

**A Look at the
MINE-TIMBER MARKET
in the Appalachian Bituminous
Coal Region**

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CONTENTS

THE QUESTIONS	1
HOW WOOD IS USED IN MINING	1
PRODUCING AND SELLING MINE TIMBERS	3
Mine-timber market	3
Mine-timber specifications	3
Equipment needed	5
CURRENT USE OF WOOD IN MINES	5
Mine-timber volumes	5
Mine-timber prices	5
Species	6
OUTLOOK FOR THE MINE-TIMBER MARKET	7
USEFUL REFERENCES.....	9



Figure 1.—The Appalachian bituminous coal region.

THE QUESTIONS

DO COAL MINE OPERATORS use many mine timbers? What are the specifications for mine timbers? Does producing mine timbers differ from producing other sawmill products? These are typical of the questions that sawmill operators in the Appalachians ask about the mine-timber market.

At first glance it seems strange that they would ask such questions. After all, the mine-timber market is a traditional outlet for wood products in the Appalachians, and it would seem that all sawmill operators in the region would be familiar with the market. But this is not the case. Sawmill operators, unless they sell mine timbers, know little about the market. Even those who sell mine timbers know little about the coal industry's current and potential need for mine timbers, because they generally supply only one or two mines.

This report was prepared to answer some of the questions that sawmill operators have about the mine-timber business in the Appalachian coal region (fig. 1).

HOW WOOD IS USED IN MINING

Wood is used in underground coal mines primarily to support the roof in the opened coal seam. For this purpose, round, split, and sawed timbers are used. Collectively these timbers are referred to as "mine materials", "timbers", or "mine timbers". Generally, round and split timbers are used for upright supports. Sawed timbers are used primarily for horizontal supports, mainly headers and half-headers. Sawed wood is also used for mine ties, floor

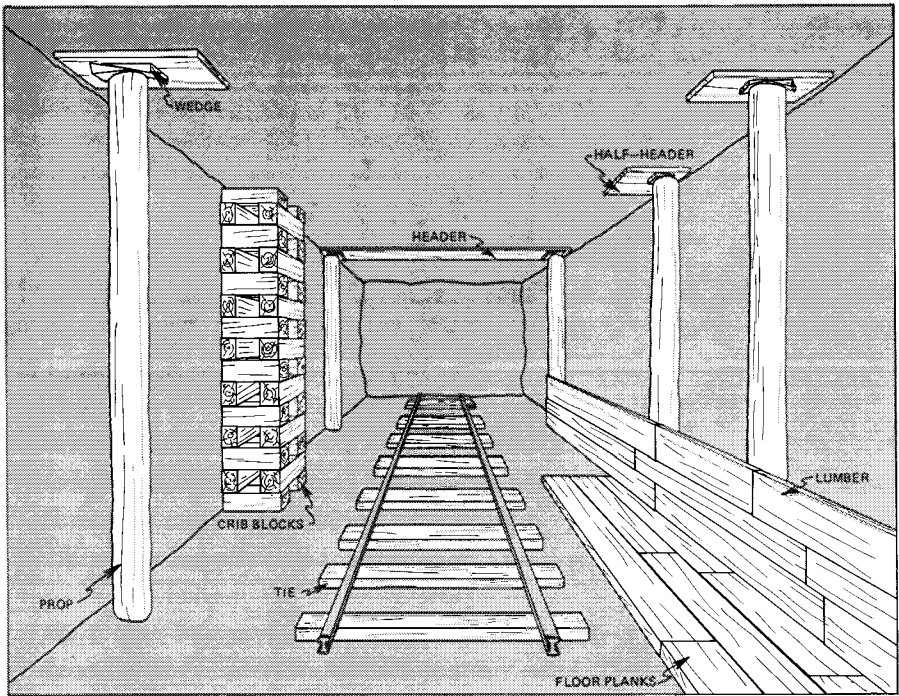


Figure 2.—Examples of timbers used in the underground bituminous coal-mining industry.

planking, wedges, crib blocks, construction and repair, and a number of minor uses (fig. 2).

As coal is extracted from the coal seam, roof support timbers are set and, depending on the mine or area in the mine, mine ties are laid, flooring is extended, and other uses are made of wood. Thus there is a direct relationship between the tonnage of coal mined and the volume of wood used.

Even though two coal companies produce the same tonnage of coal, their wood requirements may differ. The volume of wood used varies with the thickness of the coal seam, the nature of the roof and floor, the type of machinery used, other types of roof supports used, and the purity of the coal. For example, a mine with a rail system for hauling coal to the mine opening might use wooden mine ties. A mine with a conveyor system for hauling coal would not use mine ties.

PRODUCING AND SELLING MINE TIMBERS

Mine-Timber Market

Producing mine timbers for the coal industry differs somewhat from producing sawed wood products for other wood-using industries. Four of the more important differences are:

1. The coal industry does not have industry-wide specifications for mine timbers. Although all operators of underground coal mines use wood in mining coal, each mine operator determines his own timber specifications.
2. The mine-timber market is a first-hand contact type of market. Generally only the sawmill operator and the coal mine operator or his purchasing agent are involved in the buying and selling of mine timbers. Some of the larger coal companies purchase timbers through a timber broker, but this is the exception.
3. The working agreement between sawmill and coal-mine operators is on a long-term basis. Once an agreement to supply timbers is established, the agreement usually continues until one or the other quits operating for some reason. The agreement continues even though mine operators may be able to obtain timbers at lower prices elsewhere. Mine operators seldom change suppliers for a price advantage alone. If their present timber supplier is reliable, they do not want to jeopardize their mining operations because of a probable small savings on mine timbers. An advantage to this, of course, is that the sawmill operator is assured of a long-term market.
4. As coal is mined on a regular basis, so are mine timbers needed on a regular basis. To the sawmill operator, this means that green timbers can be sold, little storage space is required at the mill, and inventory turnover is rapid. Above all, it means that the mine-timber market is a steady market.

Mine-Timber Specifications

Coal-mine operators require timbers to be: (1) suitable for the intended use in the mine, (2) manufactured to their standards, and (3) structurally sound.

Most mine timbers are used to support the mine roof. Therefore strength qualities are most important in mine timbers. Other qualities such as durability, elasticity, and ease of construction are also important. Fortunately, in the Appalachians there is an abundance of species suitable for all types of mine timbers.

Mine timbers must be sawed to fit the dimensions of the working area in the mine. This is the major reason why mine-timber sizes cannot be standardized industry-wide. The dimensions of the working area are dictated largely by the height of the coal seam, which varies from mine to mine, and also varies within the same mine. Therefore mine timbers must be sawed to fit the conditions in the particular mine or area in the mine. Table 1 shows common sizes for mine timbers.

Many coal companies use drilled headers and half-headers. Roof bolts inserted through these timbers are fastened in the roof strata. In this method, a hole is drilled in the strata and a steel bolt several feet long is inserted in the hole. The bolt has 6 inches or more of threads at the end, with a metal expander attached, which gives a firm grip on the hole as the bolt is tightened. This binds several strata together, effectively forming a compound beam.

Some coal companies use treated timbers. Mine ties are often treated, but which timbers are treated and how many timbers are treated depends primarily on the expected life of the mine.

Another general requirement for mine timbers is that they must be structurally sound. No regard is paid to the decorative

Table 1.—*Dimensions of sawed mine timbers*¹

Type	Thickness	Width	Length
	<i>Inches</i>	<i>Inches</i>	<i>Feet</i>
Wedges	$\frac{1}{8}$ -1	4	1
Crib blocks	5	5	2 $\frac{1}{2}$
Half-headers	2	8	1 $\frac{1}{2}$
Headers	3	8	14
Ties	5	7	6
Miscellaneous	1	10	12

¹ Most of the round and split timbers are 36 to 70 inches long. Average length is about 53 inches, and average diameter is about 6 inches.

qualities of wood such as the furniture, flooring, and millwork markets demand. This means that sound logs and cants that will not yield lumber suitable for decorative purposes can be sawed for mine timbers.

Equipment Needed

The basic sawmill equipment required to produce mine timbers includes a headsaw, edger, trimmer, and wedgesaw, along with the necessary roller conveyors, refuse conveyors, and other auxiliary equipment. In addition, a drill press will be needed if drilled headers and half-headers are to be produced. Treating equipment will be required if treated material is to be produced.

Special attention needs to be given to the output end of the sawmill for efficient production, handling, and storage of mine timbers. Because of the large number and variety of sizes of mine timbers produced, a large sorting and storage dock is required to provide immediate access to each of the different items.

CURRENT USE OF WOOD IN MINES

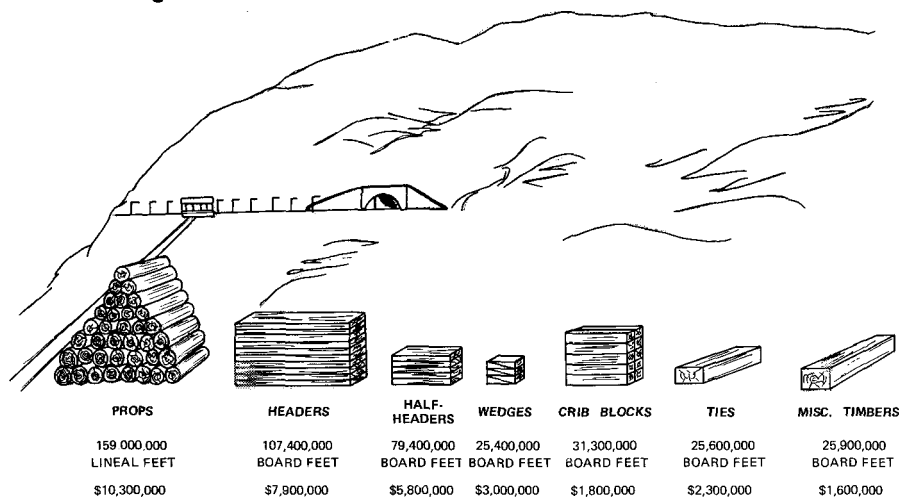
Mine-Timber Volumes

In 1967, an average of 1.0046 board feet of sawed timbers and 0.5420 lineal foot of round and split timbers were used for every ton of bituminous coal mined. In that year, approximately 294 million tons of bituminous coal were mined from underground mines in the Appalachian region. To produce this tonnage, an estimated 295 million board feet of sawed timbers and 159 million lineal feet of round and split timbers were used.

Mine-Timber Prices

Prices paid for mine timbers by a particular coal company vary according to such factors as delivery distance, timber species, size and quality, and whether the timbers are drilled, treated, or both drilled and treated. Average prices paid in 1967 for timbers delivered to the mines was \$0.065 per lineal foot for round and split timbers, and \$76 per thousand board feet for sawed timbers.

Figure 3.—Volume and value of wood used in underground bituminous coal mines in the Appalachian coal region in 1967.



The average price per thousand board feet for each type of sawed mine timber delivered to the mines was:

Wedges	\$119
Ties	90
Headers	74
Half-headers	73
Miscellaneous timber	60
Crib blocks	58

Figure 3 shows the estimated volume and value of each type of timber used by the Appalachian underground bituminous coal mining industry in 1967.

Species

A number of species are used for mine timbers. Each mine operator has his preference, but generally he uses the species available in the locality of his mine. An estimated 55 percent of the sawed timber volume is oak, primarily red oak; 15 percent hickory; 15 percent yellow-poplar, basswood, and cucumber; 6 percent beech; 5 percent pine and hemlock; and 4 percent miscellaneous hardwoods. The volume of round and split timbers consists mainly of oak, hickory, and beech.

OUTLOOK FOR THE MINE-TIMBER MARKET

Future wood requirements of the mining industry will depend on the demand for coal and on the need for wood in coal mining. The demand for coal is keyed to the demand of the industrial, export, coking, and electric utility markets. The need for wood will depend primarily on how effectively wood can compete with other products.

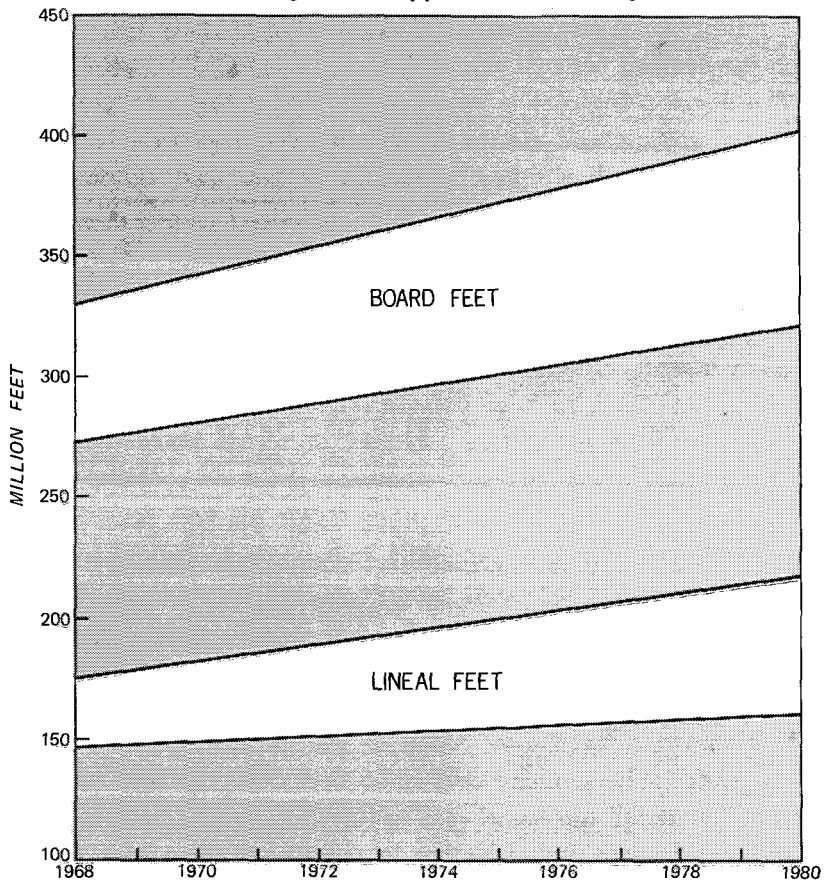
In recent years the trend in coal production has been upward. This trend is projected to continue; and it reflects the expected demand for coal by the major markets, especially the electric utility market. Electric utilities annually consume 50 to 60 percent of the Appalachian coal production. As electric utilities have expanded their production facilities in recent years—and continued expansion is expected—this market should continue strong for a number of years. The other major markets for coal are expected to maintain or gradually increase their demand for coal.

Indications are that coal production will continue to increase in future years. The volume of wood used in mining will also tend to increase, provided wood can continue to compete with substitute products. Although products such as roof bolts will continue to replace some wood in the mines, especially round and split timbers, many coal mine operators say they will use wood at about the same rate as they do now. This, together with the availability of timber in the Appalachian coal region, the relatively low cost of mine timbers, and the adaptability of wood, suggests a strong demand for wood in the future.

Assuming that underground coal production will rise at a steady rate until 1980, when 400 million tons of coal are expected to be produced underground in the Appalachian region, we can project an estimate of how much wood will be needed (fig. 4). These projections on wood use are based on the expectation that the wood use per ton of coal mined will remain the same or will decline somewhat.

Coal mine operators now have little difficulty in obtaining the timbers they need. However, this situation may change as the structure of the sawmill industry in the Appalachians changes.

Figure 4.—The projected range for the volume of mine timbers that will be needed in future underground bituminous coal mining in the Appalachian coal region.



Because of the geographic closeness of sawmills and coal mines in the Appalachians, it is easy for operators of coal mines and sawmills to discuss mine-timber prices, specifications, problems, and so forth. But there is a gradual reduction of sawmills in the Appalachians. With the reduction in number of mills, there is likely to be a growing distance between the mines and sawmills. A communication gap could develop, and this market for wood could be gradually lost. Therefore it is important that sawmill operators keep the needs of nearby coal mines in mind when considering the various potential markets for their products.

USEFUL REFERENCES

For the sawmill operator who wants to know more about the economics of producing timbers, two current publications are available:

Church, Thomas W., Jr., and L. D. Garrett.

Should hardwood lumber manufacturers consider cross-tie production? Submitted for publication in *S. Lumberman*.

Garrett, Lawrence D.

Economic implications of manufacturing sawed ties and timbers. USDA Forest Serv. Res. Paper NE-148. 24 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1969.

Although these publications do not deal directly with producing mine timbers, the same type of reasoning can be used in making a decision about producing mine timbers. These publications can be obtained by writing to the USDA Forest Service, Northeastern Forest Experiment Station, 6816 Market Street, Upper Darby, Pennsylvania 19082.



ACKNOWLEDGMENTS

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