SERVICE TESTS ON POSTS AS A MEANS OF EVALUATING WOOD PRESERVATIVES AND METHODS OF TREATMENT

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SERVICE TESTS ON POSTS AS A MEANS OF EVALUATING WOOD PRESERVATIVES AND METHODS OF TREATMENT

(Suggestions as to procedure that should be used in order to obtain the maximum benefits from service tests on treated posts)

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Although other properties need to be considered, the essential requirements of a good wood preservative are toxicity and permanence (2)[3]. To be effective or to provide a high degree of protection any preservative must be applied by a method that assures an adequate retention and good penetration in the wood (11). Long experience of users of treated fence posts, poles, ties, and other forest products shows that premature failures are usually due to inadequacies either in the preservative itself or in the method of applying it. The evaluation of a preservative treatment therefore involves a consideration of the preservative and of the penetrations and of the retentions that are obtained in its application.

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

[3]Underlined figures in parentheses refer to Literature Cited at the end of this report.

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It is a simple matter to determine preservative retentions and penetrations. The most satisfactory method of determining the ultimate effects of differences in these factors, with a given preservative, however, is to install the treated product in service under different exposure conditions and await the results. Some indication of the value of wood preservatives can be obtained through laboratory toxicity and permanance tests or from accelerated field tests on small treated stakes (1), (5), (4). These tests are extremely useful for screening purposes and can often be employed to advantage as an index of anticipated performance. Such tests, however, do not duplicate conditions under which preservatives are applied and used in service. They cannot be used therefore as an accurate yardstick or as a reliable substitute for the more time-consuming service tests in which the objective is to determine the actual life of the treated product as it is used. Since even in service tests, the results of a single installation may be misleading, it is advantageous, whenever possible, to make the evaluation on the basis of several installations under different use conditions. The results of post tests cannot be used as a direct measure of the performance to be expected from other products installed under different conditions, but they can furnish a good indication of the value of the preservative or treatment in question.

Post tests constitute one of the simplest and most convenient forms of service tests (3). Posts are usually easier to treat, install, and inspect than other treated products, such as poles and ties. Tests on posts, when carefully conducted, can be a useful tool in making comparisons of various wood preservatives and wood-preserving treatments. They can also be used to advantage in demonstrating the adaptability of a treatment to posts of different species of wood. Improperly handled, they, as well as any other tests, can yield misleading and confusing results. It is the object of this discussion to suggest suitable procedures. Test procedures in wood preservation are constantly undergoing improvement. It is therefore recommended that the suggestions offered be used as a foundation upon which to build as improved tools and techniques become available, rather than be considered as a "cook-book recipe." The suggestions apply principally to research studies, although they may, in some cases, be used to advantage by commercial or private post-treating agencies.

Suggested Procedure

Any test should be well planned, and plans for post tests, which may extend over many years, should take into consideration not only the immediate future but also the time when the follow-up work will be dependent

upon the successors of the one who initiates the test. The value of many such tests has been lost due to failure to carry the program beyond the beginning stages.

Factors to be considered in a post-service test are essentially as follows:

The posts to be used

The preservatives and retentions (pounds per cubic foot) to be included

The treatments or methods of applying the preservatives

The installation

Inspections of the posts

Reporting results

Selection of Posts

The posts selected for test should be preferably of the same species, unless there is a special reason for using more than one species. Some investigators may want to include only one treatment on a variety of species. The posts should be sound and, as far as possible, should be selected for uniformity in size, sapwood thickness, seasoning or moisture content (unless treated unseasoned), and density. A 3- to 5-inch top diameter and a 6- to 7-foot length is a convenient size for test posts. To assure soundness, the posts should be carefully piled off the ground during seasoning; and when climatic conditions are favorable to decay or mold infection, they should be sprayed soon after cutting with a stain-control chemical such as a 1 percent solution of sodium pentachlorophenate. Quantity of spray should be limited so that a large amount of the chemical will not be absorbed by the wood and thereby influence the results of the test. All posts should be carefully and uniformly peeled, since even narrow strips of inner bark may block penetration of the preservative (fig. 1). A complete record should be made that will include information on these factors of preparation and initial condition and on the source of the posts. In studies for the comparison of preservatives it is well to select an easily treated wood, such as one of the pines with thick sapwood, in order to assure good preservative distribution, and to use a method of treatment that will provide such results.

Many tests on posts have included a large number of species, preservatives, treatments, and other variables, but have made the mistake of not requiring a sufficient number of replicate posts for each test variable. It is desirable in limited tests to include fewer test variables and to increase the number of posts for each test variable.

The minimum number of posts that could be considered statistically as an adequate sample, is not definitely known. Consideration should be given, however, to the fact that unavoidable losses can be expected in post-service tests due to fire, pilferage, and mechanical injury. Furthermore, variables of sapwood depth, post size, and other influential factors, such as test site, cannot be entirely eliminated or controlled. On this basis, 25 posts for each treatment is considered by the author of this report as the minimum number that should be used. Experience indicates that there is a reasonable likelihood that a 25-post sample will make it possible to detect significant differences of 1 to 2 years in service resulting from various treatments. The installation should, of course, include a set of untreated control posts similar in number and character to those selected for each treatment.

Each post, preferably before treatment, should be identified by a number. The number can either be stamped on a metal tag and attached near the top of the post, or it can be branded on the post. Both methods have their advantages and disadvantages. Branded numbers often become concealed by preservative that bleeds from the post, or they tend to become illegible as the surface of the posts becomes weathered. Metal tags that are corroded by some preservatives tend to come loose, especially if the nail is not properly selected or if checking of the wood occurs at the nail hole. It may often be found desirable to number a post at two points some distance apart. Care in selection of the nails and of the metal for both nails and tags will help to reduce losses. Generally, zinc or aluminum tags and galvanized threepenny or fourpenny nails will be found suitable for the purpose.

Selection of Preservatives

It is important, first of all, in laying out plans for a test, to decide on the preservatives that should be included. The retentions of preservative to be included can often be selected on the basis of existing treatment specifications. In the case of new materials, recommendations of the supplier and the results of toxicity or accelerated tests may be the basis for selecting retentions of preservative to be used in the test. A preservative oil, for example, that is similar in toxicity to coal-tar creosote might be used with a retention of 6 or 7 pounds per cubic foot, as is generally specified for that preservative in treating specifications for fence posts. When the principal aim of the study is to test the pre-

servative rather than the treatment, it is well to include several retentions with at least one below and one above the quantity considered to be optimum. In the case of water-borne preservatives, retentions are usually indicated in terms of dry chemical, and variations in retention are obtained by regulating the concentration of the treating solution according to the quantity of solution found by trial or experience to be absorbed by the posts.

The preservative used should be of known composition and purity. This requirement applies to solvents and other components in the treating solution as well as to the actual preservative. The formulation of a proprietary preservative may be changed at any time, so that its name alone, without information as to its actual composition, is of little value in a test that may run for a period of 15 to 20 years or longer. It is advisable, even with known materials, to require an analysis for purity. It is also well to retain a sample of the preservative for future analysis, since questions as to composition frequently arise, especially when the results of the test begin to attract interest.

In preparing the treating solutions of the preservatives it is important that the weights of all components be checked and recorded. If liquids are measured volumetrically instead of by weight, the specific gravity of the liquid should be obtained, at the temperature at which measurements are taken, for purposes of converting volumes into weights. All weights, volumes, and solution concentrations should be recorded.

Methods of Treatments (11), (9)

Attention has already been called to the fact that the performance of a preservative is influenced by the thoroughness of treatment as well as by the effectiveness of the material itself. It is not proper, therefore, in making comparisons of different materials, to use one preservative applied by a superficial method and another applied by a method by which the wood is well impregnated with the preservative. If the principal aim is to compare methods of treatment, such as brush, dip, and ground-line methods, this fact should be made clear. As indicated above, in making comparisons between preservatives it is important that the wood be uniformly well treated so that the variable of incomplete sapwood penetration is excluded as far as possible.

Regardless of the method of treatment, the condition of the posts (moisture content, checks, etc.), the conditions used during treatment (time, temperature, pressure, etc.), the retentions, and the penetrations should be carefully observed and recorded. Moisture-content determinations should be made on four or five representative posts of each seasoning class and

species before treatment (8). Treating conditions such as time, temperature, and pressure are of interest since they often explain the results obtained.

It is always advisable that the posts be treated by the person conducting the tests rather than by promoters of preservatives or treatments. When this is impractical, the person responsible for the test should be present to take samples, observe the treatment, and keep a complete record of all conditions used. Many examples can be cited where failure to observe this rule has resulted in incomplete, unauthentic, and consequently worthless data.

It is usually not difficult to determine preservative retentions. The volume of the post is determined by taking measurements of the post in inches and by using the following formula:

$$V = (D^2 + d^2 + Dd) \times 0.001818 \times L$$

where V is volume in cubic feet, L is length in feet, D is top diameter in inches, and d the butt diameter in inches. Post volumes can be quickly and accurately determined by water displacement, although a day or so between water immersion and treatment may be needed to permit the surface of the wood to become dry.

The difference in the weight of the post before treatment and after treatment divided by the volume will give the retention in pounds per cubic foot. A diameter tape showing diameter readings directly in inches and tenths of an inch can be used to advantage. A calibrated stick, showing post length in feet and tenths of a foot and fitted with a hook on one end, is also useful. Tables or curves[4] that are often available, or could be developed, to show post volumes for various length and diameter classes, would make it possible to avoid computations on individual posts.

In treatments by which the posts are heated for prolonged periods in the preservative at temperatures above 212° F., differences in weights before and after treatment do not take into account moisture losses from the wood due to heating. A reasonably close correction for such losses can be made by obtaining the moisture content of increment-borer cores from the test posts, or of sections from representative nonexperimental posts, before and after treatment. The distillation method can be used to obtain the moisture content of the wood both before and after treatment (8).

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[4] See figure 6 in "Preservative Treatment of Fence Posts," U.S.D.A. Farmers Bulletin 2049.

Preservative penetrations on treated posts to be installed in test, can best be obtained by extracting increment-borer cores from the posts (10). Since deterioration is most likely to occur at the ground line of the posts, it is important that penetrations be determined at this point. It is always desirable in studies of penetration to cut up a few posts, and where it is possible to treat extra posts for this purpose, this practice is to be encouraged. In cutting up posts it is preferable to split or saw them longitudinally and to examine the penetration pattern for the full length of the post. If cutting or splitting is impractical, several cross sections of posts can be cut and examined for depth of preservative penetration. In all such cases on post sections, it is well to note minimum, maximum, and average penetration measurements in the same horizontal plane.

Attention should be called to the fact that preservative oils creep rapidly over the end-grain wood surfaces, so that increment-borer cores and cross sections of posts should be split and the penetration measurements be taken immediately from the freshly split surface rather than from the end-grain surfaces.

Penetration depth in thorough impregnation treatments is influenced by the depth of sapwood, so that in taking penetration measurements the depth of sapwood should be taken in the same plane. Forest Products Laboratory Technical Note No. 253 refers to reagents that can be used to advantage for differentiating between sapwood and heartwood of the pines, oak, and Douglas-fir (12). The author has also found a 10 percent solution of ferric chloride to be useful for this purpose when used with Douglas-fir and western larch. The heartwood is stained promptly to a color ranging from dark green to black, while the sapwood is a lighter green, which becomes darker in time.

Installation

The posts can be installed either in fence lines or in plots, depending upon the aim of the test. The plot type of installation is sometimes preferred, since by it the variables due to differences in soil, site, mechanical disturbances, and fire are more easily controlled than in fence lines extending over a wide area. Experience has also indicated that posts set in plots are less likely to be disturbed or moved after installation. Line fences are less likely to be disturbed than cross fences. The fence line, of course, has the advantages of using the posts for a double purpose and of having the posts installed under actual use conditions. This latter factor, however, may be a disadvantage when the only purpose of the test is to compare preservatives.

The site for the installation should be carefully selected. Plots should be on comparatively flat land with uniform soil type, drainage, moisture supply, and ground cover. Information on the soil and on local climatic conditions should be obtained and recorded.

It is well to randomize the posts in the installation. In the case of the fence-line installation the posts can be installed in units with the total number of units equal to the number of replicate posts for each test variable. Each unit should then contain one post representing each test variable. The posts can be randomized in the line according to units and within units. In plots the posts can be installed by the randomized block method (6). In this way the number of blocks equals the number of posts for each test variable, and the posts are randomized according to blocks and within blocks. Figure 2 shows a diagram of a fence-post installation including five different species of wood with three treatments and with untreated controls (20 test variables), and with 25 posts for each test variable. These posts were set at a distance of 3 feet apart each way. This spacing is convenient from the standpoint both of inspection and of keeping the plot free from objectionable plant growth.

The posts should be installed to a uniform depth and should not be cut off or pointed during the installation. If pointing is necessary, it should be done before rather than after treatment, since cutting away the treated surface is likely to expose untreated wood to decay and insect attack. After the installation has been completed, a map or diagram should be prepared for the record to show the location of the experimental posts.

Inspection

The inspections of the posts should be made at regular intervals, the frequency of which will be determined by the estimated effectiveness of the treatments. The condition of untreated posts and of those with treatments of limited effectiveness will change more quickly, so that inspections of them will be required more frequently than of posts with a highly effective treatment. In general, however, annual inspections are desirable.

The principal objective in inspecting experimental posts is to ascertain the time of failure. Information on the condition of the post prior to failure is of definite interest, but it is not safe to use this information for the purpose of predicting failures in advance of their occurrence. Experience frequently indicates that posts found to be partially deteriorated, will often remain serviceable longer than some of those inspected at the same time that seem sound.

It is highly important that the posts not be multilated or mechanically injured during an inspection, since injury to the treated shell may expose the interior of the post to infection or attack. The use of sharp-pointed inspection tools should therefore be discouraged.

It is the practice of some investigators in inspecting posts to apply, with the aid of a spring balance, a measured pull at a definite distance from the ground line of the post. This is good practice, but since it involves considerable time and effort in carrying and adjusting equipment, the author prefers to give each post a moderate push at the top as a means of determining whether or not the post is serviceable. Posts that break off under this push are considered to have failed. Posts that have so badly deteriorated in the tops that they will not hold staples nor support a fence, are also considered to have failed. Failures should be given a careful examination, and all contributing causes, such as decay, termite attack, fire, checking, and mechanical injury should be noted and recorded. Those that have not failed should be examined for the presence of both external and internal deterioration, although it is not necessary to examine these serviceable posts with great detail.

In recording the results of the inspection it is suggested that a stiff-covered field notebook be used. The post numbers can be entered in this book in the order that the posts appear in the installation line. This field record can later be transferred to an office record in which the posts are listed according to treatment variables (figs. 3 and 4). In the case of plots the posts can also be inspected by following lines back and forth across the plot. Sufficient space should be provided after each post number in the inspection book to permit entries for a number of future inspections, and a different-colored pencil or different symbols can be used to distinguish between the periodic inspection ratings. The following symbols are suggested for recording inspection results:

G - Good

Bpd - Partial or light decay in the butt

Bd - Bad decay in the butt

Tpd - Partial light decay in the top (above ground)

Td - Bad decay in the top (above ground line)

Teb - Termite attack in the butt

Tet - Termite attack in the top (above ground line)

R-1955 Bd - Failed during the 1955 inspection on account of decay in the butt.

(Other symbols can be substituted where another factor is responsible for the failure.)

Reporting Results

Table 1, taken from the report, "Comparison of Wood Preservatives in Mississippi Post Study (1955 Progress Report)" (2), suggests a method of summarizing the inspection results of a fence-post test. In preparing such a tabulation, however, it is helpful first to enter the field inspection records in an office record book as suggested above. In the case of the posts in table 1 the office record book lists the post numbers according to preservative, and opposite each post number is recorded the preservative retention for that post and then the periodic inspection records, expressed as symbols, copied directly from the field inspection records. The office record sheets should be wide enough to permit a number of periodic inspection entries opposite each post number (fig. 4). When a post fails, its life in years is written into the office record. These life values, when all are in for a given group, are then added and the sum is divided by the total number of posts in the group to get the average life of the posts in that group.

It is often possible through the use of mortality curves to estimate the probable life of posts on the basis of the percentage of removals after a definite period of test (7). The last column of table 1 shows estimates arrived at through the use of such curves.

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Table 1.--Condition of round southern yellow pine experimental fence posts on the Harrison Experimental Forest, Saucier, Miss., after about 13-1/2 to 18 years of service (treated posts were installed from late in 1936 to May 1941

Preservative	Posts in test[1]	Form of preservative	Retention of preservative[2]: Minimum	Maximum	Average	Standard deviation	Method of treatment	Condition of posts December 1954: Serviceable	Removed on account of: Decay	Decay, termites	Termites	Total removed	Average life[3]
	No.		Lb. per cu. ft.	Lb. per cu. ft.	Lb. per cu. ft.	Lb. per cu. ft.		Percent	Percent	Percent	Percent	No. Percent	Yr.
Posts set late in 1936 to February 1937													
Beta-naphthol, 5 percent (by weight) in oil mixture	98	Solution	3.90	10.00	6.20	1.30	Pressure	11.2	16.3	54.1	18.4	87 88.8	15
Borax-boric acid (50-50 mixture)	97	Salt	.64	1.32	.92	.11	do	4.1	15.5	44.3	36.1	93 95.9	13
Celcure (acid cupric chromate)	93	do	.75	1.05	.92	.08	do	90.4	7.5	2.1		9 9.6	
Chromated zinc chloride	96	do	.37	1.33	.87	.19	do	66.7	17.7	15.6		32 33.3	22
Coal tar	96	Oil	1.60	19.20	6.50	2.90	do	87.5	5.2	7.3		12 12.5	27
Coal-tar creosote, grade 1	98	do	1.90	8.60	6.00	1.50	do	95.9	4.1			4 4.1	
Coal-tar creosote, 50 percent, used crankcase oil, 50 percent (by volume)	98	Solution[4]	1.60	14.80	5.40	2.20	do	94.9	5.1			5 5.1	
Coal-tar creosote, 10 percent, used crankcase oil, 90 percent (by volume)	99	do[5]	.10	23.20	7.10	3.80	do	26.3	65.6	7.1	1.0	73 73.7	17
Crankcase oil (used)	98	Oil[2]	2.50	16.80	7.60	2.90	do	14.3	81.6	4.1		84 85.7	15
Lignite coal-tar creosote	98	do	1.10	11.60	6.30	3.20	do	69.4	11.2	16.3	3.1	30 30.6	22
Mercuric chloride	100	Salt	.05	.15	.09	.03	Steeping	70.0	4.0	18.0	8.0	30 30.0	22
No-D-K (hardwood-tar creosote)	100	Oil	1.30	13.60	6.60	3.50	Pressure	45.0	14.0	37.0	4.0	55 55.0	19
Osmosar	96	Salt			[7] .30		Osmose	65.6	15.6	14.6	4.2	33 34.4	21
P.D.A. (phenyldichlorarsine) 0.84 percent in gas oil (by weight)	94	Solution	4.10	11.00	5.90	.90	Pressure	51.1	6.4	30.8	11.7	46 48.9	19
Pentachlorophenol, 4.82 percent (by weight) in used crankcase oil	98	do	2.90	9.50	6.70	1.60	do	99.0	1.0			1 1.0	
Pentachlorophenol, 3.02 percent (by weight) in used crankcase oil	94	do	3.10	11.40	6.40	1.80	do	97.9	2.1			2 2.1	
Sodium dichromate	97	Salt	.59	1.14	.88	.11	do	37.1	5.2	24.7	33.0	61 62.9	18
Sodium chromate	90	do	.70	1.19	.93	.10	do	31.1	5.5	17.8	45.6	62 68.9	17
Wolman salt (Tanalith)	97	do	.20	.47	.35	.07	do	70.1	14.4	10.3	5.2	29 29.9	22
Tetrachlorophenol, 2.9 percent (by weight) in used crankcase oil	94	Solution	1.20	16.10	7.10	3.10	do	90.4	9.6			9 9.6	
Tetrachlorophenol, 4.83 percent (by weight) in used crankcase oil	96	do	3.50	9.40	5.80	1.50	do	97.9	2.1			2 2.1	
Water-gas tar	96	Oil	1.20	19.00	6.30	3.00	do	98.0	1.0	1.0		2 2.0	
Zinc chloride	98	Salt	.67	1.11	.94	.10	do	76.5	10.2	13.3		23 23.5	24
Zinc meta arsenite	96	do	.25	.54	.42	.06	do	100.0					
Untreated posts (set Feb. 1937)	65						None		3.1	93.8	3.1	65 100.0	3.1
Posts set in 1938 and 1941													
Untreated posts (set Nov., Dec. 1938)	33						None		33.3	63.6	3.1	33 100.0	3.7
Copper sulfate and sodium arsenate (set May 1941)	99	Salt			(.35 .16		Double diffusion	99.0	1.0			1 1.0	
Osmoplastic ground-line treatment (set Feb. 1941)	99	Mixture			[8] .34		(8)	17.2	24.2	46.5	12.1	82 82.8	12

[1] Installations included 100 posts for each treatment. This number has since been reduced in some cases by fire and pilferage.

[2] Based on the 100 posts treated in each group, unless otherwise indicated.

[3] Average life of all untreated posts is 3.3 years; other values are estimates taken from a mortality curve. Where percentage of posts removed is 10 percent or less, no estimate on average life is given.

[4] Retention values based on 97 posts.

[5] Retention values based on 89 posts.

[6] Retention values based on 99 posts.

[7] Average application.

[8] Average application per post to a 15-inch band (3 inches above and 12 inches below ground line) and to top surface of post.

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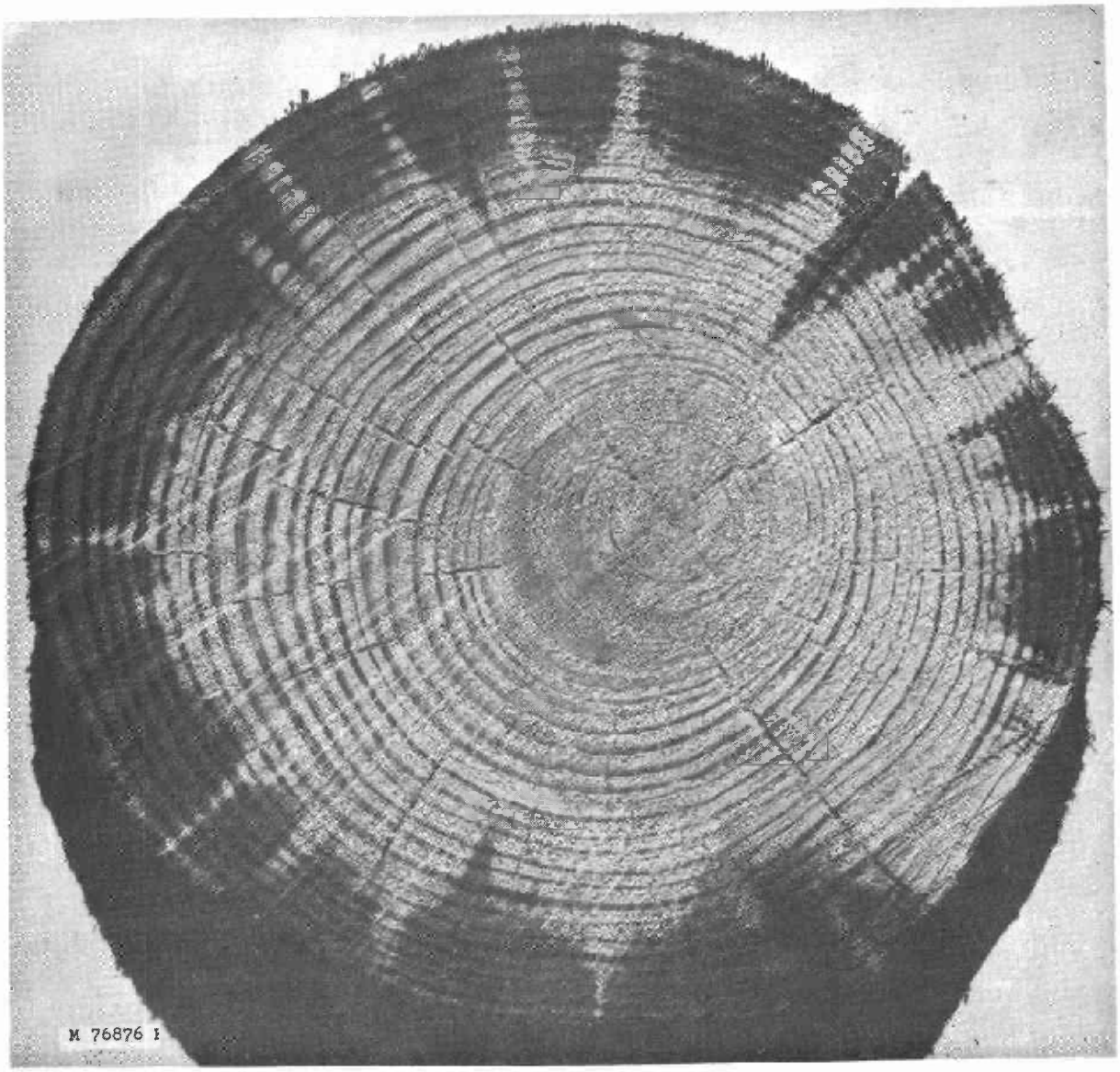

Figure 1.--Jack pine post section showing effects of strips of inner bark in blocking preservative penetration.

2 M 79244 F

1				
308	1619	1207	1816	1102
1403	2005	518	723	1701
915	111	803	1514	1015
424	1312	1911	612	215

2				
2021	1406	1107	1925	1605
923	613	1506	1715	507
405	721	207	322	816
1024	125	1210	1326	1803

3				
1913	203	2001	1305	1202
511	1716	707	1611	1115
415	113	1008	903	303
1508	812	1413	614	1825

4				
304	1908	1509	818	1010
214	610	1218	906	1311
2009	1718	411	1614	704
1823	1424	108	516	1125

5				
702	1002	406	1607	823
1221	1518	1118	222	1805
517	1704	1419	106	1318
602	1906	302	907	2016

6				
1006	524	1414	1722	218
323	811	717	107	1813
2015	1512	1907	618	1602
1302	1220	404	1116	911

7				
1802	206	1524	1111	1225
1418	709	1012	122	1324
1702	1601	402	621	1917
508	2007	814	306	908

8				
219	1401	1510	1208	101
1621	1123	1807	403	1922
2003	820	606	703	513
920	309	1315	1725	1009

9				
510	1810	116	1422	1514
1901	423	509	1703	1604
708	1104	1217	805	918
1501	224	1013	623	2006

10				
1821	607	1321	901	2014
620	1724	1519	211	1224
301	425	1021	1620	506
724	1105	1404	104	1916

11				
416	217	422	1723	1904
503	905	725	817	1806
1020	1613	1503	1405	320
1310	2022	1215	1117	121

12				
1017	914	1301	1808	413
809	1417	1114	1625	202
521	316	124	1921	718
1515	1219	1708	619	2018

13				
1523	1612	2019	1924	1709
208	115	1101	505	716
317	1004	605	1416	922
407	1313	1201	1820	822

14				
1206	1016	410	210	1407
525	1525	1707	801	604
1804	1606	919	715	1915
1317	2024	1112	117	321

15				
909	1912	2011	213	1411
1819	514	821	1022	1121
1316	325	421	701	1511
1618	112	624	1717	1222

16				
912	102	705	1018	2017
1216	1304	1721	515	418
318	204	808	1615	1517
1902	1812	503	1124	1412

17				
1822	114	1408	706	913
1616	1520	1213	617	512
1323	2002	201	307	1914
1710	1110	1014	824	420

18				
902	1801	1223	1409	819
1025	120	1920	311	1516
1113	1712	1322	611	1608
225	422	710	501	2008

19				
1001	313	1306	1918	520
1106	1415	713	223	118
408	2010	1214	609	1811
1502	1609	815	921	1714

20				
504	722	514	608	917
2013	810	1119	119	1818
1919	1319	1603	409	1212
1007	1720	1522	220	1421

21				
519	804	916	712	1711
205	401	1003	1203	1425
1624	2004	1504	1103	615
502	1905	1809	1320	105

22				
1805	1308	813	1705	1222
1824	1108	719	1903	312
1402	419	1005	209	904
510	103	1507	616	2020

23				
519	2012	625	1109	216
1303	711	1505	1814	1023
1910	110	1211	412	806
1610	324	1719	1423	918

24				
720	305	1909	1204	212
1410	1307	1122	1817	607
2023	1706	1617	414	109
1011	924	802	1513	523

25				
714	1019	221	1120	925
1420	825	1713	123	1923
1623	1815	315	601	1521
1209	417	522	2025	1309

Note: Spacing between rows and within rows - 3 ft.

N

Z M 76378 F

Figure 2.--Randomized installation diagram of fence posts treated with zinc chloride by the full-length and on-end steeping processes and pentachlorophenol by cold soaking full length. Posts treated and installed on the Harrison Experimental Forest, Saucier, Miss., during 1947.

Form 533

POST INSPECTIONS

Project No. 1263-1 Location Hill Farm Madison, Wis.

Date Set 8/12/43 Inspector 1944 - J.J. 6/12; 1945 - J.J. 6/10; 1946 - H.R. 7/15; 1947 - G.F. 7/12; ~~1948 - C.L. 7/20~~

Post No.	Condition (See instructions on inside of cover)	Remarks
281	G G G	G G[a]
156	G G G	Tpd Tpd[a]
561	Bpd Bd Bd	R-1947 (Bd)
4	Bd Tpd Bd Td Bd	Td Bd Td Bd[a]
31	G Bpd Bd	Bd R-1948(Bd)
120	G G G	Tpd Td[a]

21 - 1944 21 - 1946 21[a] 1948
21 - 1945 21 - 1947

R—2055

Figure 3.--Sample page from field inspection notebook.

Z M 79245 F

Proj. 1263-1. Slash pine cold-soaked 48 hrs. in coal-tar creosote 30 percent and No. 2 fuel oil 70 percent (by volume).

Posts set 8/12/43		Hill Farm, Madison, Wis.				Inspection dates and results									
Post no.	Absorption Lb. per cu. ft.	6/12/44	8/10/45	7/15/46	7/12/47	7/20/48									
1	3.4	Bd	Tpd Bd	Td Bd	Td Bd	Td Bd									
2	4.8	G	G	Missing -		eliminate									
3	3.1	G	G	G	G	Bpd									
4	4.2	G	G	G	G	G									
5	5.8	G	G	G	G	G									
6	5.1	G	G	G	G	G									
7	5.0	G	G	G	G	G									
8	4.1	G	Bpd	Removed		1946 (Bd)									
9	2.6	Bpd	Bpd	Bpd	Bd	Removed - 1948 (Bd)									
10	5.0	G	G	G	G	G									
11	4.7	G	G	G	G	G									
12	4.2	G	G	G	G	G									
13	7.0	G	G	G	G	G									
14	5.1	G	G	G	G	G									
15	4.1	G	G	G	G	Tpd									
16	4.0	G	Bpd	Bd	Bd	Bd									
17	5.1	G	G	G	G	G									
18	5.2	G	G	G	G	G									
19	4.0	G	G	G	G	Bpd									
20	3.2	G	G	G	Bd	Bd									
21	3.6	G	G	G	G	G									
22	6.9	G	G	G	G	G									
23	7.0	G	G	G	G	G									
24	4.0	G	G	G	G	Tpd Bd									
25	5.8	G	G	G	G	G									
Summary															
	G	23	21	20	19	15									
	Bd	1	-	1	3	2									
	Bpd	1	3	1		2									
	Bd Tpd		1			1									
	Bd Td			1	1	1									
	Tpd					1									
	Missing - eliminate			(1)	(1)	(1)									
	R-Bd			1	1	2									
	Total	25	25	24	24	24									

ZM 79246 F

Figure 4.--Sample page from office record (assumed).

SUBJECT LISTS OF PUBLICATIONS ISSUED BY THE FOREST PRODUCTS LABORATORY

The following are obtainable free on request from the Director, Forest Products Laboratory, Madison 5, Wisconsin.

List of publications on Box and Crate Construction and Packaging Data

List of publications on Chemistry of Wood and Derived Products

List of publications on Fungus Defects in Forest Products and Decay in Trees

List of publications on Glue, Glued Products, and Veneer

List of publications on Growth, Structure, and Identification of Wood

List of publications on Mechanical Properties and Structural Uses of Wood and Wood Products

Partial list of publications for Architects, Builders, Engineers, and Retail Lumbermen

List of publications on Fire Protection

List of publications on Logging, Milling, and Utilization of Timber Products

List of publications on Pulp and Paper

List of publications on Seasoning of Wood

List of publications on Structural Sandwich, Plastic Laminates, and Wood-Base Aircraft Components

List of publications on Wood Finishing

List of publications on Wood Preservation

Partial list of publications for Furniture Manufacturers, Woodworkers and Teachers of Woodshop Practice

Note: Since Forest Products Laboratory publications are so varied in subject, no single list is issued. Instead a list is made up for each Laboratory division. Twice a year, December 31 and June 30, a list is made up showing new reports for the previous 6 months. This is the only item sent regularly to the Laboratory's mailing list. Anyone who has asked for and received the proper subject lists and who has had his name placed on the mailing list can keep up to date on Forest Products Laboratory publications. Each subject list carries descriptions of all other subject lists.

FPL FILING SYSTEM DESIGNATION--PR-5-2-2

Blew, Joseph Oscar
Service tests on posts as a means of evaluating wood preservatives and methods of treatment. 3rd ed. Madison, Wis., U.S. Forest Products Laboratory, 1962.
12 p., illus. (F.P.L. rpt. no. 1726)

Discusses the selection, treatment, installation, inspection, and reporting on posts for (1) evaluation of wood preservatives and (2) the evaluation treatments (preservative and its application) to posts of different species.

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