profit margin before taxes would be \$20 to \$25 per thousand board feet.<sup>1/</sup>

The amount of lumber siding used in single-family houses in the six southeastern states is estimated at nearly 11 million square feet annually, or 11 million board feet if lumber siding is made of one-inch thickness. (See Table 12.) In addition, there are many other possible uses for overlaid lumber.

#### Irradiated Wood-Plastic Material

Irradiated wood-plastic material is made by impregnating wood with a thermoplastic monomer and polymerizing the monomer in situ by irradiation. This treatment improves some of the physical and chemical properties while retaining the aesthetic qualities of wood.

Although the material is still under development, the potential for commercial utilization is already well known. The U. S. Atomic Energy Commission, in a large development program, has contracted with several university groups, engineering firms, and research units to do research on properties of this material, processing methods and facilities, costs and economic feasibility, and commercial uses.

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<sup>1/</sup> Tze I. Chiang, Overlaid Lumber: A Manufacturing Opportunity in Georgia, Industrial Development Division, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia, 1964.

Table 12  
ESTIMATED LUMBER SIDING USED IN SINGLE-FAMILY HOUSES  
IN SIX SOUTHEASTERN STATES, 1962

<u>State</u>	<u>Est. New Houses Built (1960-1970 annual average)<sup>a/</sup></u>	<u>Per Cent of Single- Family Houses Using Lum- ber Siding<sup>b/</sup></u>	<u>No. of Houses with Lumber Siding</u>	<u>Av. Est. Wall Area of a Single- Family House (sq. ft.)</u>	<u>Estimated Lumber Siding Used (sq. ft.)</u>
Alabama	15,000	9	1,408	1,500	2,112,000
Florida	85,000	1	850	1,500	1,275,000
Georgia	26,000	4	1,040	1,500	1,560,000
North Carolina	30,000	4	1,200	1,500	1,800,000
South Carolina	14,000	4	560	1,500	840,000
Tennessee	18,000	12	2,160	1,500	3,240,000
Total	188,000		7,218		10,827,000

Sources:

a/ Economic News Notes, National Association of Home Builders, May 10, 1963.

b/ Adapted from data supplied by Division of Forest Economics, U. S. Department of Agriculture, Washington, D. C., on the percentages of different wood sidings used in FHA-inspected, single-family houses, by geographic regions, 1962.

Eastern white pine is one of the few wood species found suitable for making irradiated wood-plastic material. Generally, softwood species give better results than hardwood species.

Properties of wood-plastic material already ascertained are as follows:

1. The appearance and texture of natural wood are maintained.
2. Hardness is greatly increased.
3. Static bending strength is greatly increased.
4. Shear strength is greatly increased.
5. Flame retardancy is greatly increased.
6. Water absorption rate is reduced.
7. Weatherability is superior to that of unmodified wood.
8. Decay resistance is increased.
9. Machinability is better than in unmodified wood.

10. Dimensional stability can be improved at high cost and loss of some of the mechanical and aesthetic properties of wood. However, an apparent improvement in dimensional stability results from the fact that wood-plastic materials have lower water absorption rates; because of this, daily variations in humidity have a less pronounced effect in typical applications such as flooring, fabricated parts for construction, seating, and sporting goods.
11. Nailability is less than in unmodified wood.
12. Moldability is less than in unmodified wood.

Other properties, such as abrasion resistance, impact resistance, acid and base resistance, and insulating and acoustic powers, have not yet been fully tested.

The commercial utilization of irradiated wood-plastic material, according to the recommendation of Arthur D. Little, Inc., should be in the field of high-unit-cost products whose raw-material cost is a small segment of the overall manufacturing cost. Potential applications are listed below:

1. Specialty flooring, such as parquet flooring, bowling alleys, and gymnasium flooring.
2. Commercial and institutional seating.
3. Fabricated units for construction, such as window sashes, window dividers, exterior doors, stair treads, and counter tops.
4. Furniture, such as desk tops, side rails for desks, veneer-type furniture, and cabinets.
5. Sporting goods, including boat furnishings, golf club heads, and gunstocks.
6. Specialty items, such as cutlery handles and salad bowls.

The investment and production costs for an irradiated wood-plastic material plant have not yet been fully determined. Many facilities and materials necessary for use in the process still have not been ascertained. However, preliminary data on investment and production costs currently may be obtained from the U. S. Atomic Energy Commission. More definite and refined data should be ready within one to two years.

#### Other Uses

Eastern white pine lumber has been made into roof trusses and sheathing for use in constructing lodges, cabins, lakeside homes, or second homes for recreational purposes. It is reported that about 80,000 vacation homes are

being built annually in the United States. In the six southeastern states, over 9,000 units are being built each year. This market could represent 330,000 board feet of roof trusses and several million board feet of roof sheathing a year. In addition, the second-home market should increase as national prosperity increases in the years to come.

Being soft and light in nature, eastern white pine can be made into chips or shavings for use as cattle bedding, poultry litter, mulch for orchards and gardens, packing and insulating material, fairground covering, and machinery display material. Wood waste, cull trees, or limbs generally are used for this purpose. The bedding and litter market can effect a considerable saving for lumber producers in the area if wood waste can be economically used.<sup>1/</sup>

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<sup>1/</sup> A list of makers of wood chipping machinery and wood shaving machinery will be provided upon request.