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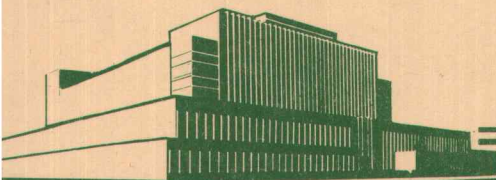
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PROTECTING GREEN LUMBER FROM DECAY DURING SHIPMENT

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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

In Cooperation with the University of Wisconsin

PROTECTING GREEN LUMBER FROM DECAY DURING SHIPMENT¹

Forest Products Laboratory,² Forest Service
U. S. Department of Agriculture

A major objection to lumber shipped green is that it may be damaged by wood-attacking fungi, either in transit or soon after it is put into use. The chance for such damage can be greatly decreased by dipping the lumber in a toxic solution at the sawmill.

Blue stain and mold fungi make wood unsightly and also can cause trouble by increasing the water absorptiveness of the wood; however, they rarely cause any serious loss of strength. The most serious type of fungus deterioration is decay. It is due to a very different type of fungus growth that can materially weaken wood before the infection is easily recognized. Bending strength and toughness or shock resistance may be reduced before there is any conspicuous effect on the appearance of the wood or any easily recognized softening. The effect of fungi on mechanical properties of wood is described in available publications.^{3, 4, 5}

¹—Original report by Carl Hartley, Division of Forest Pathology, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, 1953.

²—Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

³—Scheffer, T. C. Progressive effects of Polyporus versicolor on the physical and chemical properties of red gum sapwood, U. S. Dept. Agr. Bull. 527, 45 pp., illus., Sept. 1936.

⁴—Scheffer, T. C., Wilson, T. R. C., Luxford, R. F., and Hartley, Carl. The effect of certain heart rot fungi on the specific gravity and strength of Sitka spruce and Douglas-fir. U. S. Dept. Agr. Tech. Bull. 779, 24 pp., illus., May 1941.

⁵—Wilson, T. R. C., and Richards, C. A. Dipping helps to conserve strength of lumber. South. Lbrmn. 156(1973):30, June 15, 1938; Amer. Lbrmn. 3126:68, May 21, 1938; Timberman 39(7):44, May 1938.

Infections that have started in transit, but have not yet done real damage, too often continue to develop in later service before the wood has a chance to dry. If drying during use is slow, the infected lumber can lead to serious decay problems in construction. Furthermore, even if the wood is air dried fairly rapidly, the fungi may remain dormant for long periods. This means that the fungi can revive quickly whenever the wood is again wetted. The combination of absorptive wood and decay fungi already present has been responsible for costly damage to lumber in buildings.

Fortunately, it has been found that chemicals used successfully against sap stain and mold in lumber for air seasoning are also generally effective against decay in green bulk-piled lumber. Dipped fir, spruce, and western hemlock have been bulk-piled experimentally in Washington and Oregon for several months without apparent damage, while untreated boards in the same piles were heavily infected with decay fungi. Southern pine and hardwoods also have been protected by these dips, but the tests in the South have been for shorter bulking periods of 1 to 2 months. The cost for chemicals is less than 2 cents per gallon of solution at usual strength, or, when they are applied without waste, about 20 to 25 cents per thousand board feet of lumber. Chemical solutions that were indicated to be successful in retarding decay, in tests by the Division of Forest Pathology, include the following:

Chemical	Quantity <u>Pounds in 100</u> ¹ <u>gallons of water</u>
Lignasan (contains ethyl mercuric phosphate).....	2 to 4
MELSAN (sodium pentachlorophenate + ethyl mercuric phosphate).....	4 to 8
NOXTANE (sodium pentachlorophenate + alkaline chemicals).....	10 to 20
Permatox 10S (sodium pentachlorophenate + borax)....	10 to 20
Santobrite or Dowicide G (sodium pentachlorophenate).	7 to 14
A mixture made of	
Santobrite or Dowicide G.....	3 to 6
Powdered borax.....	12 to 24

¹The lower concentration is recommended only when periods of bulk piling are to be no longer than 2 months for western woods other than pine, and 2 weeks for southern and western pines. This concentration usually is used for lumber that is air seasoned immediately after cutting.

Lignasan and Melsan can be obtained from E. I. duPont deNemours & Company of Wilmington 98, Del. The Dovicides and Permatox 10S are supplied for use on wood by Chapman Chemical Company, Inc., located at Memphis, Tenn. Santobrite is supplied by the Monsanto Chemical Company, St. Louis 4, Mo., or the R. T. Vanderbilt Co. Inc., New York City. Noxtane is supplied by the Wood Treating Chemicals Co., St. Louis, Mo. Borax can be obtained from a number of chemical supply houses.

The lower strengths of solution advised are for stock of ordinary thickness and stored for usual periods of time. For best assurance of protection through long periods in bulk piles or for large timbers, solutions as strong as 1-1/2 to 2 times the lower strengths are advisable. For sawed timbers the benefits from dipping are less certain and the double-strength solutions should be used.

Treating is usually done at the larger mills and concentration yards by passing the conveyor chain through a dipping vat, and involves little additional labor. At some mills, timbers and, less often, lumber are treated by means of spraying equipment. This treatment is effective if all surfaces are thoroughly wetted. Illustrations of dipping vats are supplied in literature put out by the chemical manufacturers. At small mills where dipping is done by hand the full time of at least one additional man usually is required. Skin irritation from handling the freshly treated lumber must be guarded against, particularly in the case of the straight chlorinated phenol materials (Santobrite and Dowicide G).

For best results the treating should be done within 24 hours after sawing. In warm weather, delay of more than 24 hours will allow stain infection and may also permit decay fungi to get a foothold. But when lumber is planed the chemicals are mainly lost with the shavings. If it is dressed soon after sawing, the dipping should be done immediately after dressing instead of as it comes from the saw. The best course for material that is shipped green is to dip it after sawing and again after planing, if the interval between the two operations exceeds 3 days. Of course, dipping at any time is only partly effective on lumber from old logs in which infection has already started.

Dipping treatment is not to be confused with more permanent wood preservation, which requires that the wood be impregnated.

Decay retardation obtainable by the use of stain preventives does not warrant the use of green lumber when dry lumber can be obtained.