Proceedings of a Symposium on

YELLOW-POPLAR CONSTRUCTION LUMBER: An Emerging Development Opportunity for Southwest Virginia

October 27, 1989
Abingdon, Va.

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Proceedings of
a symposium on

YELLOW-POPLAR CONSTRUCTION LUMBER:
An Emerging Development Opportunity for
Southwest Virginia

October 27, 1989
Abingdon, Va.

Edited by
John Muench
Senior Research Scientist

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CONTENTS

Preface 1

Softwood Timber Resource and Demand Trends in North America 1
   Dr. John Muench

The Availability of Yellow-Poplar Timber 6
   Elvin Frame

Experiences in the Production and Marketing of Yellow-Poplar Construction Lumber 17
   Dr. Earl L. Deal

Sawmill Investment and Employment Requirements 29
   Jerry Haley

Requirements for Wholesale Lumber Distribution 41
   James K. (Ken) Porter

Opportunities for Distributing Yellow-Poplar Construction Lumber 49
   Thomas K. Smith

Potential Economic Impact on Region 58
   Dr. Thomas G. Johnson
A growing population and an expanding economy in the United States leave no doubt that the nation's demands for wood construction materials will continue their historic rising trends. But where will those materials come from? Softwood timber production in the South, the West and Canada can not be expanded or even sustained unless massive investments are made in forest management and the trend to withdrawing portions of the industry's raw material land base for non-commodity uses is halted.

Historically, when the available timber supply in a region was inadequate in the face of rising market demands, the forest industry moved into new regions and the market accepted timber species available in those regions. Southwest Virginia and the surrounding Central Appalachians could well be the next new producing region for construction lumber, as the presentations in these proceedings document. The industry would be based on the region's abundant yellow-poplar timber resources. But establishment of a construction lumber industry here would not be simply an extension of the existing sawmill industry. Rather, it would require new capital investments and innovations in production and marketing.

The establishment of a construction lumber industry based on yellow-poplar could be advanced if professional economic developers and forest industry leaders were made aware of the potential. That was the purpose of the symposium and that is the purpose of these proceedings. Readers are encouraged to think of the possible role they might play in creating the industry and the many jobs that would go with it. The School of Forestry and Wildlife Resources at Virginia Tech stands ready to assist in whatever way it can.

Appreciation is extended to the symposium speakers both for their presentations and for their cooperation in preparing these proceedings. Their presentations were followed by questions from the floor. Unfortunately, many of the questions were not picked up by the tape recorder and, if the speaker moved away from the podium, the responses were not recorded either.

Appreciation is also extended for the support of the Powell River Project, a cooperative research and education effort dedicated to the development of the economic resource potentials of Southwestern Virginia.

John Muench
Editor
This is the product we will be talking about. It is a 2x4 made from yellow-poplar. And this is the competition. It is a section from a 2x4 stud I bought at a building materials distributor in Christiansburg (VA) and is made from Canadian spruce. If you buy construction lumber from virtually any lumber yard in the Southeast, the home of the southern pine, you are likely to get either Canadian spruce, pine or fir. These three Canadian species are marketed as a group called spruce-pine-fir (S-P-F) and they dominate the market in this part of the country.

Reading the grade stamp here, we can see that it was graded according to the grade rules of the Council of Forest Industries of British Columbia (COFI). The stamp also shows that it is indeed the "stud" grade of S-P-F and that it was surfaced after drying at mill number 144. On the edge of the piece the words "kiln dried" are printed. And also here on the edge we have the name of the company, Clear Lake. I happen to have been in that mill in Prince George in the interior of British Columbia a few years ago. I was impressed at that time by the fast through-put of small diameter logs going mostly into 2x4's. At that time I remarked to the manager on how much the mill was dedicated to and dependent on the US housing market because it was not set up to produce much other than framing lumber.

Looking at the end of this piece, we can see the slow growth of the tree from which this stud was cut. Along the 2-inch radial line I have drawn across the end I can count 61 growth rings. The mill producing this stud will sell it for about $180 per thousand board feet or 96 cents for each 8-foot stud. That price must cover the harvesting and manufacturing costs, as well as the cost of the tree that produced perhaps four to six such studs. How would you like to have invested in the seedling that grew into that tree? Yet this is typical of the timber supplying Canadian lumber mills east of the Coast Range of British Columbia. The rail transportation from Interior British Columbia to Roanoke would add another $90-95 per thousand board feet to the cost.

For the few of you here who may not be familiar with it, a thousand board feet of softwood lumber would be a pile with a volume of about 2 cubic yards. The symbol M means 1000. This probably comes from the Roman numeral for 1000. MM means one million and MMM means billion. So Mbf means 1000 board feet and MMMbf means one billion board feet.
Yellow poplar was once a prime construction material in this region and it is easy to find older homes built with it. But with the development of transportation systems and the urbanization of our population, mass markets and regional production centers for construction lumber began to develop. Concern for public safety led to the adoption of building codes, which, in turn, led to the development of grading rules for lumber. A building inspector looks for grade stamps on lumber that assure that each piece of lumber in critical applications meets at least the minimum requirements for compliance with the building code.

The softwood lumber industry, working with lumber consumers, developed a grading system based on the strength of each piece of lumber used for construction. But the hardwood lumber industry was more interested in the furniture market for its products. So the grading system for hardwood lumber is based on appearance, not strength. This has been the principal difference between the softwood and hardwood lumber industries: softwoods are graded for strength and are sold in structural lumber markets; hardwoods are graded for appearance and are used in the manufacture of furniture, cabinets, flooring and similar products.

The softwood lumber industry began in New England. Then, seeking new timber resources, its center of production moved successively to New York, Pennsylvania, the Lake States, the South, and to the Douglas-fir Region of western Oregon and Washington and Coastal British Columbia. In more recent years the industry has dispersed back to the South and eastward into the western Inland Region, Interior British Columbia and the eastern Canadian provinces. The success of the eastward dispersion has been possible largely because of the small sawmill technologies developed since 1950. Those technologies allow the processing of small diameter trees found in the South's second and third growth forests and the typically small trees found in Canada.

Table 1 shows the U.S. regional production figures and the share each region's production is of total U.S. softwood lumber consumption (exports deducted). Virtually all of the imports are from Canada.

Historically, as the market continued to grow and the timber supply in a region was fully utilized, the industry has moved into another region. And the market has always accepted the species available from new regions. This is an important point to remember.
Table 1
U.S. Regional Softwood Lumber Production and Sources of Domestic Consumption, 1988

<table>
<thead>
<tr>
<th>Region</th>
<th>Production</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MMMbf</td>
<td>%</td>
</tr>
<tr>
<td>Southern Pine</td>
<td>12.7</td>
<td>33</td>
</tr>
<tr>
<td>West Coast</td>
<td>10.0</td>
<td>26</td>
</tr>
<tr>
<td>Western Inland</td>
<td>11.4</td>
<td>30</td>
</tr>
<tr>
<td>Calif. Redwood</td>
<td>2.2</td>
<td>6</td>
</tr>
<tr>
<td>Other softwood</td>
<td>1.8</td>
<td>5</td>
</tr>
<tr>
<td>Imports</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>38.1</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: NFPA

The growth of our GNP and population assure that the demands for materials, including lumber, will continue to grow. Where will the wood materials come from? Already we are seeing timber supplies in the major softwood lumber producing regions being strained even to maintain recent lumber production levels. Let's next look at what is being said about it.

For the Southern Pine Region:

The base projections in this study show timber removals rising above net annual growth and inventories declining. The base projections of resource change mean that the South is facing a future of rising stumpage and roundwood product prices, much lower rates of growth in timber harvests, and declines in employment and wages and salaries in the forest industries.

(USDA Forest Service. 1988. The South's Fourth Forest: Alternatives for the Future)

This recently published study, The South's Fourth Forest, did not take into account losses from the industry's timber supply base on both public and private lands because of the red cockaded woodpecker and other preservationist causes.

For the Western (Coast and Inland) Regions, almost daily we read in the press or see on TV some news of the controversy involving the management of old growth timber, which provides a substantial portion of the industry's log supply. It is not only a threat for more distant years, it is an immediate problem, as shown by this:
Some log shortages have already developed and it is almost certain that shortages next year will cause more mill closures and curtailments, especially along the coast areas. With U.S. lumber consumption expected to remain at a relatively high level during 1990, a short-fall (the difference between supply and demand) may develop. ....[T]he effects of current and potential log supply shortages will impact 1990 supply problems with more severity than in 1989.

(Western Wood Products Association Economic Services Forecast, September 12, 1989)

The adoption of small sawmill technologies across Canada made possible the processing of the small boreal softwood timber east of British Columbia's Coast Range. The principal market for Canadian lumber is the U.S. Canada increased its share of the U.S. softwood lumber market from about 15 percent in 1965 to 33 percent in 1984. It has since fallen to about 28 percent. The importance of Canadian lumber and the U.S. market to that nation's economy is described in a recent cable from the U.S. embassy in Ottawa. The term "Cdols" is cablese for Canadian dollars.

Canada's softwood lumber industry is almost ninety percent (by value) export-oriented. While Canada accounted for 15 percent of world production in 1986, it accounted for half of all international trade. Total value of shipments in 1986 were Cdols 5.5 billion, of which Cdols 4.9 were exported. Both 1988 and 1987 were record years for wood exports. By volume, about 60 percent of softwood lumber is exported to the U.S. (and another 10 percent elsewhere) representing 30 percent of total U.S. consumption.

(Cable from American Embassy Ottawa, 12 June 1989)

Canada’s ability to sustain current timber harvesting rates has been questioned in that country for at least fifteen years. The cable goes on to shed doubt on Canada's ability to maintain recent levels of lumber production:

The industry has been operating on generally unsustainable yields (overharvesting). As a result, log diameters are decreasing, which increases production costs. As well, more remote sites mean higher transportation costs.

(ibid)
So it appears the lumber industry has just cause to begin considering other timber resources and other species if it wants to keep its share of the construction materials market and continue serving its established customers. Why not yellow-poplar? It is the most abundant individual hardwood timber species in North America. It is technically suitable for construction purposes, being at least as good as S-P-F. The production technology has been worked out; a grading system has been established and accepted; grading agencies have been certified to supervise application of the grading rules; the species has been accepted by the building codes; and it has been accepted for use in houses with mortgage insurance from the FHA and the VA. There is no technical or regulatory reason why yellow-poplar construction lumber cannot be produced and marketed in Virginia, in the Central Appalachians or, indeed, elsewhere in the U.S.

Today's speakers will begin with the timber resource and move through the production and distribution train to the wholesale and retail markets. Finally, we will hear of the potential economic impact the establishment of a yellow-poplar construction lumber industry could have on the Central Appalachians.

I would like to keep today's discussions as informal as possible and encourage you to ask questions as they arise in your minds. At the end of the speakers' presentations we will have an open discussion about what it might take to get a yellow-poplar construction lumber industry established in this region.
THE AVAILABILITY OF YELLOW-POPLAR TIMBER
by Elvin Frame
Supervisor, Forest Products Utilization & Marketing
Virginia Department of Forestry

Today we want to look at the amount of yellow-poplar timber in Virginia, and especially in Southwest Virginia. Although some yellow-poplar is found in pure stands, most volume is found in mixtures with other species. For this reason we will look at the data for the total land area, forest area, hardwood and softwood volumes, and then specifically at yellow-poplar data and how it fits in the resource picture.

The data will show us large amounts of yellow-poplar timber growing on the stump. Whether that volume is available for harvesting can depend on many factors. And these factors can and do change from year to year, even day to day. Generally it comes down to the buyers and managers to determine if a particular stand of timber is available. We will examine the resource and let someone, maybe some of you in the audience, determine if it's available for use.

Since timber is also part of our land resource, let's start with the land area of Virginia (Figure 1). While slight changes occur from time to time, Virginia's total land area is 99.7% of what it was in 1940. Commercial forest land makes up 61% or 15.436 million acres of the total land. This is a 7% increase over the 14.412 million acres of commercial forest land in 1940. The peak year was about 1977, when there was almost 16 million acres. Since then we have had a net loss of about 500,000 acres. Most of this loss occurred in the eastern part of the state during the 70's for agricultural use. By the year 2016 commercial forest land is projected to be about 10 million acres.

Ownership of the commercial forest land in Virginia is important to know when evaluating a certain species. Figure 2 shows this ownership in 1975 and 1985. Public ownership has changed very little. Forest industry ownership has increased slightly. The big changes have been in the farmer and miscellaneous private individual categories. Farmer ownership dropped from 6.210 to 4.164 million acres. Miscellaneous corporate ownership increased slightly, while miscellaneous private ownership increased from 4.971 to 6.147 million acres.

In some areas of the state, this change in ownership may create a change in management of the timberland and, as a result, the availability of timber. Whether this is a positive or negative change as to timber management and timber harvesting, only time will tell.
Figure 1

Land Area in Virginia

Million acres

Survey Years


Commercial Forest  All Land
Figure 2
Forest Land Ownership

Million acres

Ownership Class


1975 1985
Geographically, Figure 3 shows the location and changes in commercial forest land since 1966. Over the thirty year period the Coastal Plain has lost the most forest land, with the Southern Mountains losing the least. The Southern Piedmont gained about 6,000 acres.

Commercial forest land is defined as land capable of growing twenty (20) cubic feet of industrial wood per year. Now that we have looked at how much forest land there is, who owns it, and its general location, we need to see how much timber is growing on it. Timber resource data is generally classified as growing stock and sawtimber. Growing stock includes all desirable trees of 5.0" diameter at breast height (DBH, measured at 4.5' above ground level). Sawtimber includes trees of 9.0" and larger for softwoods and 11.0" and larger for hardwoods. We will look mainly at growing stock data and very briefly toward the end of the talk at some sawtimber data.

Looking at total growing stock volume for the state, Figure 4 shows the amount and changes over the last 40 years. All groups have increased over the years, with the soft hardwoods leading the way. Yellow-poplar is included in the soft hardwoods group and is responsible for this group's rapid increase of 94% since 1955. Hard hardwoods have increased some 54% over the same period. The basic conclusion of this data is that we have lots of wood in Virginia.

We have lots of wood in Virginia, but for how long? To maintain this supply some system is needed to manage or know just how the bank account is faring. We use growth and drain data to keep track over time of how we are managing the forest resource. Growth is the net amount of wood added each year to the inventory volume. Drain is simply how much wood is harvested each year. As long as there is a surplus of growth over drain, we generally say the resource is in good shape. Figure 5 shows just that, especially for the soft hardwoods and hard hardwoods. These two groups show a surplus of 143% and 90% respectively!

Some people think that public ownership of timberland in Virginia has a significant impact on timber supplies in the state. Table 1 shows that private ownership of land and timber volume in Virginia is the controlling factor. Look specifically at soft hardwoods, where our yellow-poplar is located: 5,392.5 million cubic feet or 90% is located on private timberlands.

In Southwest Virginia, (Table 2) the public ownership percentage of forest land is slightly higher at 15%. But 85% is still in private ownership. Soft hardwood volume amounting to 1,245.3 million cubic feet, or 89%, is in private ownership. With the continued pressure for various uses of our National Forests, don't expect much of an increase in timber harvesting on that forest land. Private ownership will continue to be the place to look for increased harvestable volumes.
Figure 3

Forest Area By Region

Million acres

<table>
<thead>
<tr>
<th>Survey Units</th>
<th>1966</th>
<th>1976</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Plain</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Southern Piedmont</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Northern Piedmont</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Northern Mtns</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Southern Mtns</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 4
Growing Stock Inventory

Billion cu. ft.

<table>
<thead>
<tr>
<th>Species Class</th>
<th>1955</th>
<th>1965</th>
<th>1975</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softwoods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft Hardwoods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard Hardwoods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11
Figure 6
Growing Stock Growth & Drain, 1985

Million cu. ft.

0 50 100 150 200 250 300 350

Softwoods  Soft Hardwoods  Hard
Species Class

Growth  Drain
Table 1
OWNERSHIP OF FOREST LAND & GROWING STOCK IN VIRGINIA

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Growing Stock (MMCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Softwd</td>
</tr>
<tr>
<td>Nat'l Forest</td>
<td>1486</td>
</tr>
<tr>
<td>Other Public</td>
<td>508</td>
</tr>
<tr>
<td>For. Industry</td>
<td>1853</td>
</tr>
<tr>
<td>Other Private</td>
<td>11588</td>
</tr>
<tr>
<td>TOTALS</td>
<td>15435</td>
</tr>
</tbody>
</table>

Table 2
OWNERSHIP OF FOREST LAND & GROWING STOCK IN SOUTHWEST VIRGINIA

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Growing Stock (MMCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Softwd</td>
</tr>
<tr>
<td>Nat'l Forest</td>
<td>405</td>
</tr>
<tr>
<td>Other Public</td>
<td>46</td>
</tr>
<tr>
<td>For. Industry</td>
<td>66</td>
</tr>
<tr>
<td>Other Private</td>
<td>2435</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2952</td>
</tr>
</tbody>
</table>

Now, let's look specifically at the yellow-poplar growing stock. Since 1955, this species in Virginia has increased from 880.7 million cubic feet to 2,851 million cubic feet in 1985 (Table 3). This generally holds true over the entire range of yellow-poplar. Approximately 776 million cubic feet or 27% of the state's volume of yellow-poplar is located in Southwest Virginia (Table 4). These figures may not reflect the impact of a new plant in the Southwest that uses only poplar. However, the data would be only a few percentage points different. A large surplus still exists by all indications.

Table 3
YELLOW POPLAR GROWING STOCK IN VIRGINIA

<table>
<thead>
<tr>
<th>Million Cubic Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
</tr>
<tr>
<td>1965</td>
</tr>
<tr>
<td>1975</td>
</tr>
<tr>
<td>1985</td>
</tr>
</tbody>
</table>
Table 4
YELLOW POPLAR GROWING STOCK IN VIRGINIA, 1985

<table>
<thead>
<tr>
<th></th>
<th>Inventory</th>
<th>Growth</th>
<th>Drain</th>
<th>Drain as % of growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>2851</td>
<td>243.6</td>
<td>100.3</td>
<td>41</td>
</tr>
<tr>
<td>SW Virginia</td>
<td>776</td>
<td>35.1</td>
<td>5.1</td>
<td>14</td>
</tr>
</tbody>
</table>

While the smaller size trees are utilized during the harvesting operations for pulpwood, waferboard, and other products, users generally are looking for larger size trees for higher value products such as veneer, grade lumber and millwork stock. Table 5 shows how much of our yellow-poplar stock is in trees 11" and 15" DBH located across the state and in Southwest Virginia. The data show that 42% of the state's yellow-poplar volume and 41% of Southwest Virginia's volume is in trees greater than 15" DBH. Three-fourths (75%) of the volume is in trees greater than 11" DBH.

Table 5
YELLOW POPLAR GROWING STOCK TREE SIZES

<table>
<thead>
<tr>
<th></th>
<th>&gt; 5.0&quot; DBH</th>
<th>&gt; 11.0&quot; DBH</th>
<th>&gt; 15.0&quot; DBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Total</td>
<td>2,851</td>
<td>2,142</td>
<td>1,208</td>
</tr>
<tr>
<td>SW Virginia Total</td>
<td>776</td>
<td>576</td>
<td>316</td>
</tr>
</tbody>
</table>

Table 6 gives a summary of the yellow-poplar data we have examined for Virginia and Southwest Virginia. One of the most important figures on the table is the 14% removals as a percentage of growth. There is a lot of yellow-poplar volume that can be used -- across the state and in Southwest Virginia. I believe we will continue to see an increased use of yellow-poplar. Maybe structural lumber will be one of those uses.

One needs to be aware that production and harvesting of hardwoods has been increasing, especially since 1984. Figure 6 shows this increase from 52 million board feet in 1984 to 93 million board feet in 1988. In 1984, the booklet, "Mountains of Hardwoods" was published in a cooperative effort by the Department of Economic Development and the Department of Forestry. I believe our efforts are reflected by the data shown in Figure 6.
Table 6
SUMMARY OF YELLOW-POPLAR GROWING STOCK DATA

<table>
<thead>
<tr>
<th></th>
<th>VA</th>
<th>SW VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Hardwood Growing Stock Volume</td>
<td>16.5</td>
<td>19</td>
</tr>
<tr>
<td>Percent of Hardwood Growing Stock Growth</td>
<td>22.4</td>
<td>26</td>
</tr>
<tr>
<td>Percent of Hardwood Growing Stock Removals</td>
<td>17.2</td>
<td>19</td>
</tr>
<tr>
<td>Removals as Percent of Growth</td>
<td>37.0</td>
<td>14</td>
</tr>
<tr>
<td>Volume &gt; 11.0&quot; DBH</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>Volume &gt; 15.0&quot; DBH</td>
<td>42</td>
<td>41</td>
</tr>
</tbody>
</table>

Figure 6
Production of Hardwood Sawtimber Products in Southwest Virginia

Source: Forest Products Tax Data, Va. Dept. of Forestry
Muench: Elvin has talked about the hardwood and the yellow-poplar resource in Virginia. But it's a very similar story in western North Carolina, eastern Tennessee, southeastern Kentucky, all through West Virginia and into Maryland. There's just a lot of yellow-poplar. So those of you who are not from Virginia, there's a parallel situation in those other states. Any questions?

**Question** regarding gypsy moth.

**Frame:** Most of the area where the gypsy moth has really devastated is at the higher elevation type areas where yellow-poplar isn't found very much. And even here in Virginia we're seeing the moth come down the mountain ranges, not in the lower areas where yellow poplar grows but possibly in the coves that go up the mountain sides. Basically its on those ridge top areas. I don't think we're going to see yellow-poplar replace oak very much maybe for one or two reasons. I don't want to get too much into silviculture here. Unless that oak is harvested and the ground is torn up -- that's how yellow-poplar gets back in. And I don't think were going to see a lot of that on those areas up there. There has to be some type of soil disturbance for yellow-poplar to get in. I don't think we'll see a whole lof of that. I think we'll see the other dominant species like hickory and dogwood and all those other shade-tolerant species replace damaged oak.
EXPERIENCES IN THE PRODUCTION AND MARKETING OF
YELLOW-POPLAR CONSTRUCTION LUMBER

by Dr. Earl L. Deal
Associate Professor, Wood & Paper Science
College of Forest Resources
North Carolina State University

Although hardwood and softwood lumber producers have been ex­periencing an excellent market for their products, those producers in North Carolina, the Southeast and Eastern United States have over the long run experienced problems selling the entire yield of those logs they saw. We all should recognize that we are also facing decreasing profit margins as we head into a slowdown in the market. Hopefully, the downturn in interest rates will bolster the housing market. However, in the long run, lumber producers must constantly be looking for methods of remaining competitive. Increased investments in manufacturing equipment yielding more and higher grade lumber per log, increased sophistication in log purchasing, increased quality control, better marketing methods and finding unique niches in the market are a few of the keys to long term survival in this increasingly competitive world wide situation.

The production and marketing of yellow-poplar 8/4 framing lumber could be one method of finding a niche in the market. It offers advantages to both hardwood and softwood producers. Reduced demand for 2B and below yellow-poplar over the years has brought about a reduction in market price and hardwood producers often have difficulty finding a sale for this part of their production. Producing framing lumber from that part of the log that normally yields lower NHLA grade material can increase the dollar returns to the mill.

The increased competition for softwood stumpage in general and southern yellow pine in the South in particular has reduced profit margins for many pine producers.

Yellow-poplar is often a part of the timber found on those tracts purchased by pine producers in the Piedmont and Upper Coastal Plain. At present, most pine producers in these areas resell these logs to hardwood mills. Often the prices received barely cover the cost of stumpage and harvesting. Thus, pine mills could reduce their raw material cost and increase their profit margins by using these yellow-poplar logs to produce framing lumber in their own mills.

Hardwood species such as yellow-poplar were commonly used in house construction from colonial times until the turn of the century. Ceiling rafters, floor joists, wall framing and exterior siding were commonly made from yellow-poplar. However, its use for this purpose decreased as its value in furniture manufacturing increased. Lower shipping costs from the West Coast and generally lower stumpage prices also helped bring about the use of softwood species
for light frame construction. Although yellow-poplar framing is not a new idea, it is new to today's lumber producers and builders.

Based on the belief that yellow-poplar framing production could help improve the competitive position of both hardwood and pine producers in North Carolina, we at NC State initiated a project in the area. This project has included the investigation and development of production methods for both hardwood and pine sawmills. The development of informational materials and promotional work with potential producers has also been part of the project.

The development of the saw-dry-rip (SDR) technology by Bob Meaglin and others at the Madison lab pointed out the potential of hardwood framing production. As some of you may know, the SDR production system is designed to overcome the inherent stresses present in hardwood logs. The key to this technology is balancing stresses and thus avoiding crook and warping. However, this system requires changes in the normal production pattern followed by most sawmills. The production of unedged flitches, drying them as such and then ripping out desired sizes is a major change in the breakdown pattern of most mills.

The basic objective of our project at NC State was to find methods of improving the competitive position of those mills now in operation. The hardwood and pine mills in our region generally follow a breakdown pattern where two-sided cants are produced on a carriage, scragg or chipping canter system. This is followed by breakdown of the cant by some type of gang resaw. Unedged flitches would have to be produced by live sawing at the headsaw. The additional time required on the carriage would reduce the production of the entire mill for most producers. As the pacesetter or limiting operation, the production of the entire mill is limited to what is done at the headsaw. Any increase in process time at this operation means a decrease in mill production. Changes in conveying, stacking and the addition of a ripping operation would also be needed. In addition, those mills having a dry kiln could have its capacity reduced because of the increased volume taken up by unedged material.

Of course, a new mill could be designed to utilize the SDR flitch system and minimize the problems mentioned above. However, producers with existing mills have been reluctant to directly adopt the unedged SDR flitch system because of the production problems. In addition, the production of hardwood framing would be only a part of the total of any given mill. This is particularly true with yellow-poplar.

Although the available inventory of yellow-poplar is high in North Carolina and the Southeast, it is scattered out in relatively small stands. Most timber sales purchased by mills contain some volume. However, very few sales in our area are purely yellow-poplar. Thus, most mills would find it difficult to justify the investment in a specialized facility based on this species alone.
With these economic and mill restrictions in mind, it was determined that a modification of the SDR process would be needed to interest producers in sawing yellow-poplar framing. Four square lumber could be sawn from the cants now being developed in the mill using a balanced stress sawing system. The key principle is balancing the growth stresses in the log. This can be accomplished with the present cant sawing system. In addition, the framing lumber can be sawn from the log center where the majority of the lower NHLA grade lumber is normally found. This would allow the sawing of any higher grade lumber from the outer quality zone of the log.

Our extension wood products group has conducted several studies with both hardwood and pine producers to determine if yellow-poplar framing production using the modified SDR system is technically and economically feasible. The remainder of this talk is a report on these feasibility studies for each type of sawmill.

**Hardwood Mill Studies**

Hardwood mills in our area are generally geared to supplying a furniture market that requires rough green lumber in random widths and rough length separation. Rosserhead debarking with primary breakdown at the headsaw, followed by a gang edger is the most common layout found in hardwood mills throughout North Carolina.

The studies conducted in hardwood mills to date have involved a comparison of yields, value and costs between the breakdown of logs into NHLA furniture grade lumber only and the production of a combination of NHLA and framing grade products. The objective in producing a combination of products has been to reduce the 2B and below grade lumber yielded at the mill, and at the same time continue producing 2A and better grade from the outside quality zone. This technique involves setting up the gangsaw to cut three 8/4 pieces from the center of each cant and NHLA grade lumber from the outside jacket.

Matched samples of logs in the 6-12 inch size classes were segregated by diameter and standard USFS log grades, with each group sawn separately on a production basis. The lumber produced from each diameter-grade group was tallied by volume in each product after air drying to 19% or less.

The total board foot yield from each log diameter class has been greater when 8/4 lumber is sawn (Figure 1). This is due to a combination of taking fewer sawdust lines and the full 8/4 volume being given to lumber that is sawn 7/4 green. The significant change was the reduction of 2B and below NHLA grade lumber when framing was sawn from the heart of the logs in all diameter classes (Figure 2). The percentage of lower grade lumber dropped from 79% to 24% when 8/4 framing was produced. The percentage of lumber in the other grades changed only slightly. This change was due more to the
Figure 1

BOARD FOOT YIELD -- NHLA ONLY VERSUS NHLA + 8/4

NHLA + 8/4
NHLA Only

Log Diameter (Inches)

Board Foot Yields

100 80 60 40 20
Figure 2

Percentage Yield NHLA Only Versus NHLA + 8/4

Percentage Yield

NHLA Only

NHLA + 8/4 Framing

Framing

1F

2A

2B

3C

Lumber Grade

FAS
increase in total board feet produced from the log than the absolute board foot yields and in some cases the actual yield in a given lumber grade increased. However, the total log yield increased more. The results of these studies show that a significant percentage of the lower grade lumber can be converted to a product that potentially has a higher value.

A comparison was made between the dollar value of logs sawn for NHLA grade lumber only and the combination of both NHLA and 8/4 framing. Prices were obtained from the Hardwood Market Report for the NHLA grades. The value of the framing lumber was established by subtracting $50.00 for drying and planing from an average price for southern yellow pine as reported in Random Lengths. Thus, the average rough-green price for 8/4 yellow-poplar framing was assumed to be $185.00 per thousand board feet. This is a conservative price when considering the range of prices for southern yellow pine and the high drying and planing cost assumed. The returns per log have been shown to increase for all diameter classes (Figure 3). We feel this is due to the significant movement of lumber from 2B and below at $155.00 to framing at $185.00 per thousand.

We have also constructed a price trade off line between the market price of green 2B and below grade 4/4 and dry grade-marked yellow-poplar framing (Figure 4). When price intercepts fall to one side or the other of a given diameter price line, it becomes more profitable to saw the product represented along the closest axis. Using the prices given before ($185 for framing and $155 for 2B) the intercept point falls closer to the combination for all diameter classes. Thus, the production of framing in combination with NHLA grade lumber would bring greater returns for all diameters. Those trade off lines for diameter classes above 12 inches are theoretical projections based on obtaining three 2 x 10 pieces from the core of each log.

These studies have shown that hardwood mills in North Carolina and other areas can increase their returns by producing 8/4 lumber in combination with NHLA products. Although logs larger than 12 inches were not included in the studies, the value of these logs should also be increased by producing the three 8/4 pieces from the lower quality core. This could also increase the total volume of framing to levels significant enough to help justify any additional investments in handling and processing equipment.

However, most hardwood mills are not geared to the construction lumber market. They do not have adequate, if any, kiln capacity, planers or precision end trimmers needed to meet the specifications of the construction market. They generally do not have the required grade stamps or personnel trained in grading framing lumber. And very few mills are familiar or have good contacts in the construction lumber market. Yellow-poplar is only one of several species sawn in hardwood mills in most areas. Thus, it is difficult for any one mill to justify the investment of time and money in the development of the entire drying, planing, grading and marketing system.
Figure 3

DOLLAR VALUES PER DIAMETER

Value of Lumber in Log (Dollars)

Log Diameter (Inches)

NHLA + 8/4

NHLA Only
Figure 4

BREAKEVEN PRICE LINES BY LOG DIAMETER

Price of Green 2B and Below ($/MBF)

Price of 8/4 Yellow Poplar Framing ($/MBF)
In our opinion, an opportunity exists for some mills to purchase rough-green 8/4 framing lumber from other mills, finish and market it with their own production. This will allow adequate quantities of each size and grade to be accumulated and investments in facilities and marketing efforts can be justified. It is also our opinion that until entrepreneurs take advantage of this opportunity of brokering, we will not see hardwood mills sawing yellow-poplar framing lumber.

**Pine Mill Studies**

Our other studies have been done with pine producers in North Carolina. These mills are finding themselves in a price squeeze. Competition for raw material has bid the general level of pine stumpage up to all time highs. The opening of new oriented strand board mills and other additions to pine utilization capacity in our area means that this upward pressure on pine stumpage prices can be expected to continue. In addition to this, the highly competitive situation our industry faces in the final market place has contributed to the reduction of profit margins. Although the reduced value of the dollar and import restrictions have helped, we still face stiff competition from imports.

The overall objective of our studies conducted in pine mills has been to determine the economic potential of producing construction grade products from a lower cost raw material. No attempt was made to capture NHLA grade lumber since most pine mills are unfamiliar with these markets and are not geared to sorting and handling this material. These studies involved the determination of product yields, production costs and returns as compared to using southern yellow pine as a raw material. Primary breakdown has been done with head saws, scragg mills and chipping canters where two-sided cants were developed. Secondary breakdown has generally been done by double arbor gang resaws. Target thicknesses and widths during these studies were the same as the southern yellow pine normally sawn in the mill. There was no significant difference in product yields from the different primary breakdown systems. Production rates were comparable to that of pine in all the studies.

Lumber volume and grade were tallied by log diameter and grade following drying, planing and trimming. All log diameters yielded more than 80% #2 and better construction lumber based on the Northern Hardwood and Pine Manufacturers Association standard grading rules. The overall yield of the distributions studied was 87% #2 and better. This is an acceptable level for most southern pine mills in this area. The majority of below-grade and 4/4 material was developed from the smaller diameter logs. The lower grade lumber produced was associated with pith splits and excessive slope of grain. Some remanufacturing would improve this grade distribution. However, no significant difference between over-all yields of yellow-poplar and pine were found within each mill studied.
Lumber recovery factors (LRF's) varied from 5.1 to 8.0, depending on log diameter, log grade and the mill participating in the study.

Net values per thousand board feet were calculated assuming a stumpage cost of $50/MBF International, a logging cost of $65/MBF and a manufacturing cost of $85/MBF for yellow-poplar. A credit of $37.61/MBF was given for residue sales. The price of yellow-poplar framing was also assumed to be 10% less than comparable yellow pine products. The net value per thousand ranged from $66.34/MBF for 6-inch logs to $75.83/MBF for 13-inch logs. These margins are more than enough to justify the use of yellow-poplar in the manufacture of construction grade lumber.

Comparisons with southern yellow pine production were also made to provide information on the relative profitability of the two alternative raw materials. Stumpage cost of $120/MBF International, a logging cost of $65/M and a manufacturing cost of $75/M were assumed based on information supplied by cooperating mills. A credit of $56.55 was given for residue sales. In addition, full prices were used in calculating the value of lumber. The net value per thousand for southern yellow pine ranged from $47.60/MBF for 6-inch logs to $53.07/MBF for 13-inch logs. Yellow-poplar yielded greater value per log for all diameter classes (Figure 5). This holds even though we have assumed lower product prices, higher manufacturing costs and lower residue returns. The major reason for these results is due to the $70.00 differential in stumpage cost that exists in the Piedmont and Upper Coastal Plain regions in North Carolina. Based on these studies and calculations, yellow-poplar in this geographic area can be used to increase the profit margin of pine sawmills.

**Marketing**

Our group at NC State has also been involved in working with potential users of yellow-poplar framing. I have some examples of the publications that have been developed to improve the understanding of these products. In addition, we have been presenting programs to home builders groups and have worked with several contractors in building demonstration houses and other structures. Incidentally, we have produced a video tape program on one of these demonstrations. It is designed to be used to familiarize builders with yellow-poplar framing products. This is available for loan to anyone. Those builders that have tried yellow-poplar framing have been enthusiastic about the results they have had in floor joist, studs and wall units. Most indicated that they would like to continue using the product when a readily available supply is established.

This points out a major problem we have faced in yellow-poplar framing -- establishing a flow from the sawmill to the builder. Which comes first, the chicken or the egg. Most sawmillers are producers for an established market. They are not going to produce construction grade lumber without a market, even if they know that it is a potentially profitable enterprise. Our pine producers sell over
Figure 5

NET VALUE PER LOG

Value per Log (Dollars)

Log Diameter (Inches)

Yellow Poplar

Southern Yellow Pine
60% of their production to truss manufacturers and pressure treaters, two markets where yellow-poplar is not competitive. Our producers have yielded a large part of the conventional framing lumber market to spruce-pine-fir from the West Coast and Canada. We have proven that yellow-poplar can compete with these species. But builders are not going to buy these products if they are not being stocked by retailers.

We feel that yellow-poplar will never become an established product in the construction industry until our sawmills become better marketers. This would include entrepreneurs acting as brokers for both hardwood and pine mills that cannot justify investing in additional equipment and lumber inventories. These brokers would purchase rough-green 7/4 framing from hardwood mills and place orders with pine producers too small to build inventories and develop markets on their own. The concentration of adequate quantities of the various sizes and grades will reduce inventory and marketing problems for these small mills. Thus, a marketing chain can be established for yellow-poplar.

To summarize, this is not a new idea. Yellow-poplar has been used in the past and can be used now and in the future for light frame construction. In general, North American softwood timber supplies are decreasing and our yellow-poplar supply is increasing. We have demonstrated the economic feasibility of producing yellow-poplar framing at both hardwood and pine sawmills. Yellow-poplar has the properties required for this use and has been accepted as a light framing material on both the national and state levels.

The opportunity to produce and market yellow-poplar framing exists and is only waiting for entrepreneurs to pick up the wheelbarrow and run with it.
SAWMILL INVESTMENT AND EMPLOYMENT REQUIREMENTS
by Jerry Haley
Project Manager/Sales Engineer
Corley Manufacturing Co.

Assuming proper surveys and studies have been made on raw materials and markets before starting on the sawmill end, a lot of things must be considered when setting out to build a sawmill today. Some of these are the lay of the land, location of the mill site, access to the log supply, availability and economics of power supply, etc., etc.

It is most important that a lot of thought be given to the location of the mill on the mill property to allow good log and lumber storage and smooth traffic flow around the mill.

After all the above details have been outlined, then come the decisions on the mill proper. The amount of production and the end product determines the sizes and types of machines that will be required to do the job efficiently.

In mentioning production, please keep in mind there are usually no machinery production guarantees because of the many possible differences in the type and quality of materials being cut, experience and efficiency of machine operators, the availability of material and the flow of material from one machine to the other throughout the production process.

Planning is vital. Once the mill is designed and built, it can be very difficult and costly to make changes in the mill at a later date for whatever reason. In a lot of cases, if the mill is made a little longer or wider to begin with, quite a bit of money can be saved on down the road. Try to visualize what your needs may be five years from now and plan for them. You'll be glad you did. Trying to remodel and update an old existing mill is like trying to remodel an old house. Sometimes there is no end to it and you end up with a "new" house at a greater cost.

Not only is planning for the machinery critical, manpower becomes a very, very important factor. Sometimes a little more money up front can reduce some manpower down the line through the use of more automated equipment, etc.

We will take a look at some "typical sawmills" and see in general terms the manpower requirements, approximate production levels and ballpark cost figures.

Mill plan no. 1, shows a basic mill plan usually used for a daily production requirement of around 20 MBF (twenty thousand board feet). It consists of a log deck conveyor, carriage, circle saw headrig, two-saw board edger, a two-saw end trimmer and necessary conveyors linking the equipment together.
This mill would require a sawyer, and edger man and a trimmer man to operate the mill floor machinery. There would also be a debarker operator. Note that the debarker is not shown on this layout. A debarker is highly recommended not only for removing bark, grit and other foreign material which can damage the saws in the mill, but also because it is essential for making bark-free chips that are more acceptable for the paper mills and other uses.

Other personnel required for a mill of this type would be a fork lift operator to bring logs to the log deck, a lumber grader, and personnel to pull lumber from the green chains after it has been end-trimmed. There would probably also be someone tending the chipper to take care of any hang-ups that might occur in the chipping area. Therefore, assuming there were four people handling lumber on the green chains, this mill would require at least nine or ten people for an efficient operation. Office and management personnel are not included.

It is difficult to arrive at investment figures for a mill of this type due to the many variables and options available in the machinery. For instance, the carriage could cost $40,000 to $200,000-plus if linear positioners, computer setworks, scanners and other high tech items were included. An edger could cost from $15,000 to $150,000, depending upon the production requirements of the mill and the options selected. The trimmer could cost in the $30 to 50 thousand range. The chipper cost could fall somewhere between $40 to 80 thousand.

The necessary conveying items for a mill of this type would cost several thousand dollars. This would include conveyors from machine to machine and the waste conveyors underneath the mill. There will be a lot of options in conveying equipment as well as major machinery items. Therefore, it is difficult to indicate more accurate prices.

I might add at this point, the waste conveyor systems in mills today cause a considerable number of problems because of undersizing to cut costs, improper flow directions or an improper choice in the type of conveyor to do the job. Probably the best choice today is the vibrating type conveyor. It is very efficient and requires much less maintenance than conventional belt or chain conveyors. The vibrating conveyor can be used to separate the dust from the slabs, blocks, etc. before they get to the chipper. A vibrating conveyor also feeds the chipper better than a conventional belt conveyor.

As you can see, a lot of planning needs to be done in the beginning so that proper machinery can be selected to do the job that is required. Also to be included are site preparation cost, foundation cost, building cost, installation cost, etc.
Taking all these things into consideration, the cost of the basic mill in mill plan no. 1 begins to fall somewhere in the range of one-half to one million dollars.

Mill plan no. 2 shows the addition of a gang edger and an automatic trimmer. By adding the gang edger, the production of the mill could be increased to the 30-40 MBF range. Also, one more operator has been added. Cants (4-sided timbers) could be produced on the carriage and passed across the infeed table of the board edger to the gang edger. The gang edger would have a series of saws arranged in different cutting patterns. The cant could then be cut into several boards at one time. The gang edger could be equipped with enough options to allow the operator to operate the machine from a saw cab. A set of conveyor chains could be added to the left of the gang saw table to allow cants to be fed in from an outside source. In other words, cants could be purchased elsewhere and fed through the gang edger to increase production.

Notice that the automatic trimmer has been added to handle the increased production. Generally a two-saw trimmer, as shown in mill plan no. 1, will only function well in lower production mills. Too much time is lost waiting for the saws to be set for different length cuts.

The mill shown in mill plan no. 3 could be a possible layout for a daily production requirement of 50-60 MBF. This mill consists of most of the equipment mentioned in mill plan no. 1. But you will note that a band headrig is shown in place of the circle headrig. A band saw is used to reduce kerf (saw cut), which is a savings because less wood goes into dust due to the thinness of the saw blade. Of course, the band saw costs more and requires more sophisticated saw sharpening equipment and better trained saw filers.

Added on the opposite side of the mill is a separate line consisting of a scragg mill and a gang edger. The scragg mill is usually intended as a quick method of sawing up lower grade and smaller diameter logs. This frees up the carriage and headrig to saw grade lumber from the better logs.

The scragg mill has two large diameter saws which will produce two flat sides on the log, making a flitch which will then be fed through the gang edger. The gang edger will usually not have provisions for passing boards through it. A separate board edger will be used for edging boards.

A mill of this type will require an automatic trimmer in order to keep up with production. This addition of equipment requires adding at least three men on the mill floor: the scragg operator, the gang edger operator and a man behind it making separations of slabs and boards as they come through the machine. Also, more personnel will probably be needed in the green chain to handle the increased production.
This is just one of the many variations that can be made to a basic mill to increase production. Now you can begin to see that if you plan ahead this extra equipment can be added while production is still going on with existing equipment. This is very important in long range planning.

Another very popular variation in production increase is the line bar resaw with a circular run-around return system, as shown in mill plan no. 4. This can be added at a later date to the basic mill plan no. 1, providing space has been included in the original mill plan. The line bar resaw has its advantages over the other systems because it allows for grade sawing to be made just as it is on the carriage and headrig. Line bars today can be fitted with computer technology and the accuracy of the lumber can be controlled very well. The cants for the line bar can be produced on the carriage and headrig. This system allows better grade sawing and other options over the scragg mill.

Mill plan no. 5 shows a layout that could be considered for a mill requiring 80 to 100 MBF daily. It consists of two carriage headrigs (one on each side of the mill), a line bar resaw, a gang edger, a board edger and a trimmer. This mill would require highly automated equipment in order to get high production.

All of the mills shown above would, of course, include a debarker and chipper. Very few mills today operate without these pieces of equipment. The chipper is vital in reducing wastes, such as slabs, trim blocks, etc., to a more manageable material. The waste can then be sold as chips to the paper mill or to other places as fuel. Bark and dust can also be sold as fuel, mulch or to other markets.

Used equipment is often considered as a cost-cutting measure. This can sometimes eventually costs more than new equipment, especially if it has to be updated with safety measures required by the Occupational Safety and Health Administration (OSHA). I would certainly recommend buyer beware when looking at used equipment.

The sawmill industry has come a long way in the last ten years. Computer technology is being applied in several areas of the mill. This allows for more recovery and yield from the log. Since logs coming to the mill today are smaller, it is important to get all usable material possible from the log.

Exploration of all modern day technology and state of the art equipment should be made before making a final decision of machinery. Make sure the machinery can be updated or retro-fitted in the future without having to totally replace it. All this boils down to the old cliche, "Pay me now or pay me later." In some cases, later can be very costly.
CUT LENGTH: 8'-16'

[Diagram with various labeled components such as Carriage, Log Deck, Bandsaw, Top Arbor Edger, Unscreamer, Drop Saw Trimmer, and Operator.]
Do not design the sawmill to fit the building. Design the building to fit the sawmill. I have seen many mills become a source of bottlenecks and limitations because of this. If at all possible, elevate the mill several feet off the ground. This will allow for a better flow of the waste material to the refuse conveyors underneath the mill and better access for maintenance and clean-up.

Corley Manufacturing Company, located in Chattanooga, TN, has been serving the sawmiller since 1905 and we have seen just about everything imaginable in sawmill construction. We have several thousand mill plans in our files and would welcome the opportunity to share them with you. We also provide a consulting service for our customers. We would be glad to inspect an existing mill and make recommendations for upgrading the equipment to obtain more production, reduce manpower, improve lumber flow, etc. We have the ability and personnel to assist the potential sawmiller from planning the mill to erecting the mill. We can provide turnkey projects if so desired.

Corley is also the U.S. distributor for the Linck Profiling Line made by the Linck Co. in West Germany. This line of complex and automated machinery can process 4,000-5,000 logs a shift with one man on the mill floor. This system is in a class all by itself.

There have been several books written on sawmills, their operation, etc. It is very difficult to cover everything you need to know about building a sawmill in the short time I have today. But I hope I have given you some thoughts to begin with.

Again, I would like to remind you that more thought given to the project initially will pay off with a smoother and more profitable operation.

Question: The break-even on something like that, in terms of volume? If you were running yellow-poplar, could you predict a break-even on that?

Haley: No, I wouldn't know what that would be because I'm not into the cost of logs. I wouldn't know what the situation would be on that.

In response to another question inaudible on the tape --
Haley: Well, let me clarify that a bit. Let's start with the mill over at Gilbert. It's easy for him to make yellow-poplar construction lumber. He can do it very easily. It doesn't take down time, it doesn't take anything. All he has to do is change the spacer requirements for this gang edger and do some reprogramming of the computer out here, which is easy to do. It doesn't take a lot of money. But the reason he's not going to do it is that he already has a market for what he is making now. And he knows what he is going to be doing next week. If you want him to produce something else, you have a tough selling job. That is what I was trying to say. Hardwood mills don't have marketing people. What they do is use the telephone. They have people calling them saying, "Please sell me so-and-so."

Question: A mill that is cutting 40M feet a day, five days a week, one shift -- that's 10 million feet a year. How many people would that employ?

Haley: You'd have a fork lift operator, a debarker operator, a sawyer, as auxiliary for the the scragg mill or whatever, two edger operators, a trimmer operator, and probably five or six on the green chain. So, you're probably talking 15 - 18 people. It could be a little less than that, depending on how efficient your men are.

Question: If you going to produce with the SDR method, you have to pull the flitches off the line and take them off somewhere to dry them and then put them back in the production line.

Haley: Right. Here is a problem for a mill because they don't want to take anything out and then put it back into the mill. Most of them don't have the facilities to do that. They way to go about doing that is just to go to a mill and say, "Cut me some flitches or waney material." Then you take it and dry it and buy yourself an edger and trimmer and make yourself a reman station. But trying to get material out of the mill and then back into the mill is a real problem. The only provision most mills would have for getting material back in would be if they had a mill nearby that was making cants. And they'd buy them and then have a facility here to resaw them.

Question on sash gang saws.

Haley: Sash gangs were popular back in the 50s and 60s. They did a good job. Their big drawback is slow production. They are accurate but the feed on them is slow. You're talking big bucks but there is some interest in bringing them back.

Question on kilns

Haley: You have to have somebody who knows the moisture content of the wood, how to keep the temperature regulated on them. And most small mills are not going to have that person there.
Question: Where does one go to get training in kiln drying?

Muench: Virginia Tech, N.C. State ---

Haley: And Hayward Tech over at Clyde.

Muench: The forestry schools all put on short courses. They can be anywhere from a day to several days. And NHLA in Memphis -- don't they also put on drying schools? I'm not into that but some of my colleagues are.
On behalf of the Georgia-Pacific Corporation, I would like to thank Jack Muench and Virginia Tech and the Forest Products Center for this opportunity of sharing ideas with you. This time is important as we consider the options and opportunities, and requirements of our collective industry interests for the development of yellow-poplar into the "species of choice" in the markets where it has a natural fit.

Obviously, the production of poplar lumber for construction uses is not a new or unique idea. Various earlier, short-lived efforts have already proven that poplar lumber can be produced as an acceptable alternative to many softwood species for use in general framing applications.

One of the early difficulties encountered by yellow-poplar marketing efforts was a lack of code approvals for construction uses. It was this one area more than structural or manufacturing deficiencies that hindered the development and acceptance of poplar. And these earlier production efforts were also very instrumental in the eventual granting of code approvals for yellow poplar by the American Lumber Standards Committee (ALSC).

So our meeting here today is not to determine if the conversion of yellow-poplar into general construction quality dimensional lumber is a reasonable activity. Rather, we hope to have beneficial discussion on how this product can be turned into a wholesale and distribution reality with enough consistent volume to make a difference.

Other participants will share with you their ideas on areas such as availability of timber, previous manufacturing activities, opportunities for resale, and the potential economic benefits for us all when this idea results in a measurable degree of success.

My remarks will cover a few of the basic requirements that the lumber and construction industries will demand of yellow-poplar and its producers. If we either don't - or cannot - fill these needs with a product that is acceptable - or at least an equal, then the market potential for yellow-poplar is being vastly overstated.

As any of you who are familiar with commodity lumber practices will recognize, these comments will include some very basic considerations of lumber wholesaling for two primary reasons:

1. Many areas of softwood production and marketing efforts are quite different from hardwoods.
2. Most of the changes in yellow-poplar production, its marketing concepts, and its products will have to be originated and supported - long term - by the hardwood producers.

However, these changes in production and marketing are necessary if we are to have any reasonable expectation of successfully wholesaling poplar against other more established species.

In this instance, the industry, whose requirements we are attempting to satisfy, is really a part of each of us, our various interests - plus others - all based on the needs and preferences of the distributor, dealer and contractor.

In appearance and structural characteristics, poplar resembles western spruce much more closely than it does southern pine. The very nature of its physical appearance, texture, and technical qualities suggests that this comparison with western species be established as standard. This one area - that of species comparison and competition - may be our most difficult challenge as we try to help a consuming public to recognize poplar as a "normal" and acceptable species.

All species in all grade descriptions, normally used in general construction practices, eventually compete around several common denominators: code acceptances; availability; preference; price; and ease of handling and storage.

1. **Code acceptances**
   As we know, poplar does have the necessary code approvals.

2. **Availability**
   It must be consistently available in multiple shipment quantities.

3. **Preference**
   This is the result of consistent, acceptable product performance.

4. **Price**
   It must be at least competitively priced - and possibly lower - to buy into established markets.

5. **Ease of handling and usage**
   It must be at least as easy and adaptable to handling, storage, and application practices as its competing species.

We must make the assumption that all comparable species and products meet the same minimum acceptable quality standards. It is very important that a dependable consistency be developed for the overall grading of yellow-poplar framing lumber.
There are several ALSC certified grading agencies whose activities center around the verification of the minimum quality standards of various finished grades: WWPA, WCLIB, PLIB, SPIB, Eastern Agencies, and, of course, TPI. There are few, if any, significant differences from one agency to another on the same grade and species. While this does not suggest that all mills grade exactly alike, all final production grading would need to be graded according to the same set of standards.

This is not one of the simpler problems to be solved, since current hardwood production facilities include so many small and often isolated sawmills, each one pulling their own candidate stock. Also, as most mills are concerned with yield and recovery, much of the potential candidate stock may have already been "pulled down to rock bottom" prior to any attempt to recover additional grades for conversion into framing grades that would be dimensionally and structurally consistent.

There are several basic product characteristics of softwood lumber that poplar will be compared to:

1. **Dimension**
   A. Thickness - standard nominal dry sizes - 1 1/2 X
   B. Width - 3 1/2, 5 1/2, 7 1/4, 9 1/4, 11 1/4
   C. Length - 8' to 16' and 20' E/L/O
      Heavy to 16'; light 8' & 14'

2. **Moisture content** - may be different from southern pine or hardwoods.
   A. Kiln dried (KD) - 15% or less
   B. S-dry - (19% or less)
   C. S-green - (more than 19%)

3. **Surfacing**
   A. S4S - surface 4 sides
   B. Eased edges
   C. End trimmed

4. **Grade stamped**
   It must be grade stamped to be acceptable by the various code officials.

5. **Tally**
   A. 8'-16' & longer - nothing shorter than 8 feet, except short studs
   B. Even lengths only
      No odd lengths

6. **Packaging**
   A. Standard bundle size
   B. End painting
   C. End wax
Sometimes end treatments help reduce checking and splitting.

7. **Volume consistency**
   Being on the market continually

8. **Grade consistency**
The quality level should be consistent regardless of the level of quality.

If I asked each of you what one particular problem has plagued southern pine, and still is a problem, I suspect that answers like crook, twist, and warp, would be mentioned.

And, yes, yellow-poplar, like southern pine, has also enjoyed or endured the reputation of being a somewhat unstable species because many producers were producing with more emphasis on quantity than they were on quality.

As an industry, we have done everything from blame the "preference gap" against southern pine on unfair export practices of other species to "it won't matter - a cheap price will win in the end." We now have some improvements, perhaps brought about from a realization that neither higher volume, nor cheaper prices, will capture the areas of our markets that are led by quality and guided preferences.

The marketing of yellow-poplar is different from southern pine, SPF, or other softwoods in that it has no past to guide it. What is produced today is its reputation tomorrow. Its past is now and its future is dependent on what is produced today. The quality determinations that each producer of poplar resolves in the beginning will determine whether or not a "preference" will be developed, based on merit.

The marketing of yellow-poplar will involve strategies that are different from either southern pine or other softwoods. We have tremendous quantities of yellow-poplar, but will likely not have an unlimited availability in the grades and sizes of raw material required for conversion to framing lumber. It would be easy to assume that availability would be the least of our problems. However, our manufacturing restrictions and production requirements have already suggested that poplar is not going to available in enough volume to earn a niche in the market simply because we overwhelm the market with seemingly unlimited production and willingness to continually reduce prices.

Another very important factor of marketing yellow-poplar that should not be underestimated is its general location. Poplar logs are most available in the same area where western spruce has enjoyed some of its best demand - the Southeast and Mid-Atlantic areas and extending into certain areas of the Midwest and Northeast. This supports the earlier suggestion that poplar's most natural competition should be
spruce. The geographies alone provide a potentially significant advantage for poplar simply from a transportation availability and cost standpoint.

Everyone involved with western domestic and Canadian softwood lumber has seen freight costs per thousand board feet escalate much more often and rapidly than has the price of the product on an FOB mill basis. In fact, even when FOB mill prices reach "seasonal highs," we know the "seasonal lows" are just around the corner. Not so with freight. The freight rates are basically locked in, except for and until the next rate increase. We may see the FOB mill price fluctuate from $175 to $300 per thousand board feet. In either instance, the freight to be added to destinations in our area is still approximately $90 to $95 per thousand board feet.

This means that freight could be from 25 to 35 percent of the total delivered sales price. The marketing benefits of yellow-poplar into this same 25 to 35 percent geographic area are obvious. A product that is grown, harvested, produced, sold, and shipped from and into this same area would certainly have a considerable cost advantage over western species from the freight difference alone.

And one of the goals of meetings such as this should be the development of the types of motivation and encouragement needed to insure that any further delay in taking advantage of lost market opportunities will not be the result of default due to indecision or inactivity. This will not be accomplished without difficulties that might be expected of any industry faced with making changes and adjustments to its normal practices.

The potential benefits of producing poplar did not recently occur. If the project could have been easily accomplished, it would have already been done. What we have is still an opportunity to develop a product as a result of under-utilized manufacturing capacities for an under-used species. The degree of success and the length of time required to achieve that success in touchable numbers depends upon how well we respond to these needed adjustments and how deeply felt is the general commitment to those changes.

The recent and current logging difficulties in the West due to timber restrictions and environmental concerns, along with something as seemingly unrelated as the tremendous value of Japanese yen (which apparently is matched only by the Japanese demand for logs and timber) only increases the opportunity for the successful manufacture and distribution of this prolific species as an acceptable alternative to western species.

With our more locally grown yellow-poplar as the available alternative to the western species, the producing mill is close -- two to three states away -- not 48. Freight costs are local -- not transcontinental -- and the transit time could be two to three days, instead of two to three, even four weeks.
The market price of lumber can undergo significant changes in a three-week time span. And with the lumber distribution channels of producer to wholesaler to retailer continually attempting to improve on the "just in time" buying and delivery philosophy, this three weeks is certainly not an advantage. This time in transit factor should not be overlooked --after other obstacles have been settled.

Some of the other obstacles that will influence the success or failure of yellow-poplar in wholesale distribution efforts and general construction usages are these:

1. **Performance**
   What are we comparing it with?
   Does it perform as well as SPF, LPP, E SLP, W. Fir?
   Does it have necessary code approvals?

2. **Availability**
   Is it available today and tomorrow?
   In multiple shipments, consistently?

3. **Preference**
   Does it perform favorably enough to justify reordering?

4. **Price**
   It must be competitively priced -- or slightly lower than SPF -- while it is developing its performance record.

5. **Grade consistently**
   This is a "given," an automatic. However, it is so important as to demand additional emphasis. It must be the same today as yesterday -- better, but no worse. The new product in the market has fewer chances to perform as expected, and fewer supporters than the old favorite standby.

The pride of production must be evidenced if this product is to start earning its way by developing a reputation of consistent quality from the beginning.

An additional statement on the many small hardwood producers. This still may be one of the more obvious deterrents, since many of these sawmills have limited individual volumes and it is a difficult task to manage and monitor the concentrating of sufficient candidate stock of smaller size and lower grade mixes to produce a consistent supply of comparably graded finished product.

I hope you have determined by my statements that -- yes, yellow-poplar is a wholesaleable species for general construction applications, preferably in competition with western spruce, rather than southern pine.
With many different industry interests as are represented here today, I am sure these comments may differ from the viewpoint of some hardwood people. However, we should seriously consider that the establishment of yellow-poplar as a factor in general construction uses will not occur if we only displace other hardwood products or uses. We must be able to displace other softwood species and products, preferably western SPF.

I appreciate the opportunity of sharing these thoughts with you today and look forward to further discussion and questions later in this program.

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**Question:** What volume of poplar would you have to have to introduce it into your structural market?

**Porter:** It’s hard to say what volume. It’s one of those things where most of my yards and probably most retailers have multiple carloads either on their yard or bought and rolling at any one time. The key to it is -- and we’re not coming in and I don’t think any of us are suggesting that we’re going to go to someplace and say, “Spruce is dead. We’re here, your troubles are over.” We just want a piece of that. But the key is that whatever that volume is, whether it is one or two truckloads that are available or whether it’s 50 truckloads, it needs to be there on a regular, consistent basis without any real perceptive drop in the quality in what it takes to generate that volume of raw material. What I see rumbling around in my head is that the more production that we can get, whether it’s out of some big mother plant or smaller plants or whatever the format, the wider we can expand the market. If the production is little, we keep it into a niche market.

**Muench:** Like manufactured housing or something like that?

**Porter:** Absolutely. And I can think of very few things that this should have a better opportunity with than manufactured housing. Even if there has to be a little code work done, perhaps. But I don’t think they would have any real long lasting concern about its stability. And not its strength.

**Muench:** The strength characteristics of the two are comparable. In fact, yellow-poplar is a little better than SPF. Earl, didn’t you show those figures? It’s not as good as southern pine. This is why southern pine is going into engineered applications, like trusses and joists.

**Question:** Mr. Porter brought up a very important point. In spruce you don’t get color variation. In yellow-poplar you have significant color variation. All of the samples here are cut from smaller trees, therefore you have more sapwood. When you get into bigger trees you have more heartwood and more mineral deposits.
Porter: Perhaps because what I have the most experience with was the peeler cores -- I may not have gotten into the whole log to see what that was -- but the most unsightly thing I saw was the purple or black hearts. While structurally, according to our grade people, that's not a problem, aesthetically, it's a major problem. And my suggestion to our mill when we ran into those was pull those out and let the poplar go to where it was going before we turned it into dimension lumber or stud. Because it can be worth no less than what it would have been had it kept going. And it takes a little more teaching on the planer and the grader. But, I think that if that problem is something that you wind up with a lot of color variation -- now this is very little. This side has a little more. I've seen some that have much more apparent yellow or greenish tint.
What I'd like to do today is give you some perspectives from the retailer's point of view. Lowe's is in a different position than anyone else talking to you today. We are a retailer. That's purely what we are. We have no manufacturing operations whatsoever. All we do is buy it, turn around and sell it to somebody else and hopefully, with a little bit of luck, make a little profit.

From our perspective, the single most important thing that we're doing is trying to provide our customers with a product that they need to do whatever they are going to do. Primarily, the customer that we'd be looking at for a yellow-poplar construction material would obviously be a construction contractor, the person who's using the material to build, remodel and repair houses. So I'd like to talk to you about some of the things our contractors are telling us about what they need from us and maybe we can draw out some parallels to some of the potential problems you have with yellow-poplar.

If we weren't providing our customers with what they want from us, we'd be out of business today. How many of you -- I know that some of the people, the academicians especially -- remember the Hewlitt-Packard calculators, they were the first ones on the market. And they had the reverse Polish logic. You had to enter the number. Then you hit the enter key. Then you hit the function. Then you had to hit the equal sign. They were difficult to use. Today, you ask the average consumer what their first choice brand for a calculator would be, it would be Texas Instruments. Because Texas Instruments came on the market place and introduced a calculator with 2+2=4. It was the way you thought through a problem. It was the way the customer was going to be most likely to use the product. So, as we look at any kind of new product, we've got to look at it in terms of "Is this product going to be in a form that the customers will be able to use it?"

The second thing we've got to ask when we're looking at potential new products is, "What use is the customer going to have for this product?" Microwave technology was really invented in World War II, part of the outgrowth of some of experiments in the development of radar. Microwave ovens were first introduced commercially in this country in 1948. They languished for 30 years. There was a little bit of use in commercial applications. But it wasn't until people began to feel time constraints, with two income households, the lack of a full-time wife in the household to prepare the meals, that the benefit of an 8-minute baked potato really became apparent to them. So, just because there is a technology there, doesn't necessarily mean
that the market place is ready for it. There has to be something happen in the market place to create the demand for any kind of a new product that you're thinking about introducing. And that's another issue I think you have to look at when you're considering a replacement product for one that may be existing in the marketplace already today.

Another thing that you want to be looking at is something we would be asking our customers about if we were to go into the market place with yellow-poplar -- "Is this species any better than what you currently are using?" We've had a pretty good overview today of some of the various characteristics of poplar versus spruce versus southern pine. That's an issue that you're going to have some real good answers to. Disposable diapers were a wonderful idea because they freed mothers up from having to spend all their time washing or they cut down the expense of diaper service. So that was an idea that was a good, new replacement item in the market place that offered the potential customers something that they could have or an easier way of doing business.

We're also concerned about timeliness. Some things that work today wouldn't have worked yesterday and may not work tomorrow. Wood stoves were something that we saw in garages and basements or in shacks and hunting lodges up until the energy crisis in the '70s and early '80s. Today, they're very trendy; they're nicely designed with glass windows and very much a popular design item in a house. So, if you're going to sell yellow-poplar, you've got to make sure the timing is right in the marketplace to replace the product that is currently out there with something the timing is right for.

And we'll talk a little bit about some of the pricing issues. We were talking earlier about how some of the pricing issues relate to the timing issue. As supplies of some of the more traditional products go down, the demand for a new product may be created. So, one of the things you've got to look at is the timing issue. Is the time exactly right now?

As you're looking at what the potential growth in the market for yellow-poplar is, keep in mind that timing is going to play, I think, a big part in how quickly this thing is going to unroll for us.

Some of the work we have been doing with our contractor customers also provides some insights to the issue. We do an awful lot of research focused on talking with contractors and whatnot. And we're finding out that contractors are becoming increasingly cost conscious. I'm telling you something new, right? But what we're also finding is that it is no more just the material cost that is the primary consideration. It used to be that when we saw contractors, we saw a guy come in with blue jeans and work boots and he was carrying a hammer and he had a tape measure on his belt. Today it is not uncommon for our average builder to be driving a Mercedes, be wearing a nice pair of khaki slacks and have a cellular phone on his
belt, rather than a tape measure. There are no longer builders. We have general contractors. And for them, cost is not just for the material. For them, time is cost. Anything they can do today or any product or service that Lowe's can demonstrate is a way to save time is our best marketing tool today for our contractor customers. We can tell them that it is going to be 5, 10, 15 percent cheaper and that would be nice. But if it saves them time then it probably interests them more, even when it saves them only a small or medium amount of money. That sounds kind of strange. But if you stop and think about it, back in the '60s and '70s, the biggest single thing the builder was worried about was what the materials were going to cost. Back then, construction money was 5, 6 or, in the worst of times, 7 percent and he was dealing, probably, with the local savings and loan and he knew the president. Construction money sometimes was even available on 60 or 90 day terms, which you couldn't begin to touch today with the way the savings and loans this year are going through a washout. It's impossible today for a contractor, who is less of a builder and more of a businessman, to get anywhere near the same kind of deals he used to be able to get for construction money. So, anything that can speed up the turnover of his investment in construction money is going to be something that he is going to look to us very, very favorably for.

Another thing that is increasing in cost is land. One of the most popular seminars we have at our building trip to Las Vegas in the last couple of years was a presentation by a guy from the state of Florida whose main message was how to set buildings on property so you could increase the density of single-family construction on a given acre of land without making it look like a tract or without, possibly, making it look like your living room window looks into the next door neighbor's bedroom. The density factor and the ability to make better use of an acre of land is something that is more interesting to contractors than saving 10-15% on material costs.

We're also seeing our builder-contractors becoming more quality conscious. Now, part of that is because of the fact that they are building bigger homes. But some of it has to do with the fact that we are seeing a shift in the kinds of homes they build. Before the early '80s a lot of our builder customers were spec builders. They built anywhere from 50 to 75% of their homes on speculation. But we're seeing a big shift today to a point where it's almost the other way around -- on a custom basis. When you're building a custom home, you already have a buyer for the home. In fact, the home owner has probably come to you and contracted with you to build a home for him. So that means one thing that will change dramatically: as a builder you can expect probably every day that Mrs. Homeowner or Mr. Homeowner on his way home from work is just going to happen to drop in. And because of that, they'll see things in the production of that home that when you were building a spec home didn't used to be a problem.
If you look behind the drywall of a lot of homes today you'd probably find some studs in those walls that are little bit less than straight and have some pretty good knotholes in them. But they were going to get covered up. They weren't structurally essential walls, they were just basically stud walls to hold up the drywall. So it wasn't necessary -- you knew that as a builder. But today the customer-homeowners, building their dream house, don't care if there's never going to be anybody see that stud after it gets covered up with drywall and painted and decorated. All they see is that there's a crooked stud in that wall. So, as our builders are shifting more to custom homes, they are not able to use as many of the lower end products as they used to be able to.

We're also seeing this same upward movement of product quality demands as the builder makes shifts from new construction to repair and remodeling. It used to be that when you looked at the distribution between product that went into new construction versus what went into repair and remodeling, it was about 25-27% residential renovation and repair and about 70-75% new construction back in 1976. Last year it was about 46% R&R and the balance, 54%, in new construction. And they are saying that sometime midway through the next decade that may even flip-flop.

And you have the same problem with the homeowner being present in a repair and remodeling job as you do in a custom home job. Not only are those customers flitting around on the way home from work, they're living there. So they're inspecting every piece of wood as it goes up. And when you stop and think about it, these people are also probably adding on to their home additions that are going to improve the quality of the home. They're adding more on things that are going to increase the value of the home. And in a lot of cases that addition is going to be of a higher quality that will improve the overall quality of the basic house. So, they're not going to be satisfied with the same quality of material in the addition or alteration or improvement to the house as what went into the original house. Because now they're stepping up for whatever reason.

So we're seeing a demand for a higher quality product cropping up a lot in our stores. Builders are accepting fewer culls. And when you end up having to go out and get culls or having loads refused, that ends up costing us money and that ends up costing them money. And what we're finding is that they are willing to pay us a couple of bucks more for quality because what they found out is that quality, in the longer run, costs less, especially from these custom homes and repair and remodeling jobs. There are fewer culls on the job. And the homeowner is perceiving that the quality of the product that is going into the home is better. The worst thing that you can have today is a homeowner who gets dissatisfied when you're halfway through the job. People are more demanding on what they will accept today than what they used to be.
In trying to look at how all the goals of market place demands might impact our use of yellow-poplar lumber, what I tried to do was go around and talk to our buying staff, our buying specialists, and ask them what kind of hints they might have or what kind of suggestions they might have about the quality of the yellow-poplar product. One of the things I found without exception when talking with the buying staff was their perception -- and not necessarily real, that's not what we talked about, because perception is what counts -- there's a perception internally in my company that yellow-poplar is a product that is more susceptible to warping and twisting. Whether that's real or not, that's not the issue. That perception is there. So that's something that I think we would be very concerned to hear about from you. Because of this shift we're seeing to quality on the part of our customers, the image that we have built up internally that the product is susceptible to warping and twisting is something that will have to be dealt with.

There is also a concern on the part of our customers today that they will not accept weathered lumber like they used to. In fact, we used to build a store and a warehouse and then we'd pave the lot out back and just sit lumber out there in stacks. And when we had to deliver a load of studs we'd go out and get it off of the stack. Well, that's not working like it used to. Builders today more and more are demanding from us new looking lumber, nice fresh looking lumber that just came out of the mill. And what we're finding is, if they can't get it from us, they'll go somewhere else. There is a perception internally at Lowe's that yellow-poplar doesn't weather as well as some other species of lumber. In a store that is doing $10-12 million a year, that wouldn't be a major problem because we'd turn that inventory significantly. But in some of our smaller stores, that would be a problem because that lumber would not turn fast enough the retain its brightness. And with the quality concerns and the appearance concerns that our builders are telling us they're looking for today, they got to have some kind of guarantees from a poplar lumber source that the discoloration -- maybe a wrapping on the product -- some of the Canadian producers are wrapping some of their product, some of them are spraying a preservative over the outside of the stack to keep the weathering problem down a little bit. So, that would be an issue I think that as a retailer, we would be concerned about.

As we look out into the future, one of the things we have to forecast is how much demand for a product is going to be in a macro sense. We're looking at the next few years -- total housing starts. We don't see them going in an upward direction. We see them remaining relatively flat in an area -- total U.S. starts -- of about 1.45 to 1.50 million starts. And there is another part of that story that is less favorable as far as we're concerned. Back in the late '70s and up into the early '80s, the mix of new construction starts that were attributable to the Southeastern region of the United States was approaching 50%. Almost half of the new starts in the United States were in the Southeast. This year
that's going to be roughly 30%. With the changing migration patterns and the slowing population growth in the South, we're going to see the South accounting for a smaller percentage of that 1.45 to 1.5 million starts than we have seen over the last few years.

So, we are anticipating that there are going to be some underlying shifts in demand for product for new housing starts. When we are looking at what kind of availability is going to be out there, we're forecasting that over the next few years some of the demand is going to be softening for product and usage rates are going to change. Some of the projections that we saw this morning that were based on past usage rates in the '70s and early '80s, some of those curves are going to flatten out a little bit. So overall, we're looking at a market that's not going to be as dynamic as what it had been. So, as we're looking at new source, we're going to be, probably, less concerned with where we're going to get it and more concerned with where we're going to sell it because of the softening demand we're seeing. In fact, we've been in the last couple of years doing less inventory build-up and we've been pulling our inventories down more on a seasonal basis than what we had been because we just are not seeing the demand curves go up like they had been.

One of the other things that is of concern to us today is the changing technology that is out there in the market place. I think that this a real major concern when we're looking at how to position yellow-poplar products in the new construction market. One of the things that is happening quite a bit is the increased use of composite products. Part of that has to do with the poor availability of good quality single species product. But another reason we're seeing growth in some of these composite products is in the labor savings that might be available. If you want to compare the load bearing characteristics of the best southern pine with a composite board, there is no comparison. You can span 30 and 40 feet with some of these composition boards and use much less material, much less bracing is required than what would be required when using conventional lumber. And some of these builders, who are concerned with the costs of building, are increasingly looking to new technologies for ways to get that cost of building down. While composite board may cost more initially, he is finding that it's requiring less labor to complete the construction and its requiring less material because it requires less bracing, and so on and so forth. So as demands for new technology products continue to grow, we're going to have to be responding to some of those. I think that's one thing that we ought to keep in mind as we are looking for ways to use some of this yellow-poplar. Maybe there are ways to apply some of the new technologies to it that will give you an even better marketing niche; that would allow you to carve out an even better position for yourself where you have even more margin opportunities.

Another thing about technology that is of concern to us is the increasing growth that we're seeing in the use of metal studs. This is something that I think you really have to be aware of when your
looking at this product as potential construction material. Metal studs have basically taken over the light commercial market. We're installing in-stock inventories of metal studs in all of our stores next year for the first time. We've had it on a special order basis for the last couple of years and in the last couple of years we have increased dramatically the amount of in-stock position for metal studs. The reason is very simple. In the commercial market today, we're averaging every seven to eight years, light commercial office buildings -- doctors' offices, dentists' offices, so on and so forth -- are being remodeled. The time that it takes to put up as metal stud wall is about half of what it takes to put up a traditional 2x4 stud wall. One man working with an electric screw driver and lightweight metal studs, can put up a wall in about half the time. So, these technologies are going to change the demand for structural products. We see it now in light commercial. We're starting to see it in some of our jobs selling in the multi-family market. Codes are a problem in the multi-family area so far. In non-load bearing room dividing walls in multi-family, we're starting to see a trend where that is beginning to show up. It's not all over. It's spotty. It's more into the larger markets, than in some of the rural markets. So you've got to keep technology change in mind, also.

As we look down the road into the '90s and try to look at what is going to be happening tradewise with us and other companies, we're seeing a situation where our trade relationships with Canada are not going to get any worse. In fact, they're probably going to get better. So, I think that as we're looking at potential new sources for yellow-poplar, that's another factor we're considering -- what the market for some of the West Coast products and Canadian products is going to be; what's going to happen if some of these trade and tariff-barriers continue to come down. As the continued growth of the dollar cuts off some of the off-shore sources for the Canadians, we're going to find them to be a lot more likable trading partners than what they have been for the last ten years. So, don't discount the Canadians. And look for that market to continue to get better slowly over the next 5 - 10 years.

So, all of these thing together -- changes in technology, changes in demand that our customers are making upon us, -- what will Lowe's be looking from yellow-poplar as a potential source? Well, Earl hit on the first thing this morning. The retailer in North Carolina that he was referring to that agreed to try a test product was us. We were pretty excited about it. What was the volume, 300 MBF? That was in one store. We have 300 stores. In order to make that one experiment happen, we would have to have enough product to keep one store in stock. In order for Lowe's to really consider yellow-poplar as a product long term, we would have to have some kind of guarantee from the distribution system that you would be able to have a reliable, on-going production source, just like Earl mentioned earlier today. Our problem isn't just one store. It's 300-plus stores. Because we don't buy for just one store at a time. We buy 300 stores at a time. And we're not alone in that. Because if you look at
the consolidation that Ken mentioned on the manufacturing side of it and then look at what’s happened on the retail side of it -- the list of the top ten building materials retailers in the last ten years, 1979 to 1989, there are only about three majors on there that are the same. The rest of them are gone, whether they were bought out or consolidated.

So, any retailer who would be looking to get into this product as a potential product offering, whether for new home construction contractors or even on the DIY side -- the small person buying 10 to 12 pieces on a Saturday morning -- we would have to have a very high degree of faith that we would be able to get the production. Just to give you an example, you know those fliers, the tabloids in the newspapers? Do you know how far out in advance one of our buying staff has to commit product to get in one of those things? About three months. In fact, we really got hurt when the hurricane hit down on the South Carolina coast. That particular weekend we had 3/8" waferboard in the tabloid for $6.49. When we committed to that, that was a good deal. The replacement cost the following Monday was $7.89. So, we have to be planning way out in advance and we have to have some real strong guarantees for any kind of product that we consider because it’s not just one store, it’s 300 stores. And the time and planning that we have to put in to carry any kind of product is something that is going to be key in our minds as we’re thinking about what kind of products we might want to stock in the future.

So, it’s got to be the same or better product, obviously. Prices would have to be as good or in the same ball park. But if you can show us where some of these other things, some of the quality issues, some supply issues, will work in our favor, we got to look at the whole thing. And price, although it’s always an issue, and anyone who has called on us might think we’re a bunch of ogres, price, although it’s always an important thing, we got to be listening to what our customers are telling us. So, my advice to you guys, number one would be to look at those ultimate consumers of the product, builders that are out there in the market place today and repair and remodeling contractors. Set them up to demand the product. Then we’re not going to have any choice but to buy it from you.

So, we are always going to be in the market place looking for new products. We have to do that. If we don’t have what our building contractors want from us when they come to see us, they’re just going to go down the road to buy someplace else. We’re not going to give volume away because we don’t have the product. As soon as there is any indication of demand for a product like this -- Earl was talking earlier about a deal with one builder at our Charles County, Maryland store last spring. The store manager agreed to source yellow-poplar for the framing on a house. It was a one shot, one store deal. As soon as the builder said he wanted to use it, we got him the product. So, that’s the group in my opinion you really need to be targeting with your marketing efforts. And you need to be
targeting them with some of these time-saving and quality issues, as well as the price issues, because those are the top ones that are going to make them start including poplar on their spec list in the future.

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**Question** on color.

*Smith:* I think it would be more important that it be white than purple or yellow.

**Question** about storage.

*Smith:* Every time we build a shed, basic 40-foot structure, it costs $80 thousand. So we're going to be using that covered storage as efficiently as we possibly can. And right now the thing that's providing the best return on covered storage is gypsum.
It's a pleasure to be here. I've learned a lot today. Before we get started, let me remind you not to ask me questions about yellow-poplar because I didn't know anything about it until I came here today. I've learned a lot. I'm one of those Saturday morning stick pickers. And beyond that, what I'm going to talk about is economics.

If you'll bear with me for a few moments, I'll start with a refresher course in basic economics so we can understand how important an industry like the yellow-poplar industry could be to a region like Southwest Virginia.

Really, how any industry influences the economics of the region in which it is located all comes down to a matter of leakages and linkages. Leakages are the bad things. That's when dollars that come into a community, turn around and leave again without doing any work for you. And linkages are those relationships between industries which slow things up and keep those dollars within your community long enough to have an impact and do some work for you.

Now, we distinguish between backward linkages and forward linkages. They are very important and it is important to understand the differences between them. A backward linkage, for instance, is when one industry purchases the output of another industry to use as an input for its product. The construction industry is backward linked to the sawmill industry, where it buys its material. The sawmill industry is backward linked to the logging industry and so on. On the other hand, forward linkages go the other way. The sawmill is forward linked to the construction industry.

Why do we distinguish between those two things? Well of course, in the case of a backward linkage, if you have a change in your economy, the backward linkages fall into place very nicely. For example, if you have an increase in the construction industry, it is safe to say that you're going to have impacts that run through those backward linked industries. On the other hand, it doesn't always follow that if you interject a change into your economy that you necessarily bring about changes in your forward linked industries. If we begin by increasing substantially the amount of yellow-poplar lumber that we produce, that in itself will not assure that forward linked industries will come along to make use of those products locally. We think of the construction industry as influencing the producers of its for the construction material. But we really don't
imagine that just by increasing the availability of yellow-poplar lumber that we will influence the construction industry.

The reason that I bring this up is that we are going to talk about multipliers. The multiplier is a very misunderstood concept and one that is abused and misused a great deal. And it's important because we often think of those forward linkages as easy to get hold of as the backward linkages. And we shouldn't do that.

Multiplier effects are basically related to the backward linkages. When we talk about a multiplier of 2.0, we're talking about that stream of linkages that go backward, the backward linkages. The construction industry has a multiplier. This multiplier is all the stream of effects from construction. Part of that stream is the sawmill industry that is providing, down a couple of steps, the materials. And it (the sawmill) has a multiplier. But that multiplier is actually a part of all the other industries that precede it. On the other hand, value added, which we hear about so much, is primarily related to the forward linkages. And value added is, undoubtedly, a powerful economic development tool and a useful one. But it refers to those forward linkages. And we have to go out there and make sure that those value added activities accompany this new industry. If we're going to talk about the potential economic impact of the yellow-poplar lumber industry in this part of the state, we can talk about the multipliers as probably falling into place very nicely. But if we want to talk about those forward linkages, well, we're going to have to go to work to make sure that those value added industries, those industries that add value to this basic piece of material, fall into place. We can't assume them. If we do assume them, we get preposterously huge multipliers -- 7, 8 and things like that. But we generally can't assume them. So we really talking about multipliers that are much smaller than that.

Let's consider now the benefits: the regional economic development benefits of an industry, such as the yellow-poplar lumber industry. What do they depend on, then? They depend on the strength of the linkages -- how linked that industry is, particularly backward linked. And secondly, how well do those industries involved in those linkages retain the benefits? How important is employee compensation? How important is employment? Are there a lot of jobs per dollar of sales? How profitable is the industry? How much do those linked industries contribute to the local tax revenues? Whether the industry is locally owned or whether that in itself becomes a part of the leakage.

Well, as we will see, this particular industry, the forestry industry in this state, has very, very strong linkages. And it tends to retain dollars exceptionally well. And it turns out that of all the kinds of industries that this state has, the forest-based industries are by far the most linked with each other, thus retaining benefits. We'll see that. And it turns out that in this part of the state, where the industries are fairly simple, the forest-based industry stands out even
more because there aren't any other industries up there competing with it in terms of strong retention of benefits.

I have to do this, that is teach just a little bit more economics for those of you who are not familiar with multipliers before we really get to the punch line. I have to because I read in the newspapers and see on TV a lot about economic impacts and they're almost always based on some misconceptions that are very easily dispelled. So if you'll give me maybe 5 or 10 minutes more before we get to the punch line.

How do we measure benefits? Well, dollars, it turns out, are not dollars. There are different kinds of dollars. There are dollars of sales. There are dollars of income. There are dollars of value added. Basically, we like to measure things according to their contribution, at the national level, to the Gross National Product. You've all heard of Gross National Product, I'm sure. GNP is unrelated, except by coincidence, with sales. Sales include the value that you or your firm put into that product plus all the value of all the things you bought from backward linked industries. What we really want to get at is to add up the value added -- here is another use of the term value added but a more strict economic use of the term -- we want to add up at each level of production that level's additional value of the product. So if we are talking about the value of a home, we don't attribute all the value of that home to the builder. We talk about the value that is added to that at the logging industry level, by the sawmills, by the wholesalers, by the retailers, by the transportation and by the builder himself or herself. We want to attribute all those value added and add them up. Well, that's what Gross National Product is. It's very, very close to each industry's added value or value added.

At the state level we talk about Gross State Product. At the community level we usually talk about community value added.

Well, value added itself contains within it a number of other very important dollar measures, including income and taxes and all those other things. We can talk about, then, sales or output multipliers, keeping in mind that these are the most familiar multipliers we think of but they have a lot of double counting in them. A better measure is value added multipliers. Or we can also talk about income multipliers. We can talk about tax multipliers. We can talk about employment multipliers. All of those are measured in dollars, except employment, but they are all different dollars. I'm going to talk to you now about all those different kinds of multipliers.

The sales multiplier tells you once there's a $1 sale of yellow-poplar, for instance at the sawmill level, how many other dollars of sales will occur in the area because of that dollar. It's going to be something greater than one. If nothing happened, the multiplier would be one if that dollar immediately leaked out. But if it was linked in any way backward, that multiplier would increase -- in each round the
increase gets smaller and smaller -- but if you added it all up you would have that sector's multiplier.

Well, that dollar of sales includes some value added, maybe 20 or 30 cents. That 20 or 30 cents and the linkages with the other sectors are going to result in a little bit of value added over here in the first round and a little over there in the second and third rounds. And it's going to have a value added multiplier. Part of that value added is income. And we're going to generate income in this family's household and in that one. And they're going to spend the money and it will end up in another family's household income and so on. And we get a multiplier there. And, of course, employment multipliers work in the same way. You're probably more familiar with employment multipliers because it's obvious that one person's job creates another person's job.

Now to the bottom line. I was asked to talk about the potential regional economic impact of the yellow-poplar lumber industry. To the extent that there isn't a yellow-poplar sawmill industry or that there is a very small yellow-poplar industry, that in itself is impossible. But what I can do is imply what its impact might be from looking at similar industries. And I've looked in particular at the general sawmill industry. Jack, I assumed that is what we are talking about -- and I think after hearing what I have today, that that's really the most important point of interjection. I could have talked about hardwood mills because it's a hardwood, but that's really not the market that we're going to be competing with.

Now, as far as an area, I looked at the state. But I also wanted to look at a smaller area, so that those of you who are going back to your community and are wanting to communicate to your fellow residents how important this industry could be to them, I wanted to give you a feel for the local impacts. I'm using a model developed by the Forest Service at Fort Collins. It's a tool for measuring impacts. It's called the IMPLAN model, for those forestry people who might be familiar with it. It allows us to look at the county level and in this state I like to aggregate it up to the planning district levels. And so, I had to choose a planning district. I chose Cumberland Plateau Planning District, which is north of here. It does not include this county or the ones right around here. Had I done the Lenowisco Planning District, which this area is in, with some fairly major forest-based industry, the multipliers would have been somewhat larger because it is a more integrated, more linked, less leaky economy. But for most of you going back, I think the Cumberland Plateau will give you a very good feel for the kinds of impacts that this industry could have.

Most of you have probably have heard of multipliers of 2 and 3 and 4. At the local level those simply do not occur. At the national level they rarely occur. At the state level they probably never occur. But at the local level, a good multiplier is probably anything over 1.5.
The sawmill industry in the Cumberland Plateau District, the total region, is 1.92, which is significantly larger than the second place -- it's by far the largest multiplier (Figure 1). The lowest is trade, which is 1.09, a very leaky industry in that part of the state. 1.92 is very large. Last night I did these in black and white. I tried to do them in color and I couldn't find my colored pens, so I shaded this by hand. My daughter thought I was having a really good time. She wished that she could have done this.

These are the output multipliers for selected industries. There are about 17 or 18 in the aggregation we chose. I'll tell you about the color scheme in a moment. On the extreme right of Figure 1 we have the sawmills, which is the point at which I chose to make the interjection, where we want to start. From that point on we are going to count all the backward linkages.

Now if we want to talk about forward linkages from that point on, we have to talk about how we are going to make those industries come here and stay here. You'll notice that at that point a 1.92 turns out to be, as I said, considerably higher than the next closest one, which is the apparel industry. The coal industry is a 1.43. Agriculture, which is usually very large in most areas, is 1.4. Construction 1.36. Services 1.31 and then forestry and logging. Then, of course, there were a number of sectors that I omitted. I put trade at the left to show you a small one.

The line you see running through the bars is 1. You'll see a 1 on the vertical axis. That line represents the first round of output sales. What I've done here is to divide the bars into the cost portion and the value added portion. The second and fourth parts are the value added portions. The first and third parts are someone else's value added or the costs of inputs that come from other parts of the economy. There are implications of that which I'll point out in a little while. The top or fourth part is the value added from all those other rounds -- the second, third, fourth and fifth rounds, which add up slowly to the multiplier of 1.92. This is the value added that occurs in all other sectors. And you can see that none of them have a larger multiplied value on the value added than does sawmills. The others are all smaller. Now there are some that generate a larger value added directly (below the line). And in a sense, the size of this is another indication of that industry's retention value. You notice the forestry industry, for instance, retains a great deal of value added. This is another good sign.

Agriculture, because of the persistent problems in the industry, doesn't have a particularly large multiplier; it doesn't have a particularly large retention ability, either. It doesn't produce particularly large returns to that dollar.

Now, we could talk about value added multipliers as well. To some extent, the value added multiplier tells you, if it's big, that is big because it has a very small direct part below the 1.0 line.
Figure 1

Output Multipliers for Selected Industries
Cumberland Plateau Planning District

Multiplier Value

<table>
<thead>
<tr>
<th>Industry</th>
<th>Multiplier Value</th>
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<tbody>
<tr>
<td>Trade</td>
<td>1.09</td>
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<tr>
<td>Forest</td>
<td>1.29</td>
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<tr>
<td>Log</td>
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<tr>
<td>Serv</td>
<td>1.31</td>
</tr>
<tr>
<td>Constr</td>
<td>1.36</td>
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<tr>
<td>Agric</td>
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<tr>
<td>Coal</td>
<td>1.43</td>
</tr>
<tr>
<td>Appar</td>
<td>1.64</td>
</tr>
<tr>
<td>Mills</td>
<td>1.92</td>
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</table>
So you can see the large potential if the yellow-poplar lumber industry was like the general sawmilling industry -- but it's not exactly. It's going to be somewhat different. What we really would have to do would be to take some of those budget numbers that we saw this morning and really get in and do an exhaustive study. But it would come out something like this. I'm sure that it wouldn't be very much different. It might be a little bigger here or smaller there. Basically, it's going to be about the same.

So the point is, that if you wanted to hit your economy with something hard, you would do it with the sawmill industry. This is where you would kick it off with a good sound economic impact both in sales and in value added, which is really the bottom line of what you want to talk about; what you really want to change.

To give you an idea of the other impacts of these sectors, I compared the total amount of employee compensation. On the left side of Figure 2 you see the vertical axis. This shows the dollar per dollar of first round effect. So that this .6 means 60 cents on the dollar. After all those rounds impacts have been added up, how much income can be generated in total from a $1 increase in sales? And, like I said, dollars are not always dollars. We're mixing two dollars here, sales and income. But, again, sawmills is very high. It's the highest. Construction comes in very high. Trade comes in very high. Trade comes in high because it has a very large direct component; it has a lot of direct value added in Figure 1. Most of trade is payroll, in other words. Some of these other ones are very small. Services, which is today's large growth industry -- and will be the largest growth industry for the next generation or so -- generates a lot of jobs as we will see. But it doesn't generate a lot of income because the pay is very low. The jobs in sawmills, coal and construction, in other words, are quality jobs and the ones that they impact upon are relatively quality jobs too. They're not the low income jobs, like services, and they certainly are not the low income jobs like agriculture. Forestry is fairly low there as well.

Well, let me remind you, if I need to -- you probably recognize it -- because of vertical integration, there are a lot of other activities going on in some of these industries. Sawmills includes a lot of logging and other things too because of vertical integration. Forestry, as defined here, is a very small industry.

And finally, I want to show you employment (Figure 3). This is astonishing, if you look at the big tall one there. Not a very attractive graphic, I'm sorry. We're measuring employment per million dollars of output. Now the service industry looks great -- lot's of jobs. But you noticed on the last graphic that those jobs are not particularly high quality jobs. The trade is very low because of the large volumes; the sales really push that down. The sawmills show a moderate employment generation, third to the service industry and apparel in employment potential.
Figure 2

Employee Compensation per Dollar of Sales
Cumberland Plateau Planning District

<table>
<thead>
<tr>
<th>Trade Forest</th>
<th>Log</th>
<th>Serv</th>
<th>Constr</th>
<th>Agric</th>
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Figure 3

Employment per $ Million Output
Cumberland Plateau Planning District

Jobs

Trade  Forest  Log  Serv  Constr  Agric  Coal  Appar  Mills
By the way, the apparel industry is under extreme pressure from offshore competition and its days may be numbered. I think within a generation we won't see the apparel industry being nearly the important industry in terms of employment generation that it is today unless it becomes highly mechanized and replaces the employment, in which case it still won't be a very important source of employment. Services will be a very important source of employment but not as important a source of income. If we want to generate value added for our community tax bases it will be with jobs in the forest-based industries and some industries that don't even show up here. A diversified economy is something that this area needs a great deal.

Let me just review. That's how it looks at the local level. Very important. It stands out by itself among the industries that exist in this part of the state. At the state level, the sawmilling industry has the second highest income multiplier at 2.06. It has the second highest value added multiplier at 2.05. The industries that beat out the sawmill industry at the state level are usually other forest-based industries, by the way. They're all up there very high compared with the other industries in the state.

Let me just conclude with another bottom line. It really depends on a number of things, but if the industry were to develop, I think you could count on -- I'll put a caveat on this in a moment -- for each million dollars of sales of yellow-poplar at the mill level, a minimum of 30 jobs being generated in the economy. If the technology requires more direct jobs than ordinary milling would, as I seem to gather this morning that some of the technologies might require more direct jobs, then that multiplier would relate to even more jobs in the rest of the economy. And it would lead to approximately $700,000 in income to the local economy for every million dollars of sales, which is a magnitude of 2 or 3 higher than for most other industries in the region.

Now, having said that, we'll have to keep in mind that whenever we take an industry and really go to work on it and really develop it in the region it creates some of its own forward linkages. We haven't talked about the forward linkages. If we really put together a sound economic development program, we would be concerned about that other value added. It would change the structure of the economy. We would also find that some industries that supply inputs to that industry, which are not here now because it is not a big enough industry, would be attracted. So, a good sound economic development program will (a) concern itself with the value added from these forward linkages, and (b) try to increase the multiplier effects by attracting some of those input firms so that the economy becomes more linked and less leaky.

And Jack, that's what I had to say about the potential economic impact of a yellow-poplar construction lumber industry. It's very, very bright, I think.