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LABORATORY

Pocket Edition
HARDWOOD LOG GRADES FOR
STANDARD LUMBER
and
HOW TO APPLY THEM
Reviewed and Reaffirmed
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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FOREST PRODUCTS LABORATORY
Madison 5, Wisconsin
In Cooperation with the University of Wisconsin

HOW TO APPLY THE LOG GRADES

By

Forest Products Laboratory

Extract from detailed publication containing grade-yield tables entitled "Hardwood Log Grades for Standard Lumber -- Proposals and Results," Forest Products Laboratory Report No. D1737.

The grading of logs is not so difficult as may first appear. However, it does require close scrutiny to make sure that the hidden defects are not overlooked. With some experience the grade of the log can be determined in most cases while examining the log in the process of scaling. Even in the logs where the grade is not immediately apparent it is seldom necessary to lay out the actual cuttings. Usually measurements to see whether the cuttings conform to the minimum size will be enough to determine the grade.

Faces

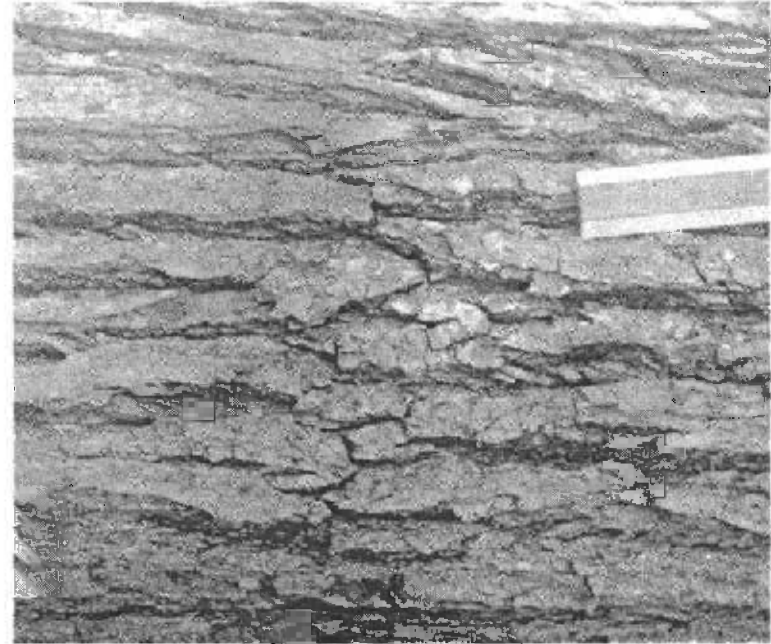
After taking into account the size and soundness of the log, the first step in grading is to visually square the log full length into four faces so oriented to give the largest possible number of good faces. The influence of a given defect should be confined to one grading face wherever possible instead of permitting it to extend over two faces unnecessarily.

Clear Cuttings

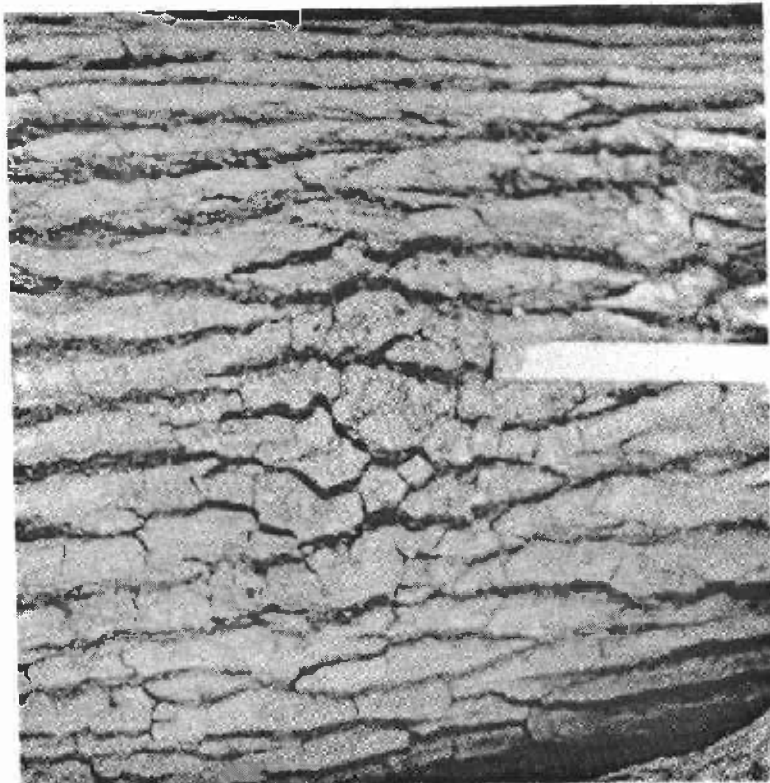
The next step is to establish the grade of the best three faces on the basis of the clear cutting requirements. Only when two of these faces grade higher than the third is it necessary to examine the fourth face in order to be sure that the best faces have been selected. The grade of the log is that of the lowest of the faces chosen as the three grading faces.

The portions of the length of the face that lie between defects or between the ends of the logs and defects and extending over the full width of the face are taken as the clear cuttings.

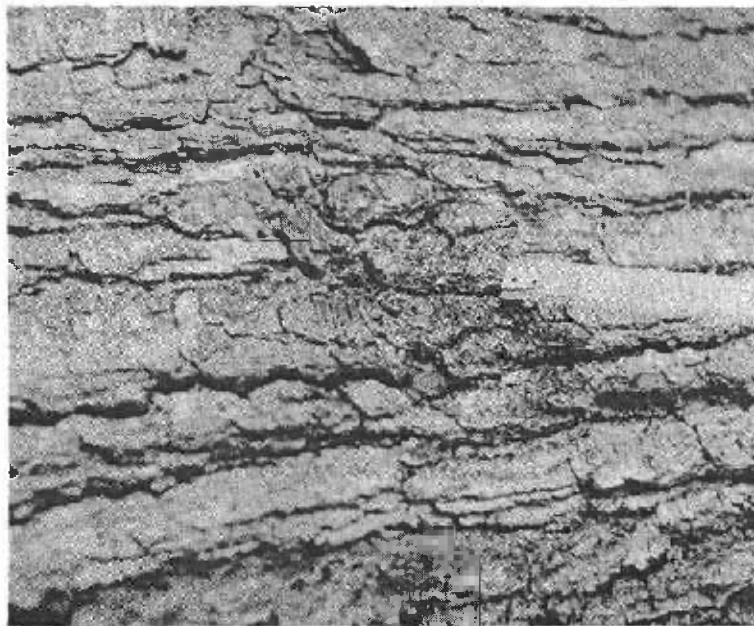
Knots, bark-covered defects such as bumps, overgrown knots, grub holes, etc., either projecting or recessed, are excluded from clear cuttings. However, any feature, such as shallow fire and other scars, seams, and frost cracks whose maximum depth extends one-fifth or less the diameter of the log at that point, is not considered a defect.



Slight bark distortion, consisting of a simple horizontal break across the normal bark pattern -- not a defect.



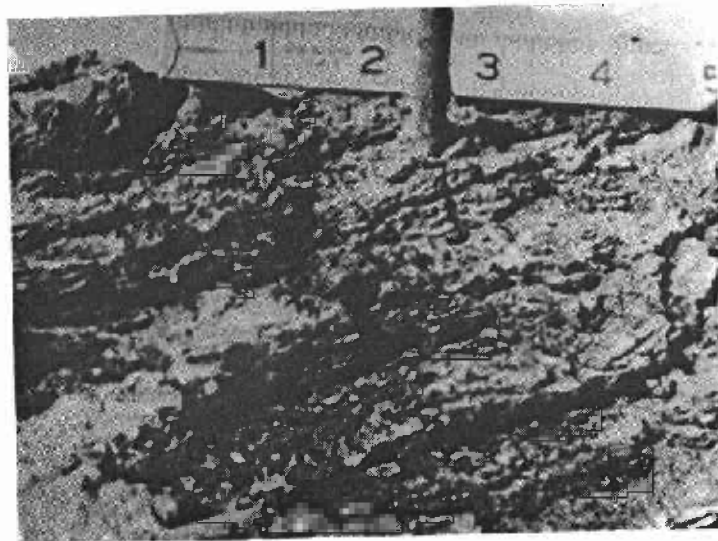
Medium bark distortion consisting of compound breaks across and along the normal bark pattern -- a defect in all diameter logs.



Small bark distortion, consisting of a localized break in the normal bark pattern but not clearly an overgrown knot -- not a defect in 15-inch and larger logs.



Bark distortion that clearly is an overgrown knot -- a defect in all diameter logs.

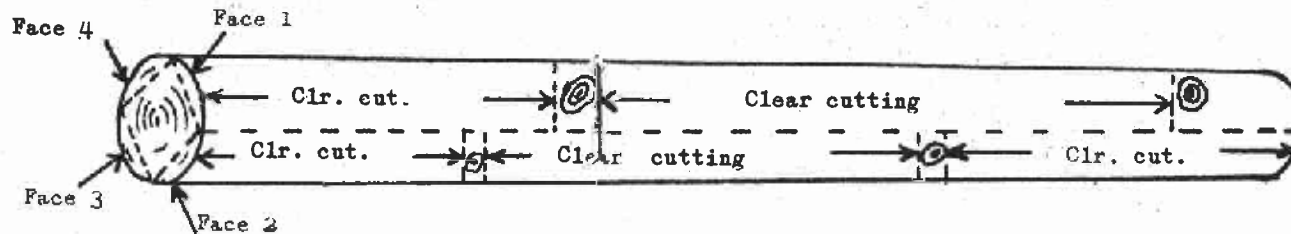


Adventitious twig growth $\frac{3}{8}$ " or less in diameter is a defect in logs under 14" d.i.b. On logs 14" and larger, only every other one is considered a defect.

In the nondense hardwood species it is not considered a defect in grade 3 logs.

HARDWOOD LOG GRADES FOR STANDARD LUMBER

Grade factors	Log Grade 1		Log Grade 2	Log Grade 3
	Butts only	Butts and uppers	Butts and uppers	Butts and uppers
DIAMETER (minimum)	13"-15"	16"-19" ; 20"+	11	8"+
LENGTH (minimum)	10'+	10'+	8'-11' ; 12'+	8'+
CLEAR CUTTINGS (on the 3 best faces)				
Length (minimum)	7'	5' ; 3'	3'	2'
Number on face (maximum)	2	2	2 ; 3	Unlimited
Yield in face length (minimum)	5/6	5/6	4/6	3/6
SWEEP AND CROOK DEDUCTION (maximum)	15%	15%	30%	50%
CULL DEDUCTION, including sweep (maximum) ..	40%	40%	50%	50%
SOUND END DEFECTS, area (maximum)	--- See instructions ---			



Exceptions.—In ash and basswood 12" d.i.b. for grade 1 butts.

Grade 2 10" d.i.b. must be grade 1 surface quality.

Grade 2 11" d.i.b. limited to two cuttings.

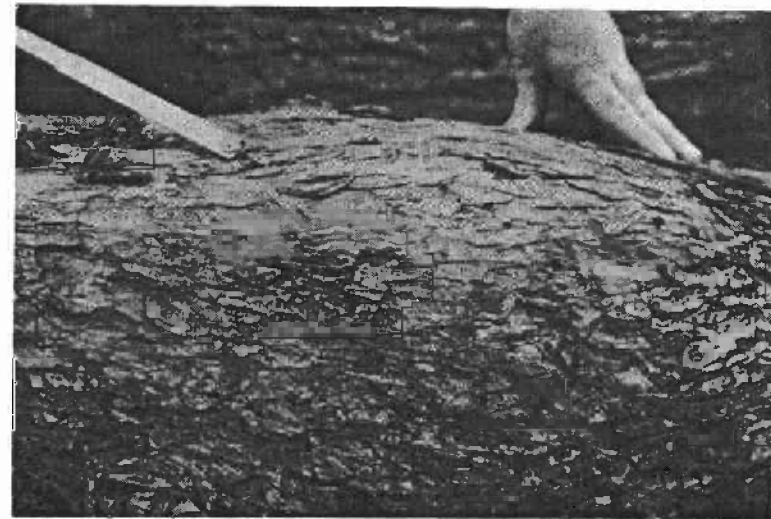
Grade 2 8' and 9' lengths limited to 12" d.i.b.; 3/4 yield in not more than two 3'+ cuttings.

Sweep and crook allowance reduced 1/3 in logs with more than 1/4 diameter in sound end defects.

Sixty percent cull deduction permitted in grade 2 if otherwise of grade 1 quality.

Sixty percent cull deduction permitted in grade 3 if otherwise of grade 2 quality.

Forest Products Laboratory
Madison, Wisconsin
March 10, 1949



Grub holes or other insect holes open or overgrown are considered defects on all logs under 16" d.i.b. In larger logs when the occurrence of the holes is frequent, some of them can be included on each face in the clear cuttings as follows:

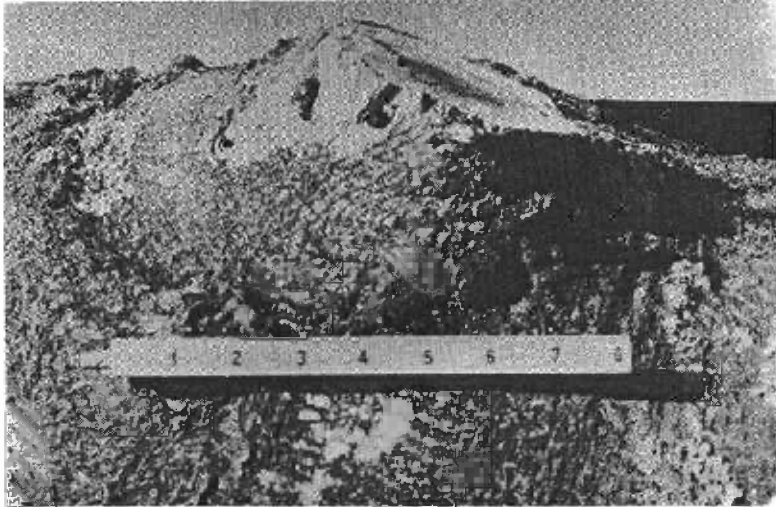
16" to 19" d.i.b. every 6th hole
 20" to 23" d.i.b. every 5th hole
 24" to 27" d.i.b. every 4th hole
 28"+ d.i.b. every 3rd hole

A bump is taken as any bark-covered protuberance with gradual to abrupt sloping sides, the cause of which is not clearly evident.

Bumps are not considered defects in logs:
 under 14" d.i.b. when the length of the bump is 16 or more times its height,
 nor in 14" logs and over d.i.b. when the length of the bump is 12 or more times its height.

Measurement of clear cuttings may extend into both ends of bumps by:

1/4 when length is 6 or more times the height,
 1/8 when length is 3, but less than 6, times the height.



For measurement of clear cuttings adjacent large, coarse, elevated defects, the size of which is taken flush with the bark surface:

- 2" to 4" defects: measure cuttings to 1/2" above flush bark surfaces,
- 5" to 7" defects: measure cuttings to 1" above flush bark surfaces,
- 8"+ defects: measure cuttings to 1-1/2" above flush bark surfaces.

End Defects

Sound end defects, such as medium to heavy mineral stain in hard maple and yellow-poplar and slight dote in yellow birch on the small end of the log, shall not exceed one-half the log diameter for Grade 1 logs and for Grade 2 logs under 16", and not exceed three-fifths the log diameter on Grade 2 logs 16" and larger. Excess will lower the log one grade. When the defect is not concentrated in one spot, its extent is taken as the sum of the individual occurrences. Slight stain is not a defect.

Unsound end defect, such as decay and heavy shake, outside the heart zone (taken as one-fifth of the diameter from the pith), when extending more than one-half the distance between the heart zone and the bark, prevents taking clear cuttings on the face surface overlying it. When it extends less than the full log length, cuttings can be taken over a third of its estimated length from the end tapering out.

Specific end defects, such as bird peck, worm holes, spot wormhole stain, mineral spots or streaks, and such unsound

Sweep, Crook, and Cull Deductions

defects as grub holes and bark pockets are considered when outside the heart zone, the heart zone being taken as extending one-fifth the diameter of the log from the pith. When these defects affect one-half the radial distance between the heart zone and the bark under three faces of the log at one end, or two faces at both ends, a log of Grade 1 or 2 shall be dropped one grade. When there is less than 3 inches either between the heart zone and the defect, or between defects, the portion will be included with the defect.

For seams, frost cracks, and fire or other scars whose depth exceed one-fifth the diameter but not extending the full length of the log, clear cuttings can be taken over one-third of its length from the end tapering out.

Bird pecks are considered defects in cuttings of Grade 1 and Grade 2 logs when the area contains more than four bird pecks per square foot. However, when the depth of the bird peck on the end of the log is less than one-tenth of the log diameter it is not considered a defect.

Logs that involve deductions in scale in excess of percentages allowed for each grade are dropped one grade. All deductions that are made by enclosing the defect in a rectangle are computed according to the National Forest Scaling Handbook (1940) by multiplying width, height, and length of defect together and dividing by 15. The maximum percentage deduction for this type of cull as provided for in log grade specifications will apply to Scribner Decimal C, Doyle, or International rules. However, the percentage deduction arrived at when Doyle, or International scale is used in grading should be multiplied by the following factors to give the approximate percentage deduction for grading:

<u>International Rule:</u>	<u>Factor</u>
Logs 8" to 14"	1.2
Logs 15" to 19"	1.1
Logs 20" to 36"	1.05
Logs 37" and up	None

Doyle Rule:

Logs 8" to 11"	0.6
Logs 12" to 13"8
Logs 14" to 20"9
Logs 21" to 31"	None
Logs 32" to 40"	1.1

For sweep the rule-of-thumb given in the Handbook is replaced by the provision that the percentage deduction is taken as the maximum sweep minus 2, divided by log diameter.

Measurement of Log Diameter and Length

Average diameter inside the bark on the small end of log is used in scaling and grading. The length for figuring the necessary clear cuttings is dropped to the full foot, but the cuttings are allowed to include the overlength.

Yield of Clear Cuttings

Required yields are given in fractions for simplicity of application: For a five-sixths yield, use 10 times the nominal length of log in feet as equal to the required total clear length in inches, namely, $10 \times 12 = 120$ or 10 feet; for four-sixths yield take $8 \times$ length; for three-sixths yield take $6 \times$ length.