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SERVICE RECORDS ON TREATED AND UNTREATED FENCE POSTS

The Forest Products Laboratory is maintained at Madison, Wisconsin, in cooperation with the University of Wisconsin.

SERVICE RECORDS ON TREATED AND UNTREATED FENCE POST[1]

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Summary

This is a progress report on service tests of fence posts, untreated or treated with preservative, conducted either by the Forest Products Laboratory and other branches of the U.S. Forest Service, or by others in cooperation with the Forest Service. The earliest test installations were started in 1908, and new tests have been added in succeeding years. The service records cover a wide variety of post species, 12 methods of treatment, and 73 different preservatives or preservative combinations. Actual or estimated life figures are shown for test installations where 10, percent or more of the posts had failed at the time of the last inspection. Table 1 is an index to the preservatives and method of treatment reported in table 2.

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[1] This Note is a revision of Forest Products Laboratory Report No. 2005 of the same title, originally published in 1954, and revised in 1959.

Introduction

The value of service tests on treated wood products in the evaluation of wood preservatives and methods of applying preservatives has long been recognized. Service tests on treated ties were started by the Forest Service (formerly Bureau of Forestry) as early as 1902, and tests on treated fence posts were started in cooperation with various agricultural experiment stations in 1908 (4).[2] With the establishment of the Forest Products Laboratory in 1910, these studies have been gradually expanded. Service tests on fence posts are a simple and convenient means for comparing the preservative value of different chemicals and the performance of the numerous methods by which the chemicals can be applied (3). Post tests are also of value for comparing decay and insect resistance of untreated woods.

This progress report includes records only on test installations by Forest Service agencies or on installations by others in which the Forest Service has cooperated. A list of other sources of information on post service records will be found in the appendix of this report. Space does not permit a presentation of complete details on the treatments or on the properties of the various preservatives used in the treatment of the posts. Much of this information is available, however, either in other publications or in the files of the Forest Products Laboratory.

General Description of the Tests

The records in this report were obtained from test installations in various sections of the United States. Soil and climatic conditions vary widely in the different test areas. In some installations such as those in Mississippi and Louisiana, conditions are highly favorable for decay and termite attack. Termites are seldom found, however, in the northern test areas such as those in the States of Wisconsin, Minnesota, and Montana. In the northern States, temperatures throughout the winter months are not conducive to rapid decay.

For the most part, the test posts are installed in boundary fences of farms, ranches, and units of the National Forests. Test installations by the Forest Products Laboratory since 1946 at Madison, Wis., and at Saucier, Miss., however, have been in rectangular plots with the posts installed by the randomized-block method. The posts in plots do not support a fence, but for test purposes the plot system has several advantages over the fence-line type of installation. The posts in plots are exposed to more uniform soil and moisture conditions, are less subject to loss, and are easier to inspect than line posts.

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[2] Underlined numbers in parentheses refer to Literature Cited at the end of this Note.

In many of the installations the number of posts now shown in test is less than the number originally installed. Losses have occurred through the changing of fence lines, pilferage, fires, mechanical breakage, and other causes not associated with decay or insect attack. In such cases the posts have been eliminated from test.

The posts, except in a few instances where untreated 3-1/2-foot stubs were used, are of usual fence-post size varying in length from 6 to 7-1/2 feet, and in diameter from approximately 3 to 7 inches. Square posts, when they are used, are approximately 4 inches square, and the faces of the split and half-round posts are approximately of the same dimensions as the diameters of the round posts. Posts treated by diffusion processes and the Osmose process were not seasoned, while others, unless specifically indicated, were air seasoned prior to treatment. Posts were generally debarked except where noted or where treated by the tire-tube and end-diffusion processes.

The test posts have been inspected at various times, usually at regular intervals by representatives of the Forest Products Laboratory or by those directly responsible for the installations. During these inspections the posts are examined for the presence of decay and of termite attack. Posts that would break off with a moderate push, or would no longer support a fence because of severe deterioration in the above-ground portions, were considered as failures. They are shown in table 2 as "removed."

Methods of treating fence posts are described in "Preservative Treatment of Fence Posts and Farm Timbers," U.S. Department of Agriculture Farmers' Bulletin No. 2049 (4).

Results of Tests

Post service tests must be continued until all or a high percentage of the posts have failed in order to obtain actual figures on average life. Treated or untreated posts that have been in service for 15 years or longer with few or no failures, however, furnish an indication of good performance. It is also possible through the use of mortality curves developed for crossties (6) to obtain a good estimate on average post life when 10 percent or more of the test posts have failed. On this curve the average life is indicated when 60 percent of the posts have failed. Table 2 shows such estimates, or actual average-life values when all of the test posts have failed. The various post installations in table 2 are itemized and are grouped alphabetically according to species of wood. In addition to the post removals and average-life figures, information is shown on the preservative used, kind of treatment, and preservative retention, whether the posts are round, square, or split, by whom and

where the posts are installed, the dates of installation and of the latest inspection, and the number of posts in test. To obtain information on various post species, the reader can refer directly to table 2. For information on various preservatives or processes, he can first refer to the index (table 1), which will direct him to the item numbers in table 2 relating to those preservatives or processes.

Summary of Results to Date

In arriving at conclusions on the basis of the data presented, the reader should keep in mind two important facts; namely, (1) that the performance of untreated wood used as posts is influenced by the proportion of heartwood and the soil and climatic conditions to which the posts are exposed, and (2) that the performance of wood treated with a preservative is influenced by the thoroughness of the method of application and by the resulting retention and penetration of preservative. It is not reasonable to evaluate or to compare preservatives on the basis of results obtained by superficial applications that are known to result in low retentions and incomplete sapwood penetration. Even with the more thorough methods of treatment, poor preservative performance can be the result of poor preservative penetration, due either to careless treatment, or to the resistance of a particular species to treatment. These factors, along with the locations of the tests, should be considered when evaluating a method of treatment or comparing different treatments and preservatives.

Following is a review of the results obtained to date in the various post installations according to the method of treatment used:

Brush-treated posts.--Untreated jack pine posts with an average life of 3.8 years in Wisconsin show an average life of 8 to 9 years when brush-treated full length with copper naphthenate (2 percent copper) solution, coal-tar creosote, 5 percent pentachlorophenol in No. 2 fuel oil, a water-repellent preservative containing 3 percent pentachlorophenol and 2 percent chloro-2-phenylphenol, and water-gas tar. Untreated lodgepole pine posts in Colorado show an averagelife of 8.4 years, and 12 years when the butt portion is brushed with water-gas tar. Engelmann spruce posts at the same location reveal an average life of 7.1 years untreated and 11 years when the butts are brushed with water-gas tar.

Cold-soaking (2).--This process consists of immersing the posts full length in unheated, low viscosity preservative oil, usually for a period ranging from several hours to several days. The oldest tests on posts treated by cold soaking were started in Minnesota in 1909. In these tests, elm, basswood, and red oak posts soaked in unheated coal-tar creosote from 1 to 45 hours lasted, on an average,

11 to 23 years. Posts treated with light fuel oil solutions containing coal-tar creosote, pentachlorophenol, and copper naphthenate are shown for tests located in Illinois, Mississippi, Missouri, New York, and Wisconsin since 1942. During this period of 21 years or less, some of the post species have not had an opportunity to show the length of service they may be expected to have. All have shown an improvement over untreated posts of the same species, however. Posts, such as pines, black cherry, Douglas-fir, white fir, hickory, and oaks have been in test for periods of 16 to 21 years. When seasoned and treated with soaking periods of 48 hours or longer, these posts generally can be expected to last approximately 20 years or longer on an average in Illinois, Missouri, and Wisconsin. In Mississippi, slash pine posts soaked 48 hours in pentachlorophenol solution and with somewhat higher than normal preservative retention for pine posts, will probably last longer than 20 years on an average, and red oak posts at the same location show an estimated average life of 19 years. Posts of aspen, birch, ash, maple, sweetbay, tamarack, sweetgum, and tupelo have shown somewhat less improvement through cold-soaking treatment than those of the species mentioned above. Soaking periods of longer than 48 hours have, in some cases, resulted in improved service. Aspen and birch posts in Mississippi have shown improved service as a result of incising, while incising has resulted in little or no improvement with balsam fir and tamarack posts in that State.

Double diffusion (1) .--The double-diffusion process consists of successively soaking green-peeled posts in chemical solutions that diffuse into the moisture of the wood and react with each other to deposit a preservative with high leaching resistance. Approximately 122 test installations of posts treated by the double-diffusion process have been made since 1941. Of 100 southern yellow pine posts treated full length, first in copper sulfate solution and then in sodium arsenate solution, and installed during 1941 in Mississippi, only 5 posts have failed in 22 years. Later installations of southern pine posts with various chemical combinations have been made in Mississippi, Alabama, Georgia, and Tennessee. After 7 to 17 years of service, an average life of from 6 to 26 years, and possibly longer, is indicated. Many of the earlier failures can be attributed to low preservative retentions and to the inadequate protection to the tops of posts treated only at the butt end. These factors would appear to have greater significance than the effect of differences in chemical combination, although the copper sulfate-sodium arsenate and the nickel sulfate-sodium chromate (with and without arsenic acid) appear to show up favorably. An excessively high retention of chemicals applied to posts from dead (insect-killed) trees provided only limited protection, possibly due to lack of sufficient moisture in the wood to provide good chemical diffusion.

Hardwood posts of red alder, hickories, red and white oaks, sassafras, sweetgum, and tupelo have shown up less favorably than southern pines. Hardwoods such as willow and yellow-poplar appear to show more promising results, particularly with higher retentions and with full-length treatment.

Lodgepole pine and Douglas-fir treated with copper sulfate-sodium chromate have shown poor performance during 9 to 10 years' service in Washington and Oregon but have shown up much better when treated with sodium fluoride-copper sulfate.

With 3 years' exposure of posts in Hawaii, results with sugi and araucaria are promising, while early failures have been noted with brush box, casuarina, blue gum, eucalyptus robusta, silk oak, and ohia.

End diffusion.--In this process the butt ends of green, freshly cut, unpeeled posts are allowed to stand upright for several days in a 15 to 20 percent solution of zinc chloride or other water-soluble wood preservative, Following the application to the butt end, the tops of the posts are given a somewhat shorter application in the same preservative solution. Of the posts treated by end diffusion, 6 installations were made in Wisconsin during 1945 and 1946, including jack pine treated with copper sulfate, and aspen, red oak, white oak, and jack pine treated with chromated zinc chloride. These posts showed an average life of from 14 to 24 years, or from 10 to 15 years in excess of untreated posts of the same species.

Five installations of posts treated with zinc chloride in Mississippi showed an average life of 5 to 7 years for posts of sweetbay, water tupelo, and sweetgum, 9 years for red oak, and 17 years for slashpine as compared to an average life of 2 to 3 years for untreated posts of these species.

Groundline treatments.--Lodgepole pine posts with Anaconda (arsenic trioxide) around the groundline zone had a life averaging from 18 to 28 years in Wisconsin. The untreated tops of the posts held a fence but were badly rotted in that time. The results were somewhat less satisfactory on lodgepole pine and other species treated in Montana, presumably due to drier soil and conditions otherwise less favorable to diffusion of the preservative in Montana. After mercuric chloride and white arsenic were poured in bored holes at the groundline zones, posts of various species installed in Wisconsin showed an average life of 8 to 10 years for box elder, American elm, and shagbark hickory, and 11 to 18 years for red oak, white oak, slippery elm, and black cherry. Jack pine posts treated with pentachlorophenol solution, applied in holes at the groundline, have a life of 3.7 to 7.5 years in Wisconsin, Southern yellow pine posts treated with Osmo-plastic at the groundline and on the post top had an average life of 11.2 years in Mississippi.

Hot bath.--Posts of alpine fir and lodgepole pine treated with a hot bath of water-gas tar lasted 21 and 18 years, respectively, in Colorado, and Virginia pine similarly treated had an average life of 17 years in Maryland Willow posts treated with a hot bath in asphaltum had an average life of 10.8 years in Maryland.

Hot-and-cold bath. --Approximately 135 installations of posts treated by the hot-and-cold-bath method, involving 47 different species and 9 different preservatives, are included in this report. In 58 installations involving posts of various species treated in coal-tar creosote, average post life varies from 9 years to more than 50 years. Where an installation has had an average life of less than 20 years, it was generally butt treated in an area favorable to decay in the untreated tops. In the case of loblolly pine, tupelo, and sweetbay posts in Louisiana, however, the somewhat mediocre performance was attributed to inadequate debarking in the case of the pine and to poor preservative penetration at the groundline zone of the two hardwoods. Good results were noted with other hardwoods, some of which are difficult to penetrate uniformly.

The results from posts treated with creosote-petroleum solution, pentachlorophenol solution and water-gas tar, are generally favorable. When petroleum oil was applied alone during the hot bath followed by creosote in the cold bath, the length of the post service was not so great as when creosote was used throughout the treatment. In Stoneville, Miss., variable results have been noted when various hardwoods have been subjected to a hot-and-cold bath of diesel oil containing 5 percent pentachlorophenol. The results in treatment with zinc chloride solution in Wisconsin were less satisfactory than with creosote.

Osmose.[3] --An installation in Mississippi of unseasoned southern yellow pine posts treated full length by the Osmose diffusion process displays an estimated average life of 25 years. Four installations of aspen posts in Wisconsin similarly treated show average-life values of 6 to 14 years. Round red oak and jack pine posts installed in Wisconsin in 1946 have an estimated averagelife of 17 and 19 years, respectively.

Pressure-treated posts. --In reviewing the test installations of pressure-treated posts, 43 installations treated with coal-tar creosote are located in Mississippi, Missouri, Montana, and Wisconsin with 6 to 38 years of service. Of these, 27 installations should have an average life exceeding 30 years, and only 8 installations have had sufficient removals to permit an estimate on average life. Cottonwood, loblolly pine, southern yellow pine, and sweetgum posts treated with approximately 6 pounds of creosote per cubic foot show estimated average-life values of 18, 22, 36, and 23 years in Mississippi, respectively, while with 12 pounds per cubic foot sweetgum posts have an estimated average life of 34 years. The other species should last somewhat longer. Lodgepole pine posts in Montana experienced an average life of only 21 years. In the latter case, the comparatively poor performance is attributed to inadequate bark removal and poor penetration of preservative. The creosote retention is not known, but is presumed to be substandard.

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[3] Forest Products Laboratory Memorandum No. 63-015, "The Osmose Preservatives and Processes," describes the Osmose method.

Between 9 and 47 years of service have been reported for 57 installations of posts pressure treated with miscellaneous preservative oils other than straight coal-tar creosote. Outstanding in this group in Wisconsin are southern yellow pine, aspen, basswood, black oak, and northern white cedar posts treated with either creosote-coal tar solution or creosote-petroleum solution. These posts display no failures during 37 to 47 years of service. Alsooutstanding are southern pine posts in Mississippi treated with water-gas tar and with 5 percent solutions of pentachlorophenol or tetrachlorophenol, which have sustained few failures during 27 years of service.

The results noted from posts pressure treated with waterborne preservatives are variable. Southern yellow pine posts treated with zinc meta arsenite have been in service in Mississippi for 27 years with only 3 percent removed, while in Nebraska, lodgepole pine posts treated with a similar retention of the same preservative, show an estimated average life of only 20 years. Southern pine posts treated with acid copper chromate (Celcure) in Mississippi display an average life of 35 years, while those treated with borax-boric acid average only 10.6 years. Other waterborne preservatives show an average life of 27 to 28 years in Mississippi, while several more recently installed have shown no failures during 14 years of service.

Steeping (8). --Posts treated by the steeping process using waterborne preservatives, such as zinc chloride, chromated zinc chloride, sodium fluoride, and mercuric chloride, have been installed in Alabama, Mississippi, Montana, Nebraska, and Wisconsin. Posts of southern yellow pine in Mississippi, and Douglas-fir and western larch in Wisconsin, that were treated with mercuric chloride, show estimated average-life figures of 27, 47, and 39 years, respectively. Cottonwood, red oak, sweetbay, sweetgum, tupelo, and willow posts treated by steeping in zinc chloride or chromated zinc chloride have average-life values of 4 to 10 years in Mississippi. In that same State southern pine posts steeped in zinc chloride have had an average life of 16 years. Western redcedar posts treated with sodium fluoride and zinc chloride and installed in Montana exhibit no appreciable increase in life over untreated posts of the same species. In Nebraska, Montana, and Wisconsin, however, a significant increase is reported in the post life of ash, cottonwood, Douglas-fir, elm, western larch, the pines (jack, lodgepole, ponderosa, scotch, and red), and willow, when treated by steeping with sodium fluoride or zinc chloride.

Tire-tube (7).--Posts of ash, aspen, birch, butternut, cherry, cottonwood, maple, red oaks, jack pine, sweetgum, and willow show an estimated average life of 10 to 15 years when treated by the tire-tube method and installed in Wisconsin. This is significantly greater than the untreated life of posts of these same species. Posts of basswood, hickory, black locust, and white oak in Wisconsin display no significant increase in life as a result of this treatment, however. Aspen, ponderosa pine, and pinyon posts experience considerable added life in Arizona as a result of tire-tube treatment, while posts of naturally durable Arizona cypress, Gambel oak, and local junipers exhibit little or no increase in service life.

Top application.--In treating the tops of red oak posts one-half pint of No. 2 fuel oil containing 5 percent pentachlorophenol was applied by inverting a jar set on a layer of felt. These posts were installed in Wisconsin, but have shown no significant increase over the life of untreated posts.

Literature Cited

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1963. How to treat fence posts by double diffusion. U.S. Forest Serv. Res. Note FPL-013, Forest Products Lab., Madison, Wis.

(2) Blew, J. Oscar, Jr.
1944. Treating wood by the cold-soaking method. U.S. Forest Products Lab. Rpt. 1445, revised 1961.

(3) _____
1948. Service tests on posts as a means of evaluating wood preservatives and methods of treatment. U.S. Forest Products Lab. Rpt. 1726, reviewed and reaffirmed 1962.

(4) _____, and Champion, Francis J.
1952. Preservative treatment of fence posts and farm timbers. U.S. Dept. Agr. Farmers' Bul. 2049, revised 1956.

(5) MacLean, J. D.
1921. Service tests on treated and untreated fence posts. Amer. Wood-Preservers' Assoc. Proc. 1921:401-423.

(6) _____
1926. Percentage renewals and average life of railway ties. U.S. Forest Products Lab. Rpt. 886, reviewed and reaffirmed 1957.

(7) U.S. Forest Products Laboratory.
1937. Tire-tube method of fence post treatment. U.S. Forest Products Lab. Rpt. 1158, revised 1962.

(8) _____
1954. Preservation of timber by the steeping process. U.S. Forest Products Lab. Rpt. 621, reviewed and reaffirmed 1959.

APPENDIX

List of Other Publications Containing Service Records on Treated and Untreated Fence Posts

American Wood-Preservers' Association

Report of Committee U-5, post service records. Published periodically in AWPA proceedings (1949, 1954, and 1961). Prior to 1949 post service records were presented in reports of Committee 7-9.

Applequist, M. B.

1953. A study of the durability of native Louisiana fence post material. La. State Univ. Forestry Notes, No. 2, School of Forestry, Baton Rouge.

Carter, Deane G., Barr, Harold T., and Woods, John B.

1933. Durability of posts and results of preservative treatment. Bul. No. 287, Univ. of Ark., Col. of Agr., Agr. Expt. Sta., Fayetteville.

Crumley, J. J.

1910. Relative durability of post timbers. Bul. No. 219, Ohio Agr. Expt. Sta., Wooster.

Dunkelberg, G. H.

1942. Nonpressure preservative treatment of southern pine posts. S.C. Expt. Sta., Clemson Col., Clemson.

Graham, Robert D.

1960. Service life of treated and untreated fence posts. Progress Report No. 12 on T. J. Starker post farm. Oreg. State Univ., Forest Res. Lab., Corvallis.

Hicock, Henry W., and Olson, A. Richard

1954. Preservation of wood by simple methods. Bul. No. 581, Conn. Agr. Expt. Sta., New Haven.

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1956. Highway post survey, A 1956 progress report. Cir. 196. Conn. Agr. Expt. Sta., New Haven.

King, W. W.
1953. Progress report on durability tests of posts treated by non-pressure methods and with various wood preservatives. Res. Note No. 5, Tex. Forest Serv., Tex. A&M Col. System, Col. Sta.

Lumsden, G. Q.
1952. A quarter century of evaluating pole preservatives. Monog. 1999. Bell Telephone Labs., Inc., Murray Hill, N.J.

MacDonald, G. B
1915. Preservative treatment of fence posts. Bul. No. 158. Forestry Sec., Agr. Expt. Sta., Iowa State Col., Ames.

McNeal, Xziu
1952. Tests of fence post preservatives. Bul. 519, Ark. Agr. Expt. Sta., Fayetteville.

Meagher, George
1951. Service record of wood posts in the Southwest. Res. Note No. 120, SW Forest and Range Expt. Sta., U.S. Forest Serv. (available from Rocky Mountain Forest and Range Expt. Sta., Ft. Collins, Colo.).

Mississippi State Highway Department
1963. Annual report of inspection of preservatives in the Mississippi State highway department's test garden, State highway dept., Jackson.

O'Neill, W. J.
1963. Tests on treated fence posts. Bul. 808. Univ. of Mo., Col. of Agr., Mo. Agr. Expt. Sta., Columbia.

Paton, R. R.
1944. Progress report on catalpa fence post test. Bimo. Bul., Ohio Agr. Expt. Sta. 29(229):217-218.

Sarles, R. L.
1953. Progress report: 1944 post service life tests. Forestry Mimeo. No. 11, Ohio Agr. Expt. Sta., Wooster.

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1954. Fence post test at Marietta State forest nursery (red pine). Forest Mimeo. No. 15, Agr. Expt. Sta., Wooster.

Smith, Marvin E.
1951. Longer-lasting fence posts with pentachlorophenol. Ext. Folder No. 153, Ext. Serv., Col. of Agr., Univ. of Minn. Minneapolis.

Tennessee Valley Authority
1950-1960. Reports on "fence post preservation investigations in the Southeast." Agr. Expt. Stas. of Alabama, Mississippi, Tennessee, and Virginia and Forest Invest. Branch, Forestry Relat. Dept., TVA.

Thompson, Warren S.
1953. Fence post preservation with copper naphthenate by the cold-soaking method. Circ. No. 191, Agr. Expt. Sta., Miss. Sta. Col., State College.

Walters, C. S., and Peterson, K. R.
1957. Report of project 301-C, "preservative treatment of fence posts with toxic oil solutions by cold-soaking, dipping, and brushing." Forestry Note No. 73, Dept. of Forestry, Agr. Expt. Sta., Univ. of Ill. Urbana.

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1963. Report of project 331-A, "preservative treatment of fence posts by cold-soaking in pentachlorophenol-fuel oil solutions." Forestry Note No. 103, Dept. of Forestry, Agr. Expt. Sta., Univ. of Ill. Urbana.

White, Wallace E.
1952. Report of fence post preservation projects conducted at Pennsylvania State College. Northeastern Coordinated Wood Preservation Investigations Conference. NE Forest Expt. Sta. and Conn. Agr. Expt. Sta. New Haven.

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1953. Treatability of northeastern species by simple methods. Agr. Expt. Sta. Pa. State Col. State College.

Wooley, J. C.
1937. Effect of treatment on fence posts. Bul. 374. Mo. Agr. Exp. Sta. Columbia.

Table 1.--Index to preservatives and methods of treatment
(Figures refer to item numbers in table 2)

Preservative	Method of treatment											
	Brushing	Cold-soaking	Double diffusion	End diffusion	Ground-line	Hot bath	Hot-and-cold bath	Osmose	Pressure	Steeping	Tire-tube	Top application
1. Acid copper chromate (Celcure) (AWPA-P5)									636			
2. Ammoniacal copper arsenite (Chemonite) (AWPA-P5)									538			
3. Anaconda (arsenic trioxide)					4,22,102, 138, 431-440, 497 498,720							
4. Asphaltum						834						
5. Beta naphthol in petroleum oil									637			
6. Boliden salt B ($ZnO + H_3AsO_4 + CrO_3$)									539			
7. Boliden salt S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)									127,128, 134,135, 182,183, 187,188, 223,224, 327,328, 441,442, 638,639, 738,739, 758,759			
8. Borax									640,641			
9. Borax--boric acid									642			
10. Carbosota (coal-tar creosote)									540			
11. Chromated copper arsenate (Erdalith, Greensalt) (AWPA-P5)									643 165C,355			
12. Chromated zinc arsenate (Boliden salts) (AWPA-P5)									541			
13. Chromated zinc chloride (AWPA-P5) (see also zinc chloride)				24,286, 329,390, 391					644,645	103,104,828, 829	23,105	
14. Chromated zinc chloride, copperized (AWPA-P5)									542			
15. Chromated zinc chloride (F.R.) (AWPA-P10)									543			
16. Coal tar									654			
17. Coal tar--petroleum oil							106					
18. Copper naphthenate	392	393,394							544			
19. Copper sulfate				395						545	25	
20. Copper sulfate--borax and boric acid			546,547, 624									
21. Copper sulfate--borax and sodium fluoride			548									
22. Copper sulfate--disodium phosphate			647-650									
23. Copper sulfate--sodium arsenate			646									
24. Copper sulfate--sodium arsenate and sodium chromate			90,92, 165,165b, 165g,252 354,396 549,737, 751,806									
25. Copper sulfate--sodium chromate			1,130, 195,443-446,615 616,625-628,651-653,733								245a	
26. Copper sulfate--sodium fluoride			551,552									

Table 1.--Index to preservative and methods of treatment--Continued
(Figures refer to item numbers in table 2)

Preservative	Method of treatment											
	Brushing	Cold-soaking	Double diffusion	End diffusion	Ground-line	Hot bath	Hot-and-cold bath	Osmose	Pressure	Steeping	Tire-tube	Top application
27. Copper sulfate--sodium fluoride and sodium chromate			550									
28. Copper sulfate and arsenic acid--sodium chromate			553,554, 613,614									
29. Crank-case oil, used									655			
30. Creosote, coal-tar	397	66,164a,291				721	19,20,26,27,57, 62-65,71,72,80, 91,99,109,122, 123,163,164,232, 241,249,263,282, 287-290,330,447- 452,499,532,707, 713,714,717,753, 761-763,791,796, 797,801,808-813, 832,833,835,836, 854		27a,96, 107,108, 129,136, 162,184, 189,191, 225,245, 257-262, 292,331, 332,453, 454,530, 531,555- 568,617, 618,656- 658,740, 760,764, 765,814, 815			
31. Creosote--asphaltum solutions							708					
32. Creosote--coal-tar solutions									570,662, 663			
33. Creosote, coal-tar--creosote, lignite									577			
34. Creosote, coal-tar, plus pentachlorophenol									569			
35. Creosote, coal-tar--petroleum oil solutions		16,29-34,86,87, 166,167,270,333, 398,399,718,722, 731,792,793,817					5,6,58,59,81,110- 112,152,153,176- 178,207-209,242, 243,276,283,322, 324,325,348-350, 366-368,372,373, 455-458,709,715, 766-768,830,837, 838		28,67, 254,500 501,571, 572,660, 661,816			
36. Creosote and petroleum-oil solution, plus pentachlorophenol									573			
37. Creosote, coal-tar--water-gas-tar solutions							68,293,294,716, 839					
38. Creosote, lignite									400,576, 659			
39. Creosote, lignite--petroleum-oil solutions									578			
40. Creosote, oil tar (Gasco)									574			
41. Creosote (Gasco), plus pentachlorophenol									575			
42. Creosote, wood tar									598,697			
43. Fluor chrome arsenate phenol (Tanalith) (AWPA-P5)									664			
44. Mercuric chloride										139,226,665		
45. Mercuric chloride, white arsenic, sodium chloride					89,96a, 154,162a, 191a,295, 334							
46. Nickel sulfate and arsenic acid--sodium chromate			196, 310, 351,582- 584,670- 672,840- 842									

Table 1.--Index to preservative and methods of treatment--Continued
(Figures refer to item numbers in table 2)

Preservative	Method of treatment											
	Brushing	Cold-soaking	Double diffusion	End diffusion	Ground-line	Hot bath	Hot-and-cold bath	Osmose	Pressure	Steeping	Tire-tube	Top application
47. Nickel sulfate--disodium phosphate			666-669, 769-771									
48. Nickel sulfate--sodium chromate			401-403 579-581									
49. Nickel sulfate--sodium dichromate										35,404,519		
50. Nickel sulfate--sodium fluoride and disodium phosphate			772-774									
51. Osmoplastic					673							
52. Osmosar								36,37,248, 296,374, 405,406, 674				
53. Osmotite								38,39				
54. Pentachlorophenol in various solvents	407	7,21,40-44,73-79, 89a,93,97,140,141, 155,156,161,171-173,181,192,193, 197,222,246,255, 278,298-303.309, 314.371,375,388, 408-413,460,461, 502,520,629,678-690,748-750,750a, 752,754,756,777, 802,843			414,415		157,158,160,179, 180,210.277,326, 352,369,370,775, 807		165d,356, 585-588, 675-677			297
55. Pentachlorophenol and chloro-2-phenylphenol in mineral spirits and water repellent	416											
56. Pentachlorophenol and copper naphthenate in petroleum oil									589			
57. Petroleum oils	459,741								590-596			
58. Phenyldichlorarsine									691			
59. Sodium chromate									693			
60. Sodium dichromate									692			
61. Sodium fluoride										8,9,113-115, 142,227,417, 418,462,503-506,521,522, 526,723,724, 844		
62. Sodium fluoride--copper sulfate			2,131,419, 463-465, 597,619									
63. Tar (see coal-tar and water-gas tar)												
64. Tetrachorophenol in petroleum oil							124,466,818,819		45,46, 143, 420-422,694, 695,820-822			
65. Water-gas tar	423,470 745					169,284,469, 710,744	69, 304,467,468, 742, 743		144,696			
66. Wolman salts (Triolith)										523		

Table 1.--Index to preservative and methods of treatment--Continued
(Figures refer to item numbers in table 2)

Preservative	Method of treatment											
	Brushing	Cold-soaking	Double diffusion	End diffusion	Ground-line	Hot bath	Hot-and-cold bath	Osmose	Pressure	Steeping	Tire-tube	Top application
67. Zinc chloride (see also chromated zinc chloride)				311,630, 755,779, 804			47,48,146,265		145,228, 264,266, 471,698	10-13,82,83, 117-119,147, 159,312,336, 424,425,472, 473,507-511, 524,527,528, 599-601,631, 725,726,756, 780,805,845-847,849,850	17,49,50, 70,84,91a, 98,116,125, 186,194, 214,216, 218,220, 233,247, 271,274, 305,335, 426,512, 711,778, 794,848	
68. Zinc meta arsenite									474,699			
69. Zinc sulfate--borax and boric acid			604,632									
70. Zinc sulfate--borax and sodium fluoride			605,606									
71. Zinc sulfate--sodium arsenate and sodium chromate			607									
72. Zinc sulfate--sodium chromate			633									
73. Zinc sulfate--sodium fluoride and sodium chromate			608,609									
74. Zinc sulfate and arsenic acid--sodium chromate			198-202, 315-318, 320,337-340,475-478,533-536,602, 603,620, 781-784, 798,855-858									

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Table 2.--Service tests of treated and untreated fence posts

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Alder, red												
1	Copper sulfate--sodium chromate	Double diffusion (butts)	0.98	Round	Oregon State University	Corvallis, Oreg.	1952	1962	25	25	100.0	Decay	6
2	Sodium fluoride--copper sulfate	do	.14	do	do	do	1952	1962	25	18	72.0	do	9
3	None	Untreated		do	do	do	1952	1960	25	25	100.0	do	3
	Ash, green												
4	Anaconda Wood Preservative (dust)	Groundline		do	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1941	12	12	100.0	do	7.3
5	Creosote--diesel oil	Hot bath--Creosote cold bath (50-50)	8.9-11.9	Round and split	Delta Experiment Station	Stoneville, Miss.	1941	1959	24	1	4.2	do	
6	do	do	8.9-11.9	do	do	do	1946	1959	11				
7	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 48 hours	1.7	Round	University of Illinois	Oregon, Ill.	1942-43	1962	20				
8	Sodium fluoride	Steeping	.28	do	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1943	19	19	100.0	Decay	13.1
9	do	do	.22	do	U. S. Forest Service	Halsey, Nebr.	1925	1957	24	24	100.0	Decay and termites	[3]23.8
10	Zinc chloride	do	.46	do	U. S. Range Livestock Experiment Station	Miles City Mont.	1926	1943	10	10	100.0	Decay	13.1
11	do	do	.31	do	do	do	1926	1943	10	10	100.0	do	12.3
12	do	do	.26	do	U. S. Forest Service	Halsey, Nebr.	1925	1957	19	19	100.0	Decay and termites	[3]22.9
13	do	do	.28	do	do	do	1925	1957	5	5	100.0	do	[3]30.0
14	None	Untreated		do	do	do	1925	1950	10	10	100.0	do	18.7
15	do	do		do	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1941	12	12	100.0	Decay	8.6
	Ash, white												
16	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	1.5	do	Forest Products Laboratory	Madison, Wis.	1958	1963	10				
17	Zinc chloride	Tire-tube	0.26-1.63	do	do	Mazomanie, Wis.	1940	1960	14	14	100.0	Decay	[3]11
18	Untreated			do	do	Madison, Wis.	1958	1963	10	9	90.0	do	4
	Ash[2]												
19	Creosote, coal-tar	Hot-and-cold bath (butts)	4.2 pounds per post	Half-round	Iowa State University	Ames, Iowa	1909	1922	11	1	9.1	Decay	
20	do	do	6.0 pounds per post	Round	do	do	1909	1937	22	21	95.5	do	21
	Aspen, bigtooth												
21	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 48 hours	1.9	do	University of Illinois	Oregon, Ill.	1942-43	1962	25	23	92.0	do	15
	Aspen, quaking												
22	Anaconda Wood Preservative (dust)	Groundline	3.0 pounds per post	do	U. S. Forest Service	Salmon, Idaho	1929	1934	57				
23	Chromated zinc chloride	Tire-tube	0.64-1.35	do	Forest Products Laboratory	Madison, Wis.	1937	1963	17	12	70.6	Decay	26

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Aspen, quaking--continued												
24	Chromated zinc chloride	End diffusion	0.75	Round	Forest Products Laboratory	Madison, Wis.	1946	1963	25	18	72.0	Decay	15
25	Copper sulfate	Tire-tube	0.12-0.54	do	do	do	1937	1963	17	15	88.0	do	17
26	Creosote, coal-tar	Hot-and-cold bath	9.4	do	do	Brooklyn, Wis.	1936	1963	9	2	22.2	do	37
27	do	do	11.4	do	do	Drummond, Wis.	1936	1962	13				
27a	do	Pressure	16.3	do	do	Oregon, Wis.	1960-61	1963	17				
28	Creosote, coal-tar, 25 percent--gas oil, 75 percent	Pressure	16.1	do	do	Brooklyn, Wis.	1916	1963	15				
29	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Seasoned 6-1/2 months and cold-soaked 48 hours	4.4	do	do	Madison, Wis.	1946	1963	25	15	60.0	Decay	17
30	do	Seasoned 12 months and cold-soaked 48 hours	4.1	do	do	do	1946	1963	25	16	64.0	do	15
31	do	Cold-soaking, 48 hours	3.6	do	do	do	1958	1963	10	2	20.0	do	7
32	do	Cold-soaking, 48 hours (chemipeeled)	3.8	do	do	do	1958	1963	10				
33	do	Cold-soaking, 48 hours (butts incised)	6.2	do	do	Saucier, Miss.	1954	1963	10				
34	do	Cold-soaking, 48 hours	4.0	do	do	do	1954	1963	10	6	60.0	Decay and termites	8
35	Nickel sulfate and sodium dichromate	Butt steeping	1.19	do	do	Madison, Wis.	1945	1963	9	5	55.5	Decay	18
36	Osmosar	Osmose	.29	do	do	do	1936	1946	16	16	100.0	do	6.4
37	do	do	.29	do	do	Drummond, Wis.	1936	1962	46	46	100.0	do	14.2
38	Osmotite	do	.23	do	do	Madison, Wis.	1936	1946	7	7	100.0	do	6.6
39	do	do	.23	do	do	Drummond, Wis.	1936	1962	41	41	100.0	do	14.4
40	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 8 hours	2.8	do	do	Oregon, Wis.	1943	1954	9	9	100.0	do	6.2
41	do	Cold-soaking, 24 hours	3.4	do	do	do	1943	1963	9	9	100.0	do	8.4
42	do	Cold-soaking, 48 hours	4.2	do	do	do	1943	1963	9	8	88.9	do	11
43	do	Cold-soaking, 96 hours	5.1	do	do	do	1943	1963	9	5	55.6	do	20
44	do	Cold-soaking, 168 hours	5.5	do	do	do	1943	1963	8	7	87.5	do	13
45	Tetrachlorophenol, 2.9 percent in used crank-case oil	Pressure	8.2	do	do	Drummond, Wis.	1936	1962	12	5	41.7	do	29
46	do	do	7.5	do	do	Brooklyn, Wis.	1936	1963	10				
47	Zinc chloride	Hot-and-cold bath	1.32	do	do	Madison, Wis.	1937	1963	53	25	47.3	Decay	28
48	do	do	1.20	do	do	Drummond, Wis.	1936	1962	4	1	25.0	do	33
49	do	Tire-tube	0.14-1.88	do	do	Madison, Wis.	1937	1963	33	26	79.0	Decay	21
50	Zinc chloride, 10 percent	do		do	U. S. Forest Service	Tucson and Flagstaff, Ariz.	1940	1958	10	3	30.0	do	22
51	None	Untreated		do	do	do	1940	1958	10	9	90.0	do	14
52	do	Untreated (stubs)		do	Forest Products Laboratory	Drummond, Wis.	1937	1945	33	33	100.0	do	4.9
53	do	Untreated		do	do	Saucier, Miss.	1954	1956	10	10	100.0	Decay and termites	1.4
54	do	do		do	do	Madison, Wis.	1958	1963	10	7	70.0	Decay	6
55	do	Untreated (chemi-peeled)		do	do	do	1958	1963	10	2	20.0	do	7
56	do	Untreated		do	do	do	1946	1954	10	10	100.0	Decay	4.0
56a	None	do		do	do	Oregon, Wis.	1961	1963	5	5	100.0	do	2.8

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Baldcypress												
57	Creosote, coal-tar	Hot-and-cold bath (butts), cold bath (tops)	6.6	Round and split	Northern Louisiana Agricultural Experiment Station	Calhoun, La.	1908-10	1940	49	24	49.0	Decay	29
58	Creosote--diesel oil	Hot bath--creosote, cold bath (50-50)	6.8	do.	Delta Experiment Station	Stoneville, Miss.	1941	1959	9				
59	do.	do.	6.8	do.	do.	do.	1946	1959	4				
60	None	Untreated		Round	do.	do.	1937	1947	16	16	100.0	Decay and termites	5.8
61	do.	do.		Split	do.	do.	1937	1947	19	19	100.0	do.	5.4
	Basswood[2]												
62	Creosote, coal-tar	Hot-and-cold bath (butts)	5.7 pounds per post	Half-round	Iowa State University	Ames, Iowa	1909	1922	15	3	20.0	Decay	17
63	do.	do.	4.5 pounds per post	Split	University of Minnesota	Minneapolis, Minn.	1909	1918	6	6	100.0	do.	9.0
64	do.	Hot bath (butts), cold bath (full length)	5.9 pounds per post	do.	do.	do.	1909	1937	117	47	40.2	do.	32
65	do.	do.	5.2 pounds per post	do.	do.	do.	1909	1937	35	32	91.4	do.	22
66	do.	Cold-soaking	2.4 pounds per post	do.	do.	do.	1909	1937	23	22	95.7	do.	21
67	Creosote, coal-tar, 25 percent--gas oil, 75 percent	Pressure	28.0	Round	Forest Products Laboratory	Brooklyn, Wis.	1916	1963	4				
68	Creosote--water-gas tar	Hot-and-cold bath	6.1 pounds per post	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	14	13	92.9	Decay	22
69	Water-gas tar	Hot-and-cold bath (butts)	2.4 pounds per post	do.	do.	do.	1909	1926	8	8	100.0	do.	9.0
70	Zinc chloride	Tire-tube	0.88-1.0	Round	Forest Products Laboratory	Mazomanie, Wis.	1939	1947	10	10	100.0	do.	5.4
	Bay (see Sweet Bay)												
	Beech, American												
71	Creosote, coal-tar	Hot-and-cold bath	8.5	do.	Maryland Agricultural Station	College Park, Md.	1908	1939	9	1	11.1	do.	48
72	do.	Hot-and-cold bath (butts)		do.	do.	do.	1908	1923	5	5	100.0	do.	13.0
	Birch, paper												
73	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 8 hours	1.7	do.	Forest Products Laboratory	Oregon, Wis.	1943	1950	9	9	100.0	do.	4
74	do.	Cold-soaking, 24 hours	2.1	do.	do.	do.	1943	1963	9	8	88.9	do.	6
75	do.	Cold-soaking, 48 hours	3.0	do.	do.	do.	1943	1956	9	9	100.0	do.	7.5
76	do.	Cold-soaking, 96 hours	4.6	do.	do.	do.	1943	1963	9	9	100.0	do.	9.1
77	do.	Cold-soaking, 168 hours	6.7	do.	do.	do.	1943	1963	10	7	70.0	do.	16
78	Pentachlorophenol, 5 percent in No. 2 fuel oil and crank-case oil (50-50)	Cold-soaking, 48 hours	4.8	do.	do.	Madison, Wis.	1943	1960	11	4	36.4	do.	20
79	do.	Cold-soaking (butts 48 hours, tops 24 hours)	4.6	do.	do.	do.	1943	1960	9	5	55.6	do.	18

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Birch, river												
80	Creosote, coal-tar	Hot-and-cold bath	.....	Round	Maryland Agricultural Experiment Station	College Park, Md.	1908	1939	11	7	63.6	Decay	30
81	Creosote--crude petroleum	Hot bath--petroleum, cold bath--creosote	.....	...do.....	...do.....	...do.....	1908	1939	8	7	87.5	...do.....	26
82	Zinc chloride	Butt steeping (hot)	.....	...do.....	Forest Products Laboratory	Mazomanie, Wis.	1940	1954	3	3	100.0	...do.....	11.6
83	...do.....	Butt steeping (cold)	.....	...do.....	...do.....	...do.....	1940	1945	3	3	100.0	...do.....	3.4
84	...do.....	Tire-tube	0.81-2.00	...do.....	...do.....	...do.....	1940	1960	16	16	100.0	...do.....	[3]12.0
85	None	Untreated	.....	...do.....	Maryland Agricultural Experiment Station	College Park, Md.	1908	1914	5	5	100.0	...do.....	5.4
	Birch, yellow												
86	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours (butts incised)	5.0	...do.....	Forest Products Laboratory	Saucier, Miss.	1954	1963	10	1	10.0	...do.....	.....
87	...do.....	Cold-soaking 48 hours	3.4	...do.....	...do.....	...do.....	1954	1963	10	8	80.0	Decay and termites	8
88	None	Untreated	.....	...do.....	...do.....	...do.....	1954	1956	10	10	100.0	Decay and termites	2.0
	Blackgum (see Tupelo, black)												
	Boxelder												
89	Mercuric chloride, white arsenic, sodium chloride	Groundline	.....	...do.....	...do.....	Brooklyn, Wis.	1943	1956	14	14	100.0	Decay	7.7
89a	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	9.8	...do.....	Delta Experiment Station	Stoneville, Miss.	1953	1963	15	.....	.....	.....	.....
	Brushbox (Tristania conferta)												
90	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	.79	...do.....	U. S. Forest Service	Honolulu, Hawaii	1961	1964	25	3	12.0	...do....	4.
90a	None	Untreated	.....	...do.....	...do.....	...do.....	1961	1964	25	21	84.0	Decay and termites	2
	Butternut												
91	Creosote, coal-tar	Hot-and-cold bath (butts)	6.0 pounds per post	...do.....	Iowa State University	Ames, Iowa	1909	1926	10	10	100.0	Decay	10.8
91a	Zinc chloride	Tire-tube	0.43-1.2	...do.....	Forest Products Laboratory	Mazomanie, Wis.	1939	1955	8	8	100.0	...do....	11.3
	Casuarina, longleaf (C. glauca)												
92	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	.65	...do.....	U. S. Forest Service	Honolulu, Hawaii	1961	1964	25	6	24.0	...do.....	3
92a	None	Untreated	.....	...do.....	...do.....	...do.....	1961	1964	10	10	100.0	...do....	1.0
	Catalpa[2]												
93	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 48 hours	0.7	...do.....	University of Illinois	Oregon, Ill.	1942-43	1962	23	4	17.4	...do....	27
94	None	Untreated	.....	...do.....	U. S. Forest Service	Trousdale, Kans.	1935	1960	31	.....	.....	.....	.....
95	...do.....	...do.....	.....	...do.....	...do.....	Greensburg, Kans.	1935	1960	84	8	9.5	Decay and termites	.....
	Cherry, black												
96	Creosote, coal-tar	Pressure	8.5	...do.....	Forest Products Laboratory	Oregon, Wis.	1960-61	1963	22	.....	.....	.....	.....
96a	Mercuric chloride, white arsenic, sodium chloride	Groundline	.....	...do.....	...do.....	Brooklyn, Wis.	1943	1963	25	17	68.0	Decay	18
97	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 46-48 hours	3.35	...do.....	University of Illinois	Oregon, Ill.	1942-43	1962	23	1	4.3	...do....	.....
98	Zinc chloride	Tire-tube	0.42-1.00	...do.....	Forest Products Laboratory	Mazomanie, Wis.	1939	1960	16	16	100.0	...do....	[3]14.2
98a	None	Untreated	.....	...do.....	...do.....	Oragon, Wis.	1961	1963	5	4	80.0	...do....	3

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Chestnut, American												
99	Creosote, coal-tar	Hot-and-cold bath	.....	Round	Maryland Agricultural Experiment Station	College Park, Md.	1908	1939	10	9	90.0	Decay	25
100	None	Untreated	.....	..do.....	U. S. Forest Service	Waterbury, Conn.	1913	1932	122	74	60.7	..do.....	19
101	.....do.....	.....do.....	.....	..do.....	.....do.....	.....do.....	1913	1932	118	84	71.2	..do.....	18
	Cottonwood[2]												
102	Anaconda Wood Preservative (dust)	Groundline	.....	..do.....	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1943	33	33	100.0	..do.....	9.3
103	Chromated zinc chloride	Steeping	.....	..do.....	Delta Experiment Station	Stoneville, Miss.	1947	1959	13	13	100.0	Decay and termites	6.8
104	.....do.....	.....do.....	.....	..do.....	.....do.....	.....do.....	1948	1953	13	3	23.1	..do.....	7
105	.....do.....	Tire-tube	0.58-0.77	..do.....	Forest Products Laboratory	Mazomanie, Wis.	1940	1954	6	6	100.0	Decay	9.6
106	Coal-tar, 33.3 percent--used crank-case oil, 66.7 percent	Hot-and-cold bath (butts)	1/3 gallon per post	Split	Ray Ranch	Lavalle Creek, Mont.	1934	1957	46	46	100.0	..do.....	[3]23.7
107	Creosote, coal-tar	Pressure	6.0	Round	Delta Experiment Station	Stoneville, Miss.	1937	1959	12	11	91.7	Decay and termites	18
108	.....do.....	.....do.....	12.0	..do.....	.....do.....	.....do.....	1937	1959	12	.....	.....	.....	.....
109	.....do.....	Hot bath (butts), cold bath (full length)	12.2	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	16	8	50.0	Decay	30
110	Creosote--diesel oil	Hot bath--creosote, cold bath (50-50)	6.8-9.1	Round and split	Delta Experiment Station	Stoneville, Miss.	1941	1959	25	9	36.0	..do.....	22
111	.....do.....	.....do.....	6.8-9.1	..do.....	.....do.....	.....do.....	1946	1959	12	4	33.3	..do.....	17
112	Creosote, coal-tar, 40 percent--petroleum, 60 percent	Hot-and-cold bath (butts), hot bath (tops)	11.8	Round	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1943	9	.....	.....	.....	.....
113	Sodium fluoride	Steeping	0.42	Square	U. S. Forest Service	Halsey, Nebr.	1925	1939	25	25	100.0	Decay and termites	8.4
114	.....do.....	.....do.....	.28	Round	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1943	10	10	100.0	Decay	9.4
115	.....do.....	.....do.....	.17	..do.....	.....do.....	.....do.....	1926	1941	13	13	100.0	..do.....	7.8
116	Zinc chloride	Tire-tube	0.79-0.95	..do.....	Forest Products Laboratory	Mazomanie, Wis.	1940	1960	5	5	100.0	..do.....	[3]14.7
117	.....do.....	Steeping	0.38	Square	U. S. Forest Service	Halsey, Nebr.	1925	1957	24	24	100.0	Decay and termites	[3]22.0
118	.....do.....	.....do.....	.67	Round	U. S. Range Livestock Experiment Station	Miles City, Mont.	1926	1943	6	6	100.0	Decay	13.1
119	.....do.....	.....do.....	.48	..do.....	.....do.....	.....do.....	1926	1943	19	19	100.0	..do.....	13.5
120	None	Untreated	.....	..do.....	.....do.....	.....do.....	1926	1941	7	7	100.0	..do.....	6.5
121	.....do.....	.....do.....	.....	Square	U. S. Forest Service	Halsey, Nebr.	1925	1932	10	10	100.0	Decay and termites	5.8
	Cypress (see Baldcypress)												
	Cypress, Arizona												
122	Creosote, coal-tar	Hot-and-cold bath	2.3	Round	.....do.....	Arizona and New Mexico	1939	1958	56	.....	.....	.....	.....
123	.....do.....	Hot-and-cold bath (butts)	1.5	..do.....	.....do.....	.....do.....	1939	1958	51	.....	.....	.....	.....
124	Tetrachlorophenol, 4.7 percent in spent crank-case oil	.....do.....	.65	..do.....	.....do.....	.....do.....	1939	1958	51	3	5.9	Decay	.....

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Cypress, Arizona--continued												
125	Zinc chloride, 10 percent	Tire-tube		Round	U. S. Forest Service	Tucson and Flagstaff, Ariz.	1940	1958	10	3	30.0	Decay	22
126	None	Untreated		do	do	Arizona and New Mexico	1939	1958	123	48	39.0	Decay and termites	22
	Douglas-fir (Pacific Coast)												
127	Bolidén salt S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	0.24	do	Forest Products Laboratory	Saucier, Miss.	1957	1963	5				
128	do	Pressure	.60	do	do	do	1957	1963	5				
129	Creosote, coal-tar	do	4.7	do	do	do	1957	1963	5				
130	Copper sulfate--sodium chromate	Double diffusion (butts)	.49	do	Oregon State University	Corvallis, Oreg.	1952	1960	25	25	100.0	Decay	6
131	Sodium fluoride--copper sulfate	do	.13	do	do	do	1952	1962	25	2	8.0	do	
132	None	Untreated		do	do	do	1952	1958	25	25	100.0	do	4 0
133	do	do		do	Forest Products Laboratory	Saucier, Miss.	1957	1963	5	4	80.0	Decay and termites	5
	Douglas-fir (Rocky Mountain)												
134	Bolidén salt S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.21	do	do	do	1957	1963	5				
135	do	Pressure	.56	do	do	do	1957	1963	5				
136	Creosote, coal-tar	do	2.6	do	do	do	1957	1963	5				
137	None	Untreated		do	do	do	1957	1963	5	3	60.0	Decay and termites	6
	Douglas-fir												
138	Anaconda Wood Preservative (dust)	Groundline	3.0 pounds per post	do	U. S. Forest Service	Basin, Mont.	1928	1935	55				
139	Mercuric chloride	Steeping	0.03	do	Chicago, Milwaukee, St. Paul and Pacific R.R.	Madison, Wis.	1926	1962	13	3	23.1	Decay	47
140	Pentachlorophenol, 5 percent in No. 2 fuel oil	Seasoned 3 months and cold-soaked 48 hours	1.7	do	Forest Products Laboratory	do	1946	1963	25				
141	do	Seasoned 12 months and cold-soaked 48 hours	1.7	do	do	do	1946	1963	25				
142	Sodium fluoride	Steeping	.14	do	Chicago, Milwaukee, St. Paul and Pacific R.R.	do	1926	1962	18	15	83.4	Decay	26
143	Tetrachlorophenol, 3 percent in used crank-case oil	Pressure	6.1	Square	Forest Products Laboratory	do	1935	1956	72	5	6.9	do	
144	Water-gas tar	do	5.5	do	do	do	1936	1956	105				
145	Zinc chloride	do	.46	Round	Chicago, Milwaukee, St. Paul and Pacific R.R.	do	1926	1941	17	17	100.0	Decay	14.2
146	do	Hot-and-cold bath	.15	do	do	do	1926	1962	11	11	100.0	do	[3]24.8
147	do	Steeping	.11	do	do	do	1926	1962	18	18	100.0	do	[3]22.3
148	None	Untreated		do	do	do	1926	1958	24	24	100.0	do	12.9
149	do	do		do	do	do	1926	1941	9	9	100.0	do	10.9
150	do	do		do	U. S. Forest Service	Basin, Mont.	1928	1935	7	4	57.1	do	7
151	do	do		do	Forest Products Laboratory	Madison, Wis.	1946	1963	10	10	100.0	do	7.3

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Elm, American												
152	Creosote--diesel oil	Hot bath--creosote, cold bath (50-50)	11.1	Round	Delta Experiment Station	Stoneville, Miss.	1941	1959	8				
153	do	do	11.1	do	do	do	1946	1959	4				
154	Mercuric chloride, white arsenic, sodium chloride	Groundline		do	Forest Products Laboratory	Brooklyn, Wis.	1943	1959	10	10	100.0	Decay	9.4
155	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 48 hours	3.2	do	University of Illinois	Oregon, Ill.	1942-43	1962	25	11	44.	do	21
156	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	2.5	do	Delta Experiment Station	Stoneville, Miss.	1953	1963	15	7	46.7	do	11
157	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	5.9	do	do	do	1947	1959	12				
158	do	do	5.9	do	do	do	1948	1953	10	2	20.0	Decay	7
159	Zinc chloride	Steeping	.19	do	Forest Products Laboratory	Mazomanie, Wis.	1939	1951	5	5	100.0	do	8.7
	Elm, cedar												
160	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	9.6	do	Delta Experiment Station	Stoneville, Miss.	1947	1959	6				
161	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	5.1	do	do	do	1953	1963	15				
	Elm, slippery												
162	Creosote, coal-tar	Pressure	9.8	do	Forest Products Laboratory	Oregon, Wis.	1960-61	1963	28				
162a	Mercuric chloride, white arsenic, sodium chloride	Groundline		do	do	Brooklyn, Wis.	1943	1956	7	7	100.0	Decay	11.4
162b	None	Untreated		do	do	Oregon, Wis.	1960-61	1963	6	1	16.6	do	4
	Elm[2]												
163	Creosote, coal-tar	Hot-and-cold bath (butts)	6.0	do	Iowa State University	Ames, Iowa	1909	1929	9	9	100.0	do	11.8
164	do	Hot bath (butts), cold bath (full length)	3.0	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	5	2	40.0	do	32
164a	do	Cold-soaking	1.5	do	do	do	1909	1924	5	5	100.0	do	11.0
	Eucalyptus, bluegum (Eucalyptus globulus)												
165	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	.61	Round	U. S. Forest Service	Honolulu, Hawaii	1961	1964	25	1	4.0	do	
165a	None	Untreated		do	do	do	1961	1964	25	12	48.0	Decay and termites	3
	Eucalyptus, robusta (Eucalyptus robusta)												
165b	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	.57	do	do	do	1961	1964	25	5	20.0	Decay	3
165c	Chromated copper arsenate (Erdalith, Greensalt)	Pressure	.85	do	do	do	1962	1964	25				
165d	Pentachlorophenol 8.2 percent in mineral spirits and water repellent	do	4.9	do	do	do	1962	1964	25				
165e	None	Untreated		do	do	do	1961	1964	25	14	56.0	Decay and termites	3
165f	do	do		do	do	do	1962	1964	20	1	5.0	Decay	
	Eucalyptus, saligna (Eucalyptus saligna)												
165g	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	1.03	do	do	do	1961	1964	25	13	52.0	do	3
165h	None	Untreated		do	do	do	1961	1964	25	25	100.0	Decay and termites	0.8

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Fir, balsam												
166	Creosote, coal-tar 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours (butts) incised)	1.9	Round	Forest Products Laboratory	Saucier, Miss.	1954	1963	10	3	30.0	Decay and termites	11
167	do	Cold-soaking, 48 hours	1.3	do	do	do	1954	1963	9	5	55.6	do	10
168	None	Untreated		do	do	do	1954	1959	10	10	100.0	do	3.3
	Fir, subalpine												
169	Water-gas tar	Hot-bath (butts)	0.64 pound per post	do	Colorado State University	Fort Collins, Colo.	1912	1936	8	4	50.0	Decay	21
170	None	Untreated		do	do	do	1913	1936	10	9	90.0	do	14
	Fir, white												
171	Pentachlorophenol, 5 percent in No. 2 fuel oil	Seasoned 12 months and cold soaked 48 hours	2.0	Quartered	Forest Products Laboratory	Madison, Wis.	1946	1963	25	5	20.0	do	23
172	do	do	1.6	Round	do	do	1946	1963	25	1	4.0	do	
173	do	Seasoned 5 months and cold soaked 48 hours	1.4	do	do	do	1946	1963	25	2	8.0	do	
174	None	Untreated		do	do	do	1946	1955	10	10	100.0	do	5.5
175	do	do		Quartered	do	do	1946	1954	10	10	100.0	do	5.8
	Gum (see Sweetgum and Tupelo)												
	Hackberry[2]												
176	Creosote--diesel oil	Hot bath--creosote, cold bath (50-50)	8.0-12.7	Round and split	Delta Experiment Station	Stoneville, Miss.	1941	1959	41	13	31.7	do	23
177	do	do	8.0-12.7	do	do	do	1946	1959	16	5	31.2	do	17
178	do	do	8.0-12.7	Split	do	do	1948	1959	6	1	16.7	do	17
179	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	10.2-12.6	Round and split	do	do	1947	1959	29	4	13.8	do	17
180	do	do	10.2-12.6	Round	do	do	1948	1953	6				
181	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	3.5	do	do	do	1953	1963	15	6	40.0	Decay	11
	Hemlock, western												
182	Boliden salt S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.18	do	Forest Products Laboratory	Saucier, Miss.	1957	1963	5				
183	do	Pressure	.57	do	do	do	1957	1963	5				
184	Creosote, coal-tar	do	4.4	do	do	do	1957	1963	5				
185	None	Untreated		do	do	do	1957	1960	5	5	100.0	Decay and termites	3.3
	Hickory, bitternut												
186	Zinc chloride	Tire-tube	0.28-0.86	do	do	Mazomanie, Wis.	1939	1949	6	6	100.0	Decay	6.2
	Hickory, mockernut												
187	Boliden salt S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.25	do	do	Saucier, Miss.	1957	1963	5				
188	do	Pressure	.38	do	do	do	1957	1963	5				
189	Creosote, coal-tar	do	8.0	do	do	do	1957	1963	5				
190	None	Untreated		do	do	do	1957	1960	5	5	100.0	Decay and termites	3.5

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection: No.	Percent	Cause	Average life
			Lb. per cu. ft.										Yr.
	Hickory, shagbark												
191	Creosote, coal-tar	Pressure	9.7	Round	Forest Products Laboratory	Oregon, Wis.	1960-61	1963	20				
191a	Mercuric chloride, white arsenic, sodium chloride	Groundline	0.05	do	do	Brooklyn, Wis.	1943	1956	11	11	100.0	Decay	9.7
192	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 168 hours	3.5	do	do	Oregon, Wis.	1943	1963	5				
193	do	Cold-soaking, 48 hours	2.6	do	University of Illinois	Oregon, Ill.	1942-43	1962	20	1	5.0	Decay	
194	Zinc chloride	Tire-tube	0.27-1.01	do	Forest Products Laboratory	Mazomanie, Wis.	1939	1955	14	14	100.0	do	8.8
194a	None	Untreated		do	do	Oregon, Wis.	1960-61	1963	6	3	50.0	do	3
	Hickory[2]												
195	Copper sulfate - sodium chromate	Double diffusion (butts)	.20	do	do	Saucier, Miss.	1953	1963	25	20	80.0	do	8
196	Nickel sulfate and arsenic acid - sodium chromate	do	.37	do	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	21	84.0	Decay and termites	12
197	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	3.6	do	Delta Experiment Station	Stoneville, Miss.	1953	1963	15				
198	Zinc sulfate and arsenic acid - sodium chromate	Double diffusion (butts)	.51	do	Tennessee Valley Authority	Norris, Tenn.	1953	1963	25	13	52.0	Decay	11
199	do	Double diffusion	.39	do	U.S. Forest Service	Athens, Ga.	1955	1963	25	5	20.0	do	11
200	do	do	.70	do	do	do	1955	1963	25	1	4.0	do	
201	do	do	1.0	do	do	do	1955	1963	25	3	12.0	do	12
202	do	Double diffusion, first solution heated to 200° F.	.78	do	do	do	1955	1963	25	5	20.0	do	11
203	None	Untreated		do	do	do	1955	1962	50	50	100.0	Decay	3.1
204	do	do		do	Tennessee Valley Authority	Norris, Tenn.	1951	1959	25	25	100.0	Decay and termites	4.7
205	do	do		do	do	Wilson Dam, Ala.	1946	1952	23	23	100.0	do	3.6
206	do	do		do	Forest Products Laboratory	Saucier, Miss.	1953	1958	25	25	100.0	do	2.8
	Honeylocust												
207	Creosote - diesel oil	Hot bath--Creosote, cold bath (50-50)	7.4-9.8	Split	Delta Experiment Station	Stoneville, Miss.	1941	1959	43	4	9.3	Decay	
208	do	do	7.4-9.8	do	do	do	1946	1959	20	2	10.0	do	20
209	do	do	7.4-9.8	do	do	do	1948	1959	8				
210	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	7.8	Round and split	do	do	1947	1959	27	1	3.7	Decay	
211	None	Untreated		Round	do	do	1937	1947	24	24	100.0	Decay and termites	5.0
212	do	do		Split	do	do	1937	1947	56	56	100.0	do	4.2
213	do	do		do	do	do	1941	1952	9	9	100.0	do	6.2

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Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Juniper, alligator												
214	Zinc chloride, 10 percent	Tire-tube	.....	Round	U.S. Forest Service	Flagstaff, Ariz.	1939	1958	5	3	60.0	Decay	19
215	None	Untreated	.....	Round split	..do..	Arizona and New Mexico	1939	1958	103	7	6.8	..do..	.....
	Juniper, one-seed												
216	Zinc chloride, 10 percent	Tire-tube	.....	Round	..do..	Flagstaff, Ariz.	1939	1958	5	.....	.....	.....	.....
217	None	Untreated	.....	..do..	..do..	Arizona and New Mexico	1939	1958	94	6	6.4	Decay	.....
	Juniper, Rocky Mountain												
218	Zinc chloride, 10 percent	Tire-tube	.....	..do..	..do..	Flagstaff, Ariz.	1939	1958	5	.....	.....	.....	.....
219	None	Untreated	.....	..do..	..do..	Arizona and New Mexico	1939	1958	70	8	11.4	Decay	29
	Juniper, Utah												
220	Zinc chloride, 10 percent	Tire-tube	.....	..do..	..do..	Flagstaff, Ariz.	1939	1958	5	.....	.....	.....	.....
221	None	Untreated	.....	..do..	..do..	Arizona and New Mexico	1939	1958	103	12	11.7	Decay	29
	Larch, European												
222	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 168 hours	1.6	..do..	New York State College of Forestry	Syracuse, N. Y.	1942	1948	10	.....	.....	.....	.....
	Larch, western												
223	Boliden salt S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.30	..do..	Forest Products Laboratory	Saucier, Miss.	1957	1963	5	.....	.....	.....	.....
224	..do..	Pressure	.52	..do..	..do..	..do..	1957	1963	5	.....	.....	.....	.....
225	Creosote, coal-tar	..do..	4.1	..do..	..do..	..do..	1957	1963	5	.....	.....	.....	.....
226	Mercuric chloride	Steeping	.04	..do..	Chicago, Milwaukee, St. Paul, and Pacific R.R.	Madison, Wis.	1926	1962	15	7	46.7	Decay	39
227	Sodium fluoride	..do..	.13	..do..	..do..	..do..	1926	1962	16	13	81.2	..do..	28
228	Zinc chloride	Pressure	.50	..do..	..do..	..do..	1926	1941	21	21	100.0	..do..	14.7
229	None	Untreated	.....	..do..	..do..	..do..	1926	1954	22	22	100.0	..do..	13.3
230	..do..	..do..	.....	..do..	..do..	..do..	1926	1941	9	9	100.0	..do..	8.8
231	..do..	..do..	.....	..do..	Forest Products Laboratory	Saucier, Miss.	1957	1963	5	3	60.0	Decay and termites	6

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Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Locust, black												
232	Creosote, coal-tar	Hot-and-cold bath	1.6	Round	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	7	3	42.9	Decay	35
233	Zinc chloride	Tire-tube	0.63-0.95	do	Forest Products Laboratory	Mazomanie, Wis.	1939-40	1960	6	6	100.0	do	[3]15.5
234	None	Untreated		Round and split	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	15	5	33.3	do	37
235	do	do		Round	Delta Experiment Station	Stoneville, Miss.	1937	1959	67	64	95.6	Decay and termites	17
236	do	do		do	do	do	1937	1959	63	59	93.6	do	18
237	do	do		Split	do	do	1937	1959	36	28	77.8	do	21
238	do	do		Round	U. S. Forest Service	Ord, Nebr.	1935	1955	77	18	23.4	do	26
239	do	do		Split	do	do	1935	1955	14	4	28.6	do	25
	Locust, New-Mexican												
240	None	do		Round	do	Tucson, Ariz.	1940	1958	34	12	35.3	do	21
	Maple, red												
241	Creosote, coal-tar	Hot-and-cold bath		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	13	7	53.9	Decay	32
242	Creosote, coal-tar--crude petroleum	Hot bath--petroleum; cold bath--creosote		do	do	do	1908	1921	5	5	100.0	do	11.0
243	Creosote - diesel oil	Hot bath--creosote; cold bath, 50-50	8.2	Round and split	Delta Experiment Station	Stoneville, Miss.	1941	1959	8	3	37.5	do	22
244	None	Untreated		Round	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1914	5	5	100.0	do	3.6
	Maple, silver												
245	Creosote, coal-tar	Pressure	11.7	do	Forest Products Laboratory	Oregon, Wis.	1960-61	1963	5				
245a	Copper sulfate - sodium chromate	Tire-tube (double treatment)	$CuSO_4$ - 0.34; Na_2CrO_4-0.60	do	do	Mazomanie, Wis.	1940	1954	2	2	100.0	do	10.4
246	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 18 hours	2.1	do	University of Illinois	Oregon, Ill.	1943	1962	23	14	60.9	do	19
247	Zinc chloride	Tire-tube	0.92-0.98	do	Forest Products Laboratory	Mazomanie, Wis.	1940	1957	5	5	100.0	do	14.6
	Maple, sugar												
248	Osmosar	Osmose	.33	Square	Wisconsin State Highway Commission	Madison, Wis.	1956	1963	9	6	66.7	do	7
	Maple[2]												
249	Creosote, coal-tar	Hot bath (butts), cold bath (full length)	4.3	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	10	6	60.0	Decay	28
	Mesquite[2]												
250	None	Untreated		Round	U. S. Forest Service	Tucson, Ariz.	1940	1958	35	18	51.4	Decay and termites	19
	Mulberry[2]												
251	None	do		do	Delta Experiment Station	Stoneville, Miss.	1937	1959	39	35	89.8	do	19
251a	do	do		Split	do	do	1937	1959	40	30	75.0	do	21
	Norfolk-Island pine (Araucaria excelsa)												
252	Copper sulfate - sodium arsenate and sodium chromate	Double diffusion	.93	Round	U. S. Forest Service	Honolulu, Hawaii	1961	1964	25				
252a	None	Untreated		do	do	do	1961	1964	10	10	100.0	Decay and termites	1.4

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Oak, Arizona white												
253	None	Untreated		Round	U. S. Forest Service	Tucson, Ariz.	1940	1958	27	19	70.4	Decay and termites	17
	Oak, black												
254	Creosote, coal-tar, 25 percent - gas oil, 75 percent	Pressure	6.6	do	Forest Products Laboratory	Brooklyn, Wis.	1916	1963	7				
255	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 48 hours	2.7	do	University of Illinois	Oregon, Ill.	1942-43	1962	18				
256	None	Untreated		do	Tennessee Valley Authority	Norris, Tenn.	1951	1957	25	25	100.0	Decay	2.8
	Oak, blackjack												
257	Creosote, coal-tar	Pressure	7.0	do	U. S. Forest Service	Ava, Mo. Forest	1938	1964	17				
258	do	do	5.8	do	do	do	1938	1964	21				
259	do	do	6.5	do	do	do	1938	1964	12				
260	do	do	10.5	do	Forest Products Laboratory	Madison, Wis.	1938	1963	11				
261	do	do	9.8	Square	do	do	1938	1963	15				
262	do	do		Round	do	do	1938	1963	6				
263	do	Hot-and-cold bath	4.1	do	do	do	1938	1963	48	6	12.5	Decay	37
264	Zinc chloride	Pressure	.74	do	do	do	1938	1963	6	1	16.7	do	35
265	do	Hot-and-cold bath	.49	do	do	do	1938	1963	50	33	66.0	Decay	24
266	do	Pressure	.86	do	U. S. Forest Service	Ava, Mo.	1938	1964	50	16	32.0	do	31
267	None	Untreated (stubs)		Square	Forest Products Laboratory	Madison, Wis.	1938	1950	13	13	100.0	do	8.4
268	do	Untreated		Round	U. S. Forest Service	Ava, Mo.	1938	1946	50	50	100.0	do	6.0
269	do	do		Square	Forest Products Laboratory	Madison, Wis.	1937	1956	50	50	100.0	do	7.9
	Oak, bur												
270	Creosote, coal-tar, 50 percent - No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	2.9	Round	do	do	1958	1963	10				
271	Zinc chloride	Tire-tube	0.30-0.90	do	do	Mazomanie, Wis.	1939	1958	6	6	100.0	Decay	15.2
272	None	Untreated		do	do	Madison, Wis.	1958	1963	10	3	30.0	do	7
	Oak, Emory												
273	None	do		do	U. S. Forest Service	Tucson, Ariz.	1940	1958	11	11	100.0	Decay and termites	10.4
	Oak, Gambel												
274	Zinc chloride, 10 percent	Tire-tube		do	do	Tucson and Flagstaff, Ariz.	1940	1958	10	1	10.0	Decay	28
275	None	Untreated		do	do	do	1940	1958	74	17	23.0	do	24

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Oak, overcup												
276	Creosote - diesel oil	Hot bath--Creosote, cold bath (50-50)	6.1-9.5	Round and split	Delta Experiment Station	Stoneville, Miss.	1941	1959	47	4	8.5	Decay	.....
277	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	2.7-7.9	..do.....	..do.....	..do.....	1947	1959	25	3	12.0	..do.....	18
278	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	5.2	Round	..do.....	..do.....	1953	1963	15	.....	.....	.....	.....
279	None	Untreated	.....	..do.....	..do.....	..do.....	1947	1959	15	14	93.3	Decay and termites	10
280	..do.....	..do.....	.....	..do.....	..do.....	..do.....	1937	1947	20	20	100.0	..do.....	4.3
281	..do.....	..do.....	.....	Split	..do.....	..do.....	1937	1947	20	20	100.0	..do.....	5.0
	Oak, pin												
282	Creosote, coal-tar	Hot-and-cold bath	.....	Round	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	8	.....	.....	.....	.....
283	Creosote, coal-tar--crude petroleum	Hot bath--petroleum Cold bath--creosote	.....	..do.....	..do.....	..do.....	1908	1939	5	4	80.0	Decay	27
284	Water-gas tar	Hot bath (butts)	.....	..do.....	..do.....	..do.....	1908	1939	5	4	80.0	..do.....	27
285	None	Untreated	.....	..do.....	..do.....	..do.....	1908	1914	5	5	100.0	..do.....	4.2
	Oak, northern red												
286	Chromated zinc chloride	End diffusion	.75	..do.....	Forest Products Laboratory	Madison, Wis.	1946	1963	25	14	56.0	..do.....	17
287	Creosote, coal-tar	Hot-and-cold bath (butts)	1.6	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	19	9	47.4	..do.....	33
288	..do.....	Hot-and-cold bath	.....	Round	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	10	4	40.0	..do.....	36
289	..do.....	Hot bath (butts), cold bath (full length)	2.7	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	83	24	28.9	..do.....	34
290	..do.....	..do.....	1.4	..do.....	..do.....	..do.....	1909	1937	9	6	66.7	..do.....	27
291	..do.....	Cold-soaking	1.7	..do.....	..do.....	..do.....	1909	1937	15	13	86.6	..do.....	23
292	Creosote, coal-tar	Pressure	5.8	Round	Forest Products Laboratory	Oregon, Wis.	1960-61	1963	31	.....	.....	.....	.....
293	Cresote, coal-tar--water-gas tar	Hot bath--water-gas tar, cold bath--creosote	.....	..do.....	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	10	8	80.0	..do.....	27
294	..do.....	Hot-and-cold bath	2.4	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	22	15	68.2	..do.....	27
295	Mercuric chloride, white arsenic, sodium chloride	Groundline	0.05-0.10 lb. per post	Round	Forest Products Laboratory	Brooklyn, Wis.	1943	1963	24	23	95.8	..do.....	13
296	Osmosar	Osmose	.25	..do.....	..do.....	Madison, Wis.	1946	1963	25	16	64.0	..do.....	17
297	Pentachlorophenol, 5 percent in No. 2 fuel oil	Top treatment	1/2 pint per post	..do.....	..do.....	..do.....	1946	1963	25	23	92.0	..do.....	9
298	..do.....	Cold-soaking, 8 hours	3.2	..do.....	..do.....	Oregon, Wis.	1943	1962	9	9	100.0	..do.....	14.2
299	..do.....	Cold-soaking, 24 hours	3.5	..do.....	..do.....	..do.....	1943	1963	9	6	66.7	..do.....	20
300	..do.....	Cold-soaking, 48 hours	4.5	..do.....	..do.....	..do.....	1943	1963	9	3	33.3	..do.....	24
301	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 96 hours	5.8	..do.....	..do.....	..do.....	1943	1963	9	1	11.1	..do.....	31
302	..do.....	Cold-soaking, 168 hours	5.7	..do.....	..do.....	..do.....	1943	1963	9	.....	.....	.....	.....

Table 2.--Service Tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Oak, northern red--continued												
303	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 66 hours	2.6	Round	University of Illinois	Oregon, Ill.	1942-43	1962	10	.....	.....	.....	.....
304	Water-gas tar	Hot-and-cold bath (butts)	1.5	Split	University of Minnesota	Minneapolis, Minn.	1909	1937	14	10	71.5	Decay	26
305	Zinc chloride	Tire-tube	0.39-1.47	Round	Forest Products Laboratory	Mazomanie, Wis.	1939	1960	27	27	100.0	...do.....	11.9
306	None	Untreated	.....	...do.....	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1923	5	5	100.0	...do.....	9.8
307	.....do.....	.....do.....	.....	...do.....	Forest Products Laboratory	Madison, Wis.	1946	1958	10	10	100.0	...do.....	7.2
308	.....do.....	.....do.....	.....	...do.....	.....do.....	Oregon, Wis.	1960-61	1963	3	1	33.3	...do.....	4
	Oak, southern red												
309	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 48 hours	3.9	...do.....	.....do.....	Saucier, Miss.	1947	1963	25	9	36.0	...do.....	19
310	Nickel sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	.75	...do.....	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	22	88.0	Decay and termites	8
311	Zinc chloride	End diffusion	.95	...do.....	Forest Products Laboratory	Saucier, Miss.	1947	1962	25	25	100.0	...do.....	8.8
312	.....do.....	Steeping	2.4	...do.....	.....do.....	.....do.....	1947	1960	25	25	100.0	Decay	5.8
313	None	Untreated	.....	...do.....	.....do.....	.....do.....	1947	1957	25	25	100.0	Decay and termites	2.2
	Oak, red[2]												
314	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	5.6	...do.....	Delta Experiment Station	Stoneville, Miss.	1953	1963	15	.....	.....	.....	.....
315	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion	1.0	...do.....	U. S. Forest Service	Athens, Ga.	1955	1963	25	.....	.....	.....	.....
316	.....do.....	.....do.....	1.6	...do.....	.....do.....	.....do.....	1955	1963	25	.....	.....	.....	.....
317	.....do.....	.....do.....	2.1	...do.....	.....do.....	.....do.....	1955	1963	25	4	16.0	...do.....	11
318	.....do.....	Double diffusion, first solution heated to 200° F.	1.6	...do.....	.....do.....	.....do.....	1955	1963	25	3	12.0	...do.....	12
319	None	Untreated	.....	...do.....	.....do.....	.....do.....	1955	1963	50	43	86.0	...do.....	4
	Oak, scarlet												
320	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	.44	...do.....	Tennessee Valley Authority	Norris, Tenn.	1953	1963	25	14	56.0	Decay and termites	10
	Oak, silverleaf												
321	None	Untreated	.....	...do.....	U. S. Forest Service	Tucson, Ariz.	1940	1958	43	43	100.0	...do.....	9.3
	Oak, swamp chestnut												
322	Creosote, coal-tar -- crude petroleum	Hot bath--petroleum; Cold bath--creosote	.....	...do.....	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	13	10	76.9	Decay	28
323	None	Untreated	.....	...do.....	.....do.....	.....do.....	1908	1921	5	5	100.0	...do.....	7.4
	Oak, water												
324	Creosote - diesel oil	Hot bath--creosote, cold bath (50-50)	8.4-9.6	Round and split	Delta Experiment Station	Stoneville, Miss.	1941	1959	35	6	17.1	Decay	27
325	.....do.....	.....do.....	8.4-9.6	...do.....	.....do.....	.....do.....	1946	1959	46	3	6.5	...do.....	.....
326	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	2.7-5.6	...do.....	.....do.....	.....do.....	1947	1959	29	2	6.9	...do.....	.....

Table 2.--Service tests of treated and untreated fence posts--Con.

Item No.	Species and preservative	Treatment (full length unless otherwise indicated	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Oak, white												
327	Boliden salt, S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.28	Round	Forest Products Laboratory	Saucier, Miss.	1957	1963	5				
328	do	Pressure	.54	do	do	do	1957	1963	5				
329	Chromated zinc chloride	End diffusion	.75	do	do	Madison, Wis.	1959	1963	25	4	16.0	Decay	24
330	Creosote, coal-tar	Hot-and-cold bath		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	15	5	33.4	do	37
331	do	Pressure	8.1	do	Forest Products Laboratory	Saucier, Miss.	1957	1963	5				
332	do	do	6.9	do	do	Oregon, Wis.	1960-61	1963	21				
333	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	3.3	do	do	Madison, Wis.	1958	1963	10				
334	Mercuric chloride, white arsenic sodium chloride	Groundline	0.05-0.10	do	do	Brooklyn, Wis.	1943	1963	17	15	88.2	Decay	13
335	Zinc chloride	Tire-tube	0.32-1.01	do	do	Mazomanie, Wis.	1939	1960	17	17	100.0	do	[3]16.63
336	do	Steeping	1.14-1.80	do	do	do	1940	1960	10	10	100.0	do	[3]16.4
337	Zinc sulfate and arsenic acid - sodium chromate	Double diffusion	1.3	do	U. S. Forest Service	Athens, Ga.	1955	1963	25	11	44.0	do	9
338	do	do	1.5	do	do	do	1955	1963	25				
339	do	do	2.3	do	do	do	1955	1963	25				
340	do	Double diffusion first solution heated to 200° F.	1.7	do	do	do	1955	1963	25	1	4.0	Decay	
341	None	Untreated		do	do	do	1955	1963	50	32	64.0	do	7
342	do	do		do	Forest Products Laboratory	Saucier, Miss.	1957	1963	5	5	100.0	Decay and termites	4.8
343	do	do		do	do	Madison, Wis.	1958	1963	10	8	80.0	Decay	6
344	do	do		Square	do	do	1937	1963	49	31	63.2	do	26
345	do	do		Round and split	do	do	1913	1934	428	405	94.6	do	16
346	do	do		Round	do	do	1946	1963	10	7	70.0	do	11
347	None	Untreated		do	do	Oregon, Wis.	1960-61	1963	5	2	40.0	do	3
	Oak[2]												
348	Creosote - diesel oil	Hot bath--creosote, cold bath (50-50)	8.3	do	Delta Experiment Station	Stoneville, Miss.	1941	1959	17	2	11.8	do	27
349	do	do	8.3	do	do	do	1946	1959	7				
350	do	do	8.3	Round and split	do	do	1948	1959	10	1	10.0	do	
351	Nickel sulfate and arsenic acid - sodium chromate	Double diffusion (butts)	.37	Round	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1962	15	15	100.0	Decay and termites	5.3
352	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	2.7-7.9	do	Delta Experiment Station	Stoneville, Miss.	1948	1959	10				
353	None	Untreated		do	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1958	25	25	100.0	Decay and termites	3.7
	Ohia-lehua (Metrosideros collina)												
354	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	.73	do	U. S. Forest Service	Honolulu, Hawaii	1961	1964	26	1	3.8	Decay	
355	Chromated copper arsenate (Erdalith, Greensalt)	Pressure	1.4	do	do	do	1962	1964	25				
356	Pentachlorophenol, 8.2 percent in mineral spirits and water repellent	do	12.4	do	do	do	1961	1964	25				
357	None	Untreated		do	do	do	1961	1964	25	14	56.0	Decay	3
358	do	do		do	do	do	1962	1964	20				

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Osage-orange												
359	None	Untreated	.....	Round and split	U. S. Forest Service	Greensburg, Kans.	1935	1960	15	1	6.7	Decay and termites	.....
360	..do..	..do..	.....	..do..	..do..	Trousdale, Kans.	1935	1960	68	.....	.....	.....	.....
361	..do..	..do..	.....	..do..	..do..	Orchard, Nebr.	1935	1962	90	2	2.2	Decay and termites	.....
362	..do..	..do..	.....	..do..	..do..	Foss, Okla.	1935	1956	58	1	1.7	..do..	.....
363	..do..	..do..	.....	..do..	..do..	Childress, Tex.	1935	1963	55	6	10.9	..do..	43
364	..do..	..do..	.....	Round	Delta Experiment Station	Stoneville, Miss.	1937	1959	56	.....	.....	.....	.....
365	..do..	..do..	.....	Split	..do..	..do..	1937	1959	24	1	4.2	Decay and termites	.....
	Pecan, bitter												
366	Creosote - diesel oil	Hot bath--creosote, cold bath (50-50)	6.0-8.9	Round and split	..do..	..do..	1941	1959	41	1	2.4	Decay	.....
367	..do..	..do..	6.0-8.9	..do..	..do..	..do..	1946	1959	21	.....	.....	.....	.....
368	..do..	..do..	6.0-8.9	..do..	..do..	..do..	1948	1953	10	.....	.....	.....	.....
369	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	4.3-6.7	Round	..do..	..do..	1948	1959	9	4	44.4	Decay	13
370	..do..	..do..	4.3-6.7	Round and split	..do..	..do..	1947	1959	30	1	3.3	..do..	.....
371	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	5.2	Round	..do..	..do..	1953	1963	15	.....	.....	.....	.....
	Persimmon[2]												
372	Creosote - diesel oil	Hot bath--creosote, cold bath (50-50)	7.9	..do..	..do..	..do..	1941	1959	11	2	18.2	Decay	26
373	..do..	..do..	7.9	..do..	..do..	..do..	1946	1959	7	.....	.....	.....	.....
	Pine, eastern white												
374	Osmosar	Osmose	.19	Square	Wisconsin State Highway Commission	Madison, Wis.	1956	1963	5	1	20.0	Decay	10
375	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 18 hours	2.2	Round	University of Illinois	Oregon, Ill.	1943-44	1962	23	.....	.....	.....	.....
376	..do..	Cold-soaking, 24 hours	2.6	..do..	..do..	..do..	1942-48	1962	73	5	6.8	Decay	.....
377	..do..	Cold-soaking, 48 hours	3.1	..do..	..do..	..do..	1943-44	1962	53	.....	.....	.....	.....
378	..do..	Cold-soaking, 72 hours	3.4	..do..	..do..	..do..	1942-46	1962	43	.....	.....	.....	.....
379	Pentachlorophenol, 7.5 percent in No. 2 fuel oil	Cold-soaking, 66-68 hours	3.5	..do..	..do..	..do..	1942-48	1962	74	.....	.....	.....	.....
380	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 6 hours	1.9	..do..	..do..	..do..	1943-46	1962	43	31	72.2	Decay	12
381	..do..	Cold-soaking, 23 hours	3.0	..do..	..do..	..do..	1943-47	1962	41	1	2.4	..do..	.....
382	..do..	Cold-soaking, 41-42 hours	2.5	..do..	..do..	..do..	1942-47	1962	91	17	18.7	..do..	24
383	..do..	Cold-soaking, 8 hours	1.6	..do..	Forest Products Laboratory	Oregon, Wis.	1943	1963	9	7	77.8	..do..	16

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of inspection	Number in test	Posts removed up to and at time of last inspection			Average life
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, eastern white--continued												
384	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 24 hours	2.0	Round	Forest Products Laboratory	Oregon, Wis.	1943	1963	9	8	88.9	Decay	16
385	do	Cold-soaking, 48 hours	2.8	do	do	do	1943	1963	8	5	62.5	do	18
386	do	Cold-soaking, 96 hours	3.2	do	do	do	1943	1963	9	2	22.2	do	26
387	do	Cold-soaking, 168 hours	3.3	do	do	do	1943	1963	9	5	55.6	do	20
388	do	do	4.4	do	New York State College of Forestry	Syracuse, N.Y.	1942	1948	10				
389	None	Untreated		do	University of Illinois	Oregon, Ill.	1942-43	1962	25	24	96.0	Decay	6
	Pine, jack												
390	Chromated zinc chloride	End diffusion	.76	do	Forest Products Laboratory	Madison, Wis.	1945	1962	10	10	100.0	do	14.5
391	do	do	.75	do	do	do	1946	1963	25	11	44.0	do	19
392	Copper naphthenate, 2 percent copper, in mineral spirits and water repellent	Brush	.48	do	do	do	1946	1963	25	23	92.0	do	9
393	do	Seasoned 4 mo., and cold soaked, 48 hours	2.8	do	do	do	1946	1963	25				
394	do	Seasoned 12 mo., and cold soaked, 48 hours	2.5	do	do	do	1946	1963	25				
395	Copper sulfate	End diffusion	.75	do	do	do	1946	1963	25	17	68.0	Decay	14
396	Copper sulfate--sodium arsenate and sodium chromate	Double diffusion		do	Forest Products Laboratory	Madison, Wis.	1960	1963	25				
397	Creosote, coal-tar	Brush	.58	do	do	do	1946	1963	25	23	92.0	Decay	8
398	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Seasoned 7 mo., and cold soaked, 48 hours	3.8	do	do	do	1946	1963	25				
399	do	Seasoned 12 mo., and cold soaked, 48 hours	4.0	do	do	do	1946	1963	25				
400	Creosote, lignite	Pressure	6.7	do	do	do	1937	1963	83	6	7.2	Decay	
401	Nickel sulfate - sodium chromate	Double diffusion (butts)	2.21	do	do	do	1946	1963	10	1	10.0	do	
402	do	do	1.2	do	do	do	1945	1963	9				
403	do	do	1.3	do	do	do	1945	1963	9				
404	Nickel sulfate and sodium dichromate	Butt steeping	.95	do	do	do	1945	1963	10	2	20.0	Decay	24
405	Osmosar	Osmose	.25	do	do	do	1946	1963	25	10	40.0	do	19
406	do	do	.25	Square	Wisconsin State Highway Commission	do	1956	1963	18	1	5.6	do	

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, jack--continued												
407	Pentachlorophenol, 5 percent in No. 2 fuel oil	Brush	0.43	Round	Forest Products Laboratory	Madison, Wis.	1946	1959	25	25	100.0	Decay	7.6
408	do	Cold-soaking, 2 hours	4.7	do	do	Brooklyn, Wis.	1942	1963	18				
409	do	Cold-soaking, 6 hours	1.7	do	do	Syene, Wis.	1942	1963	22	22	100.0	Decay	11.8
410	do	Cold-soaking, 24 hours	2.4	do	do	do	1942	1963	44	35	79.6	do	18
411	do	do	4.4	do	do	Madison, Wis.	1942	1963	7				
412	do	Cold-soaking, 48 hours	2.8	do	do	Syene, Wis.	1942	1963	44	36	81.8	Decay	21
413	do	Cold-soaking, 168 hours	8.2	do	do	Madison, Wis.	1942	1963	13				
414	do	Groundline	0.5 pound per post	do	do	do	1945	1952	10	10	100.0	Decay	3.7
415	do	do	240 cc. per post	do	do	do	1946	1963	25	25	100.0	do	7.5
416	Pentachlorophenol, 3.0 percent and chloro-2-phenylphenol, 2 percent in mineral spirits and water repellent	Brush	0.52	do	do	do	1946	1959	25	25	100.0	do	7.6
417	Sodium fluoride	Steeping	.37	Square	do	do	1926	1941	7	4	57.1	do	15
418	do	do	.46	Round	U. S. Forest Service	Halsey, Nebr.	1925	1952	25	25	100.0	Decay and termites	18.5
	Tetrachlorophenol, 5.0 percent in used crank-case oil	Pressure	5.7	do	Forest Products Laboratory	Madison, Wis.	1934	1963	14				
419	Sodium fluoride-Copper sulfate	Double diffusion (butts)		do	do	do	1960	1963	20				
420	Tetrachlorophenol, 5.0 percent in used crank-case oil	Pressure	5.7	do	do	Madison, Wis.	1934	1963	14				
421	Tetrachlorophenol, 2.8 percent in used crank-case oil	do	5.3	do	do	do	1934	1963	41				
422	do	do	5.8	do	do	Brooklyn, Wis.	1936	1963	22	3	13.6	Decay	40
423	Water-gas tar	Brush	.45	do	do	Madison, Wis.	1946	1962	25	25	100.0	do	8.4
424	Zinc chloride	Steeping	.51	do	U. S. Forest Service	Halsey, Nebr.	1925	1954	20	20	100.0	Decay and termites	16.9
425	do	do	.51	do	do	do	1925	1950	5	5	100.0	Decay	13.8
426	do	Tire-tube	0.82-1.01	do	Forest Products Laboratory	Madison, Wis.	1938	1948	7				
427	None	Untreated (stubs)		do	do	do	1934	1955	21	21	100.0	Decay	7.4
428	do	Untreated		do	do	do	1946	1952	10	10	100.0	do	3.8
429	do	do		do	do	do	1960	1963	16	2	12.5	do	5
430	do	do		do	U. S. Forest Service	Halsey, Nebr.	1925	1939	10	10	100.0	Decay and termites	5.7

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, lodgepole												
431	Anaconda Wood Preservative (dust)	Groundline	1.5 pounds per post	Round	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	13	12	92.3	Decay	15
432	do.	do.	1.8 pounds per post	do.	Forest Products Laboratory	Madison, Wis.	1929	1955	18	18	100.0	do.	[3]20.4
433	do.	do.	1.8 pounds per post	do.	do.	do.	1929	1955	16	16	100.0	do.	[3]25.4
434	do.	do.	3.0 pounds per post	do.	U. S. Forest Service	Basin, Mont.	1928	1935	228	25	8.8	do.	.....
435	Anaconda Wood Preservative (granules)	do.	1.8 pounds per post	do.	Forest Products Laboratory	Madison, Wis.	1929	1955	19	19	100.0	do.	[3]18.5
436	do.	do.	1.8 pounds per post	do.	do.	do.	1929	1955	19	19	100.0	do.	[3]24
437	Anaconda Wood Preservative (paste)	do.	.....	do.	do.	do.	1929	1955	17	17	100.0	do.	[3]25.5
438	Anaconda Wood Preservative (granules and paste)	do.	.....	do.	do.	do.	1929	1955	18	18	100.0	do.	[3]25.9
439	do.	do.	.....	Half-round	do.	do.	1929	1955	18	18	100.0	do.	[3]21.8
440	do.	do.	.....	Square	do.	do.	1929	1955	18	18	100.0	do.	[3]28.3
441	Boliden salt S-25 (ZnO + As_2O_5 + CrO_3 + CuO)	Pressure (oscillating)	0.26	Round	do.	Saucier, Miss.	1957	1963	5	.....	.....	.....	.....
442	do.	Pressure	.57	do.	do.	do.	1957	1963	5	.....	.....	.....	.....
443	Copper sulfate--sodium chromate	Double diffusion (butts)	1.36	do.	U. S. Forest Service	Bend, Oreg.	1952	1962	25	14	56.0	Decay	10
444	do.	do.	.97	do.	do.	do.	1952	1962	25	15	60.0	do.	10
445	do.	do.	.70	do.	Washington State College	Prosser, Wash.	1953	1962	25	5	20.0	do.	13
446	do.	do.	1.1	do.	Oregon State University	Corvallis, Oreg.	1952	1962	25	24	96.0	do.	6
447	Creosote, coal-tar	Hot-and-cold bath (butts)	3.1 pounds per post	do.	U. S. Forest Service	Dillon, Colo.	1908	1963	109	48	44.0	do.	Over 50
448	do.	do.	3.1 pounds per post	do.	do.	do.	1908	1958	413	199	48.2	do.	Over 50
449	do.	Hot-and-cold bath (butts), hot bath (top)	6.0 pounds per post	do.	Forest Products Laboratory	Syene, Wis.	1929	1963	15	8	53.3	do.	36
450	do.	do.	8.2 pounds per post	Half-round	do.	do.	1929	1963	8	.....	.....	.....	.....
451	do.	Hot-and-cold bath (butts)	4.6	Round	U. S. Forest Service	Missoula, Mont.	1916	1957	14	14	100.0	Decay	[3]45
452	do.	do.	3.6	Split	do.	do.	1916	1957	17	17	100.0	do.	[3]43
453	do.	Pressure	.....	Round	Anaconda Copper Mining Co.	Rocker, Mont.	1915	1931	610	146	24.0	do.	21
454	do.	do.	4.4	do.	Forest Products Laboratory	Saucier, Miss.	1957	1963	5	.....	.....	.....	.....

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, lodgepole--continued												
455	Creosote, coal-tar, 50 percent--used crank-case oil, 50 percent	Hot-and-cold bath (butts), hot bath (tops)	3.1 pounds per post	Round	Forest Products Laboratory	Syene, Wis.	1929	1963	15	2	13.3	Decay	Over 50
456	do	do	3.4 pounds per post	Half-round	do	do	1929	1963	7	1	14.3	do	50
457	Creosote, coal-tar, 25 percent--used crank-case oil, 75 percent	do	6.9 pounds per post	Round	do	do	1929	1963	12				
458	do	do	3.1 pounds per post	Half-round	do	do	1929	1963	6	2	33.3	Decay	41
459	Crude petroleum	Brush	0.39 pound per post	Round	Colorado State University	Fort Collins, Colo.	1913	1936	18	17	94.5	do	6.8
460	Pentachlorophenol, 5 percent in No. 2 fuel oil	Seasoned 3 months, cold-soaked, 48 hours	3.5	do	Forest Products Laboratory	Madison, Wis.	1946	1963	22				
461	do	Seasoned 12 months, cold-soaked, 48 hours	5.8	do	do	do	1946	1963	25				
462	Sodium fluoride	Steeping	.095	do	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	36	36	100.0	Decay	13.5
463	Sodium fluoride--copper sulfate	Double diffusion (butts)	.38	do	U. S. Forest Service	Bend, Oreg.	1952	1962	25	1	4.0	do	
464	do	do	.32	do	do	do	1952	1962	25	2	8.0	do	
465	do	do	.37	do	Washington State College	Prosser, Wash.	1953	1962	25				
466	Tetrachlorophenol, 3 percent in petroleum	Hot-and-cold bath (butts)		do	U. S. Forest Service	Gallatin Nat'l Forest	1935	1957	83	8	9.6	Decay	3-
467	Water-gas tar	do	4.6 pounds per post	do	Colorado State University	Fort Collins, Colo.	1912-13	1936	18				
468	do	do	1.6 pounds per post	do	do	do	1913	1936	10	5	50.0	Decay	20
469	do	Hot bath (butts)	1.3 pounds per post	do	do	do	1912-13	1936	18	12	66.6	do	18
470	do	Brush (butts)	0.4 pound per post	do	do	do	1912-13	1936	19	17	89.5	do	12
471	Zinc chloride	Pressure	.83	Half-round	U. S. Forest Service	Halsey, Nebr.	1929	1957	33	33	100.0	do	20.3
472	do	Steeping	.28	Round	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	17	17	100.0	do	15.0
473	do	do	.35	do	do	do	1926	1943	51	32	62.7	do	10
474	Zinc meta arsenite	Pressure	.43	Half-round	U. S. Forest Service	Halsey, Nebr.	1929	1957	32	32	100.0	do	20.0
475	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	.96	Round	Washington State College	Prosser, Wash.	1953	1962	25				
476	do	do	.73	do	Oregon State University	Corvallis, Oreg.	1952	1962	25	8	32.0	Decay	12
477	do	do	.93	do	U. S. Forest Service	Bend, Oreg.	1952	1962	25	1	4.0	do	
478	do	do	.27	do	do	do	1952	1962	25	4	16.0	do	14
479	None	Untreated		do	do	do	1952	1962	25	21	84.0	do	6
480	do	do		do	do	Saucier, Miss.	1957	1962	5	5	100.00	Decay and termites	4.3

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[4]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, lodgepole--continued												
481	None	Untreated		Round	Washington State College	Prosser, Wash.	1953	1962	25	15	60.0	Decay	10
482	do.	do.		do.	Oregon State University	Corvallis, Oreg.	1952	1958	25	25	100.0	do.	3.0
483	do.	Untreated (stubs)		Half-round	U. S. Forest Service	Halsey, Nebr.	1929	1947	20	20	100.0	Decay and termites	9.4
484	do.	Untreated		Round	do.	Basin, Mont.	1928	1935	22	14	63.6	Decay	6
485	do.	do.		do.	do.	Dillon, Colo.	1908	1917	213	213	100.0	do.	8.2
486	do.	do.		do.	Colorado State University	Fort Collins, Colo.	1912	1934	19	19	100.0	do.	8.4
487	do.	do.		do.	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	20	20	100.0	do.	9.4
488	do.	do.		do.	U. S. Forest Service	Missoula, Mont.	1916	1928	5	5	100.0	do.	11.0
489	do.	do.		Split	do.	do.	1916	1926	5	5	100.0	do.	9.4
490	do.	Untreated (stubs)		Round	Forest Products Laboratory	Madison, Wis.	1929	1952	20	20	100.0	do.	9.5
491	do.	do.		Half-round	do.	do.	1929	1944	20	20	100.0	do.	7.4
492	do.	do.		Square	do.	do.	1929	1955	20	20	100.0	do.	[3]11.6
493	do.	do.		Round	do.	Syene, Wis.	1929	1939	9	9	100.0	do.	7.0
494	do.	do.		Half-round	do.	do.	1929	1938	9	9	100.0	do.	5.6
495	do.	do.		Square	do.	do.	1929	1938	9	9	100.0	do.	7.1
496	do.	Untreated		Round	do.	Madison, Wis.	1946	1963	10	9	90.0	do.	8
	Pine, ponderosa												
497	Anaconda Wood Preservative (dust)	Groundline		do.	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	26	25	96.2	do.	13
498	do.	do.		Split	do.	do.	1926	1943	6	6	100.0	do.	15.0
499	Creosote, coal-tar	Hot-and-cold bath	10.1	Round	Forest Products Laboratory	Drummond, Wis.	1936	1962	15	1	6.7	do.	
500	Creosote, coal-tar, 40 percent--petroleum oil, 60 percent	Pressure	11.3	do.	U. S. Forest Service	Armour, S. Dak.	1935	1962	197				
501	do.	do.	11.2	do.	do.	Litchville, N.Dak.	1935	1964	186				
502	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 168 hours	4.5	do.	New York State College of Forestry	Syracuse, N. Y.	1942	1948	10				
503	Sodium fluoride	Steeping	.25	do.	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	33	32	97.0	Decay	12
504	do.	do.	.24	do.	do.	do.	1926	1943	17	17	100.0	do.	9.9
505	do.	do.	.27	Split	do.	do.	1926	1943	20	20	100.0	do.	15.3
506	do.	do.	.33	Round	U. S. Forest Service	Halsey, Nebr.	1925	1957	25	25	100.0	Decay and termites	[3]15.6

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, ponderosa--continued												
507	Zinc chloride	Steeping	0.46	Round	U. S. Forest Service	Halsey, Nebr.	1925	1957	19	19	100.0	Decay and termites	31[3]
508	do	do	.38	do	do	do	1925	1954	5	5	100.0	do	20.0
509	do	do	.75	do	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	6	5	83.3	Decay	15
510	do	do	.48	do	do	do	1926	1943	40	27	67.5	do	16
511	do	do	.49	Split	do	do	1926	1943	18	18	100.0	do	15.1
512	Zinc chloride, 10 percent	Tire-tube		Round	U. S. Forest Service	Tucson and Flagstaff, Ariz.	1940	1958	10				
513	None	Untreated		do	do	do	1939-40	1950	45	45	100.0	Decay	5.7
514	do	do		do	do	Armour, S. Dak.	1935	1955	21	21	100.0	do	9.0
515	do	do		do	do	Halsey, Nebr.	1925	1935	10	10	100.0	Decay and termites	6.3
516	do	do		Split	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	6	6	100.0	Decay	8.3
517	do	do		Round	do	do	1926	1941	23	23	100.0	do	8.2
518	do	do		do	National Bison Range	Moiese, Mont.	1909	1912	380	380	100.0	do	3.5
	Pine, red												
519	Nickel sulfate and sodium dichromate	Butt steeping	1.19	do	Forest Products Laboratory	Madison, Wis.	1945	1963	8	1	12.5	do	27
520	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 168 hours	6.0	do	New York State College of Forestry	Syracuse, N. Y.	1942	1948	10				
521	Sodium fluoride	Steeping	.06	Square	Forest Products Laboratory	Verona, Wis.	1925	1945	33	33	100.0	Decay	13.7
522	do	do	.44	do	do	Madison, Wis.	1926	1941	6	5	83.3	do	12
523	Wolman salts (Trialith)	do	.10	do	do	Verona, Wis.	1925	1945	34	34	100.0	do	15.9
524	Zinc chloride	do	.31	do	do	do	1925	1944	31	31	100.0	do	14.7
525	None	Untreated (stubs)		do	do	do	1925	1944	50	50	100.0	do	10.0
	Pine, scotch												
526	Sodium fluoride	Steeping	.42	Round	U. S. Forest Service	Halsey, Nebr.	1925	1949	25	25	100.0	Decay and termites	12.2
527	Zinc chloride	do	.49	do	do	do	1925	1943	18	18	100.0	do	12.9
528	do	do	.34	do	do	do	1925	1944	5	5	100.0	Decay	13.6
529	None	Untreated		do	do	do	1925	1936	12	12	100.0	Decay and termites	6.8
	Pine, southern yellow (loblolly)												
530	Creosote, coal-tar	Pressure	6.0	do	Delta Experiment Station	Stoneville, Miss.	1937	1959	12	8	66.7	Decay	22
531	do	do	12.0	do	do	do	1937	1959	12				
532	do	Hot-and-cold bath (butts), cold bath (tops)	3.7	Round and split	North Louisiana Expt. Sta.	Calhoun, La.	1908-10	1940	305	293	96.1	Decay	16.8

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow--continued (loblolly)												
533	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion	1.2	Round	U. S. Forest Service	Athens, Ga.	1955	1963	25				
534	do.	do.	1.2	do.	do.	do.	1955	1963	25				
535	do.	do.	2.3	do.	do.	do.	1955	1963	25				
536	do.	Double diffusion. First solution heated to 200° F.	2.1	do.	do.	do.	1955	1963	25				
537	None	Untreated		do.	do.	do.	1955	1959	50	50	100.0	Decay	2.1
	Pine, southern yellow (longleaf)												
538	Ammoniacal copper arsenite (Chemonite) (AWPA P-5)	Pressure	.34	do.	Forest Products Laboratory	Saucier, Miss.	1949	1963	25				
539	Boliden salt B ($ZnO+H_3AsO_4+CrO_3$)	do.	.50	do.	do.	do.	1949	1963	25				
540	Carbosota (coal-tar creosote)	do.	6.0	do.	do.	do.	1949	1963	25				
541	Chromated zinc arsenate (Boliden salts) (AWPA P-5)	do.	.70	do.	do.	do.	1949	1963	25	1	4.0	Decay	
542	Chromated zinc chloride, copperized (AWPA P-5)	do.	.98	do.	do.	do.	1949	1963	25	2	8.0	do.	
543	Chromated zinc chloride, (FR) (AWPA P-10)	do.	3.25	do.	do.	do.	1949	1963	25	1	4.0	do.	
544	Copper naphthenate, 1/2 percent copper-metal, in petroleum oil (Item No. 595)	do.	6.0	do.	do.	do.	1949	1963	25	1	4.0	do.	
545	Copper sulfate	Butt steeping	.47	do.	do.	do.	1951	1963	25	20	80.0	Decay and termites	7
546	Copper sulfate--borax and boric acid	Double diffusion (butts)	.81	do.	do.	do.	1956	1963	25	3	12.0	Decay	11
547	do.	Double diffusion (butts) Steeping (tops) in borax and boric acid	.61	do.	do.	do.	1956	1963	25	4	16.0	do.	11
548	Copper sulfate--borax and sodium fluoride	Double diffusion (butts)	.46	do.	do.	do.	1956	1963	25	2	8.0	do.	
549	Copper sulfate--sodium arsenate and sodium chromate	do.	.94	do.	do.	do.	1956	1963	25				
550	Copper sulfate--sodium fluoride and sodium chromate	do.	.62	do.	do.	do.	1956	1963	25	2	8.0	do.	
551	Copper sulfate--sodium fluoride	do.	.36	do.	do.	do.	1951	1963	25	12	48.0	do.	13
552	do.	do.	.80	do.	do.	do.	1951	1963	25	3	12.0	do.	18

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection: No.	Percent	Cause	Average life[1]
			Lb. per cu. ft.										Yr.
	Pine, southern yellow--continued (longleaf)												
553	Copper sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	0.40	Round	Forest Products Laboratory	Saucier, Miss.	1951	1963	25	15	60.0	Decay	11
554	do	do	1.18	do	do	do	1951	1963	25	1	4.0	do	
	Creosote coal-tar:												
555	Straight run, low residue	Pressure	5.9	do	do	do	1949	1963	25				
556	Straight run, medium residue	do	5.6	do	do	do	1949	1963	25				
557	Straight run, high residue	do	6.0	do	do	do	1949	1963	25				
558	Medium residue, low in tar acids	do	5.7	do	do	do	1949	1963	25				
559	Medium residue, low in naphthalene	do	6.1	do	do	do	1949	1963	25				
560	Medium residue, low in tar acids and naphthalene	do	6.0	do	do	do	1949	1963	25				
561	Low residue, low in tar acids and naphthalene	do	6.0	do	do	do	1949	1963	25				
562	High residue, low in tar acids and naphthalene	do	6.1	do	do	do	1949	1963	25				
563	Medium residue, low in fraction from 235° to 270° C., crystals removed	do	6.1	do	do	do	1949	1963	25	3	12.0	Decay and termites	22
564	High residue, crystals removed	do	6.0	do	do	do	1949	1963	25				
565	Low temperature	do	6.3	do	do	do	1949	1963	25				
566	English, vertical retort	do	6.3	do	do	do	1949	1963	25				
567	English, coke oven	do	6.0	do	do	do	1949	1963	25				
568	English, vertical retort, 50 percent; and coke oven, 50 percent	do	6.0	do	do	do	1949	1963	25				
569	Medium residue (low in tar acids and naphthalene) with 2-1/2 percent pentachlorophenol	do	6.0	do	do	do	1949	1963	25				
570	Creosote, coal-tar 70 percent--coal-tar, 30 percent	do	6.1	do	do	do	1949	1963	25				
571	Creosote, coal-tar (Item No. 560), 50 percent--petroleum oil (Item No. 594), 50 percent	do	5.9	do	do	do	1949	1963	25				
572	Creosote, coal-tar (Item No. 560), 50 percent and petroleum oil (Item No. 596), 50 percent	do	6.0	do	do	do	1949	1963	25				
573	Creosote, coal-tar (Item No. 560), 50 percent and petroleum oil (Item No. 596), 50 percent plus 2-1/2 percent pentachlorophenol	do	6.0	do	do	do	1949	1963	25				

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow (longleaf)--continued												
574	Creosote, oil tar (Gasco)	Pressure	5.9	Round	Forest Products Laboratory	Saucier, Miss.	1949	1963	25				
575	Creosote, (Gasco) with 2 percent pentachlorophenol	do	5.8	do	do	do	1949	1963	25				
576	Creosote, lignite	do	6.3	do	do	do	1949	1963	25	3	12.0	Decay	22
577	Creosote, lignite, 50 percent--creosote, coal-tar (Item No. 560), 50 percent	do	6.3	do	do	do	1949	1963	25				
578	Creosote, lignite, 50 percent--petroleum oil (Item No. 596), 50 percent	do	6.4	do	do	do	1949	1963	25	2	8.0	Decay	
579	Nickel sulfate--sodium chromate	Double diffusion (butts)	1.32	do	do	do	1946	1963	25	3	12.0	do	26
580	do	do	.25	do	do	do	1946	1959	25	25	100.0	Decay and termites	7.8
581	do	do	.36	do	do	do	1946	1963	25	18	72.0	do	10
582	Nickel sulfate and arsenic acid--sodium chromate	do	1.61	do	do	do	1946	1963	25	5	20.0	Decay	23
583	do	do	.60	do	do	do	1946	1963	25	1	4.0	do	
584	do	do	.33	do	do	do	1946	1963	25	7	28.0	do	22
	Pentachlorophenol:												
585	Five percent in petroleum oil (Item No. 594)	Pressure	6.3	do	do	do	1949	1963	25				
586	Five percent in petroleum oil (Item No. 595)	do	5.9	do	do	do	1949	1963	25				
587	Three percent in petroleum oil (Item No. 595)	do	6.0	do	do	do	1949	1963	25				
588	Five percent in petroleum oil (Item No. 596)	do	6.0	do	do	do	1949	1963	25	1	4.0	Decay	
589	Pentachlorophenol, 5 percent in petroleum oil (Item No. 595), 50 percent: copper naphthenate, 1/2 percent copper-metal, in petroleum oil (Item No. 595), 50 percent	do	6.2	do	do	do	1949	1963	25				
	Petroleum oil:												
590	Aromatic, high residue (S.W.)	do	6.1	do	do	do	1949	1963	25				
591	Aromatic, low residue (S.W.)	do	6.1	do	do	do	1949	1963	25				
592	Highly aromatic (S.O.)	do	6.0	do	do	do	1949	1963	25	1	4.0	Decay	
593	Highly aromatic, high residue (S.O.)	do	6.1	do	do	do	1949	1963	25	4	16.0	Decay and termites	21
594	No. 2 fuel oil (mid-U.S.)	do	5.9	do	do	do	1949	1963	25	24	96.0	do	5
595	No. 4 aromatic residual (California)	do	5.9	do	do	do	1949	1963	25	1	4.0	Decay	
596	Wyoming residual	do	5.8	do	do	do	1949	1963	25	20	80.0	Decay and termites	8
597	Sodium fluoride--copper sulfate	Double diffusion (butts)	.57	do	do	do	1951	1963	24				

Table 2.--Service tests of treated and untreated fence posts.--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow (longleaf)--continued												
598	Termiteol (softwood tar creosote)	Pressure	6.1	Round	Forest Products Laboratory	Saucier, Miss.	1949	1963	25	2	8.0	Decay and termites	
599	Zinc chloride	Butt steeping	1.41	do	do	do	1946	1963	25				
600	do	do	.32	do	do	do	1946	1962	23	23	100.0	Decay and termites	6.0
601	do	do	.23	do	do	do	1946	1957	25	25	100.0	do	5.6
602	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	.53	do	do	do	1951	1963	25	8	32.0	Decay	15
603	do	do	1.20	do	do	do	1951	1963	25	11	44.0	do	13
604	Zinc sulfate--borax and boric acid	do	.83	do	do	do	1956	1963	25	2	8.0	do	
605	Zinc sulfate--borax and sodium fluoride	do	.67	do	do	do	1956	1963	25				
606	do	do	.50	do	do	do	1956	1963	25	3	12.0	Decay and termites	11
607	Zinc sulfate--sodium chromate and sodium arsenate	do	.80	do	do	do	1956	1963	25				
608	Zinc sulfate--sodium chromate and sodium fluoride	do	1.11	do	do	do	1956	1963	24				
609	do	do	.75	do	do	do	1956	1963	25				
610	None	Untreated		do	do	do	1956	1960	25	25	100.0	Decay and termites	3.2
611	do	do		do	do	do	1949	1952	25	25	100.0	do	2.3
612	do	do		do	do	do	1951	1953	25	25	100.0	do	1.7
	Pine, southern yellow (shortleaf)												
613	Copper sulfate and arsenic acid--sodium chromate	Double diffusion (butts) Steeping (tops) in Na_2CrO_4	.94	do	Tennessee Valley Authority	Norris, Tenn.	1953	1963	25				
614	do	do	.88	do	do	do	1953	1963	25	2	8.0	Decay and termites	
615	Copper sulfate--sodium chromate	do	.70	do	do	do	1953	1963	25	2	8.0		
616	do	Double diffusion (butts) Steeping (tops) in Na_2CrO_4 (bug peeled)	2.05	do	do	do	1953	1963	25	8	32.0	Decay	17
617	Creosote, coal-tar	Pressure	6.0	do	Delta Experiment Station	Stoneville, Miss.	1937	1959	12	2	16.7	Decay	33
618	do	do	12.0	do	do	do	1937	1959	12	1	8.3	do	
619	Sodium fluoride--copper sulfate	Double diffusion (butts)	.64	do	Tennesse Valley Authority	Norris, Tenn.	1953	1963	23	4	17.3		14
620	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion (butts) steeping (tops) in Na_2CrO_4	.72	do	do	do	1953	1963	24				
621	None	Untreated		do	do	do	1953	1956	25	25	100.0	Decay and termites	2.4
622	do	Untreated (bug peeled)		Round	do	do	1951	1954	25	25	100.0	do	2.2

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow (shortleaf)--continued												
623	None	Untreated		Round	Tennessee Valley Authority	Norris, Tenn.	1953	1956	25	25	100.0	Decay and termites	2.0
	Pine, southern yellow (slash)												
624	Copper sulfate--borax and boric acid	Double diffusion (butts)	0.34	do	Forest Products Laboratory	Saucier, Miss.	1953	1963	25	9	36.0	Decay and termites	12
625	Copper sulfate--sodium chromate	do	.27	do	do	do	1953	1963	25	19	76.0	Decay	8
626	do	do	.21	do	do	do	1953	1963	25	21	84.0	Decay and termites	6
		Steeping (tops) in Na_2CrO_4											
627	do	Double diffusion (butts)	.94	do	do	do	1953	1963	25	4	16.0	Decay	15
628	do	do	.62	do	do	do	1953	1963	25	16	64.0	Decay and termites	11
		Steeping (tops) in Na_2CrO_4											
629	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 48 hours	6.8	do	do	do	1947	1963	25	2	8.0	Decay	
630	Zinc chloride	End diffusion		do	do	do	1947	1963	25	12	48.0	do	17
631	do	Steeping	2.5	do	do	do	1947	1963	25	14	56.0	do	16
632	Zinc sulfate--borax and boric acid	Double diffusion (butts)	.59	do	do	do	1953	1963	25	9	36.0	Decay and termites	12
633	Zinc sulfate--sodium chromate	do	.65	do	do	do	1953	1963	25	10	40.0	Decay	12
634	None	Untreated		do	do	do	1947	1952	25	25	100.0	Decay and termites	2.2
635	do	do		do	do	do	1953	1955	25	25	100.0	do	1.7
	Pine, southern yellow[2]												
636	Acid copper chromate (Celcure) (AWPA-P5)	Pressure	.92	do	do	do	1936-37	1963	86	19	22.1	Decay and termites	35
637	Beta naphthol, 5 percent in petroleum mixture	do	6.2	do	do	do	1936-37	1963	98	96	98.0	do	14
638	Boliden salt, S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.42	do	do	do	1957	1963	5				
639	do	Pressure	.57	do	do	do	1957	1963	5				
640	Borax	do	1.1	do	Chicago, Milwaukee, St. Paul and Pacific R.R.	Madison, Wis.	1926	1953	4	4	100.0	Decay	15.2
641	do	do	1.0	Half-round	do	do	1926	1953	20	20	100.0	do	14.4
642	Borax--boric acid (equal parts by weight)	do	.92	Round	Forest Products Laboratory	Saucier, Miss.	1936-37	1957	97	97	100.0	Decay and termites	10.6
643	Chromated copper arsenate (Erdalith, Green-salt)	do	0.5	Square	Wisc. State Highway Commission	Madison, Wis.	1954	1963	4				
644	Chromated zinc chloride	do	1.22	do	do	do	1956	1963	12				
645	do	do	.87	Round	Forest Products Laboratory	Saucier, Miss.	1936-37	1963	93	53	57.0	Decay and termites	27

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow[2]--continued												
646	Copper sulfate--sodium arsenate	Double diffusion	0.51	Round	Forest Products Laboratory	Saucier, Miss.	1941	1963	97	5	5.2	Decay	.....
647	Copper sulfate--disodium phosphate	Double diffusion (butts)	.93	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	Decay and termites	6.8
648	..do.....	..do.....	.29	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	..do.....	[3]7.6
649	..do.....	..do.....	.19	..do.....	..do.....	..do.....	1948	1961	26	26	100.0	..do.....	[3]6.8
650	..do.....	Double diffusion, (butts). Tops brushed with pentachlorophenol, 5 percent, in No. 2 fuel oil	.40	..do.....	..do.....	..do.....	1948	1961	24	24	100.0	..do.....	[3]8.3
651	Copper sulfate--sodium chromate	Double diffusion (butts)	1.09	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	..do.....	[3]8.1
652	..do.....	..do.....	.38	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	..do.....	[3]7.5
653	..do.....	..do.....	.10	..do.....	..do.....	..do.....	1948	1960	25	25	100.0	..do.....	6.9
654	Coal tar	Pressure	6.5	..do.....	..do.....	..do.....	1936-37	1963	93	41	44.1	..do.....	30
655	Crank-case oil, used	..do.....	7.6	..do.....	..do.....	..do.....	1936-37	1963	96	91	94.8	..do.....	8
656	Creosote, coal-tar	..do.....	6.0	..do.....	..do.....	..do.....	1936-37	1963	94	20	21.3	Decay	36
657	..do.....	..do.....	6.0	Square	Wis. State Highway Commission	Madison, Wis.	1954	1963	8	3	37.5	..do.....	10
658	..do.....	..do.....	6.5	Round	Forest Products Laboratory	Saucier, Miss.	1957	1963	5	.....	.....	.....	.....
659	Cresote, lignite	..do.....	6.3	..do.....	..do.....	..do.....	1936-37	1963	97	46	47.4	Decay and termites	29
660	Creosote, coal-tar, 10 percent--used crank-case oil, 90 percent	..do.....	7.1	..do.....	..do.....	..do.....	1936-37	1963	98	82	84.7	..do.....	11
661	Creosote, coal-tar, 50 percent--used crank-case oil, 50 percent	..do.....	5.4	..do.....	..do.....	..do.....	1936-37	1963	92	12	13.0	Decay	40
662	Creosote, coal-tar, 80 percent--coal tar, 20 percent	..do.....	7.5	..do.....	..do.....	Brooklyn, Wis.	1926	1963	14	.....	.....	.....	.....
663	..do.....	..do.....	7.5	Half-round	..do.....	..do.....	1926	1963	17	.....	.....	.....	.....
664	Fluor chrome arsenate phenol (Tanalith) (AWPA-P5)	..do.....	.35	Round	..do.....	Saucier, Miss.	1936-37	1963	95	50	52.6	Decay and termites	28
665	Mercuric chloride	Steeping	.09	..do.....	..do.....	..do.....	1936-37	1963	99	61	61.6	..do.....	[3]27
666	Nickel sulfate--disodium phosphate	Double diffusion (butts)	1.15	..do.....	..do.....	..do.....	1948	1961	24	24	100.0	..do.....	[3]10.3
667	..do.....	..do.....	.76	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	..do.....	[3]9.6
668	..do.....	..do.....	.28	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	..do.....	9.7
669	..do.....	..do.....	.24	..do.....	..do.....	..do.....	1948	1961	25	25	100.0	..do.....	7.6
670	Nickel sulfate and arsenic acid--sodium chromate	..do.....	1.74	..do.....	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	.....	.....	.....	.....
671	..do.....	..do.....	.64	..do.....	..do.....	..do.....	1946	1963	25	.....	.....	.....	.....
672	..do.....	..do.....	.42	..do.....	..do.....	..do.....	1946	1963	25	2	8.0	Decay and termites	.....
673	Osmosplastic	Groundline	.34	..do.....	Forest Products Laboratory	Saucier, Miss.	1941	1960	99	99	100.0	..do.....	11.2
674	Osmosar	Osmose	.30	..do.....	..do.....	..do.....	1936-37	1963	94	65	69.2	..do.....	25
675	Pentachlorophenol, 5 percent in petroleum oil	Pressure	6.0	Square	Wis. State Highway Commission	Madison, Wis.	1954	1963	11	2	18.2	Decay	12
676	Pentachlorophenol, 4.82 percent in used crank-case oil	..do.....	6.7	Round	Forest Products Laboratory	Saucier, Miss.	1936-37	1963	95	1	1.0	..do.....	.....
677	Pentachlorophenol, 3.02 percent in used crank-case oil	..do.....	6.4	..do.....	..do.....	..do.....	1936-37	1963	86	9	10.5	..do.....	42

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow[2] -- continued												
678	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 24 hours	2.4	Round	U. S. Forest Service	Willow Springs, Mo.	1944	1963	62				
679	do	Cold-soaking, 72 hours	4.2	do	do	do	1944	1963	36				
680	do	Cold-soaking, 120 hours	4.5	do	do	do	1944	1963	28				
681	Pentachlorophenol, 6.2 percent in No. 2 fuel oil	Cold-soaking, 24 hours	2.7	do	do	do	1944	1963	71	3	4.2	Decay	
682	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, butts, 20 hours, tops, 3-4 hours	2.1	do	do	do	1944	1963	26				
683	do	Cold-soaking, butts, 72 hours, tops, 4 hours	4.0	do	do	do	1944	1963	12				
684	do	Cold-soaking, butts, 120 hours, tops, 3 hours	3.3	do	do	do	1944	1963	10				
685	do	Cold-soaking, 4 hours	1.4	do	Forest Products Laboratory	Oregon, Wis.	1943	1963	13	12	92.3	Decay	14
686	do	Cold-soaking, 8 hours	1.8	do	do	do	1943	1963	12	10	83.4	do	15
687	do	Cold-soaking, 24 hours	1.9	do	do	do	1943	1963	13	10	76.9	do	16
688	do	Cold-soaking, 48 hours	2.7	do	do	do	1943	1963	13	8	61.5	do	19
689	do	Cold-soaking, butts, 18 hours, tops, 6 hours	2.2	do	do	do	1943	1963	17	7	41.2	do	22
690	do	Cold-soaking, 168 hours	4.0	do	do	Syene, Wis.	1942	1963	10				
691	Phenyldichlorarsine, 0.84 percent in gas oil	Pressure	5.9	do	do	Saucier, Miss.	1936-37	1963	94	75	79.8	Decay and termites	21
692	Sodium dichromate	do	.88	do	do	do	1936-37	1963	96	89	92.8	do	18
693	Sodium chromate	do	.93	do	do	do	1936-37	1963	88	78	88.6	do	16
694	Tetrachlorophenol, 2.9 percent in used crank-case oil	do	7.1	do	do	do	1936-37	1963	90	20	22.2	Decay	36
695	Tetrachlorophenol, 4.3 percent in used crank-case oil	do	5.8	do	do	do	1936-37	1963	93	14	15.0	Decay and termites	39
696	Water-gas tar	do	6.3	do	do	do	1936-37	1963	93	14	15.0	do	39
697	Wood-tar creosote (No-D-K)	do	6.6	do	do	do	1936-37	1963	99	75	75.8	do	21
698	Zinc chloride	do	.94	do	do	do	1936-37	1963	95	60	63.2	do	27
699	Zinc meta arsenite	do	.42	do	do	do	1936-37	1963	94	3	3.2	Decay	
700	None	Untreated		do	do	do	1937	1943	65	65	100.0	Decay and termites	3.1
701	do	do		do	do	do	1938	1943	33	33	100.0	do	3.7
702	do	do		do	do	do	1948	1952	25	25	100.0	do	2.3

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Pine, southern yellow[2]--continued												
703	None	Untreated		Round	Forest Products Laboratory	Saucier, Miss.	1957	1961	5	5	100.0	Decay and termites	3.4
704	do	do		do	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	24	96.0	do	4
705	do	do		do	Chicago, Milwaukee, St. Paul and Pacific R.R.	Madison, Wis.	1926	1935	15	15	100.0	Decay	6.6
706	do	do		Half-round	do	do	1926	1936	19	19	100.0	do	6.5
	Pine, Virginia												
707	Creosote, coal-tar	Hot-and-cold bath		Round	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	14	3	21.4	do	41
708	Creosote-asphaltum	Hot bath-asphaltum, Cold bath-creosote		do	do	do	1908	1939	6	5	83.3	do	27
709	Creosote-crude petroleum	Hot bath-petroleum, Cold bath-creosote		do	do	do	1908	1939	7	4	57.1	do	32
710	Water-gas tar	Hot bath (butts)		do	do	do	1908	1935	7	7	100.0	do	17.0
	Pinyon												
711	Zinc chloride, 10%	Tire-tube		do	U. S. Forest Service	Tucson and Flagstaff, Ariz.	1940	1958	10				
712	None	Untreated		do	do	do	1939-40	1950	10	10	100.0	Decay	6.2
	Poplar, white												
713	Creosote, coal-tar	Hot-and-cold bath		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	11	8	72.7	do	29
714	do	Hot-and-cold bath (butts)		do	do	do	1908	1939	5	4	80.0	do	27
715	Creosote-crude petroleum	Hot bath--petroleum: cold bath--creosote		do	do	do	1908	1939	5	5	100.0	do	11.8
716	Creosote--water-gas tar	Hot bath--water-gas tar, cold bath--creosote		do	do	do	1908	1939	7	1	14.3	do	45
	Popple (see Aspen)												
	Redcedar, eastern												
717	Creosote, coal-tar	Hot-and-cold bath		do	do	do	1908	1939	5				
718	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	1.0	do	Forest Products Laboratory	Madison, Wis.	1958	1963	10				
719	None	Untreated		do	do	do	1958	1963	10				
	Redcedar, western												
720	Anaconda Wood Preservative (dust)	Groundline		Split	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	50	10	20.0	Decay	23
721	Creosote, coal-tar	Hot bath (butts)		Round and split	National Bison Range	Moiese, Mont.	1909	1951	8,227	3,064	37.2	do	48
722	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	1.8	Round	Forest Products Laboratory	Madison, Wis.	1958	1963	10				
723	Sodium fluoride	Steeping	.14	Split	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	19	10	52.6	Decay	18
724	do	do	.11	do	do	do	1926	1943	18	1	5.5	do	
725	Zinc chloride	do	.34	do	do	do	1926	1943	24	9	37.5	do	20

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection: No.	Percent	Cause	Average life
			Lb. per cu. ft.										Yr.
	Redcedar, western--continued												
726	Zinc chloride	Steeping	0.25	Split	U. S. Range Livestock Expt. Sta.	Miles City, Mont.	1926	1943	24	1	4.2	Decay	.....
727	None	Untreated	.....	do.	do.	do.	1926	1943	42	16	38.1	do.	20
728	do.	do.	.....	do.	U. S. Forest Service	Missoula, Mont.	1916	1939	51	51	100.0	do.	16.4
729	do.	do.	.....	do.	do.	Halsey, Nebr.	1925	1957	20	20	100.0	Decay and termites	21.3
730	do.	do.	.....	Round	Forest Products Laboratory	Madison, Wis.	1958	1963	10	2	20.0	Decay	7
	Redwood												
731	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	1.6	do.	do.	do.	1958	1963	10	.....	.....	.....	.....
732	None	Untreated	.....	do.	do.	do.	1958	1963	10	8	80.0	do.	3
	Sassafras												
733	Copper sulfate--sodium chromate	Double diffusion (butts)	.32	do.	Tennessee Valley Authority	Norris, Tenn.	1953	1963	25	4	16.0	Decay and termites	14
734	None	Untreated	.....	do.	do.	do.	1951	1958	25	12	48.0	do.	8
735	do.	do.	.....	do.	Forest Products Laboratory	Oregon, Wis.	1939	1963	214	179	83.6	Decay	15
736	do.	do.	.....	Half-round	do.	do.	1939	1963	61	55	90.2	do.	13
736a	do.	do.	.....	Quartered	do.	do.	1939	1963	16	14	87.5	do.	9
	Silk-oak (Grevillea robusta)												
737	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	.91	Round	U.S. Forest Service	Honolulu, Hawaii	1961	1964	26	6	23.1	Decay and termites	3
737a	None	Untreated	.....	do.	do.	do.	1961	1964	10	8	80.0	do.	2
	Spruce, Engelmann												
738	Boliden salt, S-25 (ZnO + As_2O_5 + CrO_3 + CuO)	Pressure (oscillating)	.28	do.	do.	Saucier, Miss.	1957	1963	5	.....	.....	.....	.....
739	do.	Pressure	.95	do.	do.	do.	1957	1963	5	.....	.....	.....	.....
740	Creosote, coal-tar	Pressure	3.5	do.	do.	do.	1957	1963	5	.....	.....	.....	.....
741	Petroleum, crude	Brush (butts)	0.23 pound per post	do.	Colorado State University	Fort Collins, Colo.	1913	1936	18	18	100.0	Decay	4.6
742	Water-gas tar	Hot-and-cold bath (butts)	.91 pound per post	do.	do.	do.	1913	1936	10	6	60.0	do.	13
743	do.	do.	1.72 pounds per post	do.	do.	do.	1912	1936	20	3	15.0	do.	27
744	do.	Hot bath (butts)	.63 pound per post	do.	do.	do.	1912	1936	17	14	82.3	do.	16
745	do.	Brush (butts)	.53 pound per post	do.	do.	do.	1912-13	1936	17	15	88.2	do.	11
746	None	Untreated	.....	do.	do.	do.	1913	1927	19	19	100.0	do.	7.1
747	do.	do.	.....	do.	Forest Products Laboratory	Saucier, Miss.	1957	1960	5	5	100.0	Decay and termites	3.1
	Spruce, Norway												
748	Pentachlorophenol, 5 percent in used crank-case oil	Cold-soaking, 24 hours	1.5	do.	do.	Brooklyn, Wis.	1942	1961	5	5	100.0	Decay	12.4
749	do.	Cold-soaking, 96 hours	1.7	do.	do.	do.	1942	1958	4	4	100.0	do.	12.5

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Spruce, Norway--continued												
750	Pentachlorophenol, 5 percent in used crank-case oil	Cold-soaking, 168 hours	1.6	Round	Forest Products Laboratory	Brooklyn, Wis.	1942	1963	5	3	60.0	Decay	20
750a	Pentachlorophenol, 5 percent in No. 2 fuel oil	do.	1.5	do.	N.Y. State College of Forestry	Syracuse, N.Y.	1942	1948	10				
	Sugi (Cryptomeria japonica)												
751	Copper sulfate--sodium arsenate and sodium chromate	Double diffusion	.77	do.	U.S. Forest Service	Honolulu, Hawaii	1961	1964	26				
751a	None	Untreated		do.	do.	do.	1961	1964	25	11	44.0	Decay and termites	3
	Swamp-privet												
752	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	5.2	do.	Delta Experiment Station	Stoneville, Miss.	1953	1963	15	3	20.0	Decay	13
	Sweetbay												
753	Creosote, coal-tar	Hot bath (butts), cold bath (full length)	9.3	Round and split	N. Louisiana Agric. Expt. Sta.	Calhoun, La.	1908-10	1940	112	94	83.9	Decay	18
754	Pentachlorophenol, 5 percent in No. 2 diesel oil	Cold-soaking 48 hours	9.2	Round	Forest Products Laboratory	Saucier, Miss.	1947	1963	25	8	32.0	do.	19
755	Zinc chloride	End diffusion	.94	do.	do.	do.	1947	1958	25	25	100.0	Decay and termites	5.0
756	do.	Steeping	1.6	do.	do.	do.	1947	1958	25	25	100.0	do.	5.6
757	None	Untreated		do.	do.	do.	1947	1950	25	25	100.0	do.	1.8
	Sweetgum												
758	Boliden salt, S-25 ($ZnO + As_2O_5 + CrO_3 + CuO$)	Pressure (oscillating)	.78	do.	do.	do.	1957	1963	5				
759	do.	Pressure	.73	do.	do.	do.	1957	1963	5				
760	Creosote, coal-tar	Pressure	9.7	do.	do.	do.	1957	1963	5				
761	do.	Hot-and-cold bath (butts), cold bath (tops)	7.7	do.	N. Louisiana Agric. Expt. Sta.	Calhoun, La.	1908-10	1940	134	91	67.9	Decay	23
762	do.	Hot-and-cold bath		do.	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	13				
763	do.	Hot-and-cold bath (butts)		do.	do.	do.	1908	1939	5	5	100.0	Decay	13.8
764	do.	Pressure	6.0	do.	Delta Experiment Station	Stoneville, Miss.	1937	1959	12	7	58.3	do.	23
765	do.	do.	12.0	do.	do.	do.	1937	1959	9	1	11.1	do.	34
766	Creosote--crude petroleum	Hot bath--petroleum cold bath--creosote		do.	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	6	6	100.0	do.	25.7
767	Creosote--diesel oil	Hot bath--creosote, cold bath (50-50)	11.0	do.	Delta Experiment Station	Stoneville, Miss.	1941	1959	9	1	11.1	do.	27
768	do.	do.	11.0	do.	do.	do.	1946	1959	3				
769	Nickel sulfate--disodium phosphate	Double diffusion (butts)	.53	Round (unpeeled)	Forest Products Laboratory	Saucier, Miss.	1948	1958	26	26	100.0	Decay and termites	4.0
770	do.	do.	.21	do.	do.	do.	1948	1954	24	24	100.0	do.	2.1
771	do.	do.	.58	Round	do.	do.	1948	1957	25	25	100.0	do.	4.8
772	Nickel sulfate--sodium fluoride and disodium phosphate	do.	1.06	do.	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	22	88.0	Decay	9

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and Preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Sweetgum--continued												
773	Nickel sulfate--sodium fluoride and disodium phosphate	Double diffusion (butts)	0.47	Round	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	23	92.0	Decay and termites	12
774	do	do	.44	do	do	do	1946	1963	25	24	96.0	do	7
775	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	2.3-10.0	do	Delta Experiment Station	Stoneville, Miss.	1947	1959	27	11	40.8	do	15
776	Pentachlorophenol, 5 percent in No. 2 diesel oil	Cold-soaking, 5 days	6.0	do	do	do	1953	1963	15				
777	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 48 hours	4.9	do	Forest Products Laboratory	Saucier, Miss.	1947	1963	24	17	70.8	Decay and termites	13
778	Zinc chloride	Tire-tube	1.02-1.12	do	do	Madison, Wis.	1939	1948	10	5	50.0	Decay	10
779	do	End diffusion	.95	do	do	Saucier, Miss.	1947	1963	25	25	100.0	Decay and termites	6.6
780	do	Steeping	2.0	do	do	do	1947	1957	25	25	100.0	do	5.9
781	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion	1.9	do	U. S. Forest Service	Athens, Ga.	1955	1963	25	2	8.0	Decay	
782	do	do	2.4	do	do	do	1955	1963	25				
783	do	do	2.9	do	do	do	1955	1963	25				
784	do	Double diffusion. First solution heated to 200° F.	3.1	do	do	do	1955	1963	25				
785	None	Untreated		do	do	do	1955	1958	49	49	100.0	Decay	2.2
786	do	do		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1914	5	5	100.0	do	4.2
787	do	do		do	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1949	25	25	100.0	Decay and termites	2.3
788	do	do		do	Forest Products Laboratory	Saucier, Miss.	1947	1949	25	25	100.0	do	1.8
789	do	do		Round (un peeled)	do	do	1948	1950	22	22	100.0	do	1.5
790	do	do		Round	do	do	1957	1959	5	5	100.0	do	2.4
	Sycamore, American												
791	Creosote, coal-tar	Hot-and-cold bath		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	7				
	Tamarack												
792	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours (butts-incised)	1.3	do	Forest Products Laboratory	Saucier, Miss.	1954	1963	10	6	60.0	Decay and termites	10
793	do	Cold-soaking, 48 hours	.9	do	do	do	1954	1963	10	7	70.0	do	10
794	Zinc chloride	Tire-tube		do	do	Lodi, Wis.	1938	1963	28	3	10.7	Decay	38
795	None	Untreated		do	do	Saucier, Miss.	1954	1963	10	10	100.0	Decay and termites	5.1
	Tupelo, black												
796	Creosote, coal-tar	Hot-and-cold bath (butts), cold bath (tops)	7.2	do	N. Louisiana Agric. Expt. Sta.	Calhoun, La.	1908-10	1940	38	25	65.8	Decay	[3]20.6
797	do	Hot-and-cold bath		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	15				

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	Tupelo, black--Continued												
798	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	0.52	Round	Tennessee Valley Authority	Norris, Tenn.	1953	1963	25	6	24.0	Decay and termites	13
799	None	Untreated		do.	do.	do.	1951	1957	25	25	100.0	do.	3.4
800	do.	do.		do.	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1914	5	5	100.0	Decay	4.2
	Tupelo, water												
801	Creosote, coal-tar	Hot-and-cold bath (butts), cold bath (tops)	8.6	do.	N. Louisiana Agric. Expt. Sta.	Calhoun, La.	1908-10	1940	73	49	67.0	do.	23
802	Pentachlorophenol, 5 percent in diesel oil	Cold-soaking, 5 days	6.5	do.	Delta Experiment Station	Stoneville, Miss.	1953	1963	15				
803	Pentachlorophenol, 5 percent in No. 2 fuel oil	Cold-soaking, 48 hours	5.0	do.	U. S. Forest Service	Saucier, Miss.	1947	1963	25	11	44.0	Decay	18
804	Zinc chloride	End diffusion	.94	do.	do.	do.	1947	1958	25	25	100.0	Decay and termites	5.4
805	do.	Steeping	1.5	do.	do.	do.	1947	1961	25	25	100.0	do.	4.4
805a	None	Untreated		do.	do.	do.	1947	1950	25	25	100.0	do.	2.1
	Turpentine tree (Syncarpia glomulifera)												
806	Copper sulfate-sodium arsenate and sodium chromate	Double diffusion	1.15	do.	do.	Honolulu, Hawaii	1961	1964	26	4	15.4	Decay	4
806a	None	Untreated		do.	do.	do.	1961	1964	25	19	76.0	Decay and termites	2
	Waterlocust												
807	Pentachlorophenol, 5 percent in No. 2 diesel oil	Hot-and-cold bath	8.1	Round and split	Delta Experiment Station	Stoneville, Miss.	1947	1959	15	1	6.7	Decay	
	White-cedar, northern												
808	Creosote, coal tar	Hot-and-cold bath (butts)	4.1 pounds per post	Round	Iowa State University	Ames, Iowa	1909	1937	139	10	7.2	do.	
809	do.	do.	1.7 pounds per post	do.	do.	do.	1909	1934	64				
810	do.	do.		do.	do.	do.	1910	1934	69				
811	do.	do.	2.0 pounds per post	do.	do.	do.	1910	1934	116	4	3.4	Decay	
812	do.	do.	2.0 pounds per post	do.	do.	do.	1910	1934	12	4	33.3	do.	29
813	do.	do.	2.0 pounds per post	do.	do.	do.	1912	1937	9	1	11.1	do.	39
814	do.	Pressure	8.6	do.	Forest Products Laboratory	Vernona, Wis.	1925	1963	16				
815	do.	do.	5.9	do.	do.	Brooklyn, Wis.	1925	1963	27				
816	Creosote, 25 percent--gas oil, 75 percent	do.	7.7	do.	do.	do.	1916	1963	7				
817	Creosote, coal-tar, 50 percent--No. 2 fuel oil, 50 percent	Cold-soaking, 48 hours	1.3	do.	do.	Madison, Wis.	1958	1963	10				
818	Tetrachlorophenol, 5 percent in used crank-case oil	Hot-and-cold bath (butts), hot bath (tops)	1.9 pounds per post	do.	do.	Syene, Wis.	1932	1963	48	29	60.4	Decay	31
819	Tetrachlorophenol, 3 percent in used crank-case oil	do.	2.2 pounds per post	do.	do.	do.	1932	1963	48	38	79.2	do.	25
820	Tetrachlorophenol, 2.9 percent in used crank-case oil	Pressure	8.6	do.	do.	Drummond, Wis.	1936	1962	14	1	7.1	do.	
821	Tetrachlorophenol, 2.86 percent in used crank-case oil	do.	6.5	do.	do.	Madison, Wis.	1934	1962	11				

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr.
	White-cedar, northern -- continued												
822	Tetrachlorophenol, 2.86 percent in used crank-case oil	Pressure	4.5	Round	Forest Products Laboratory	Madison, Wis.	1934	1948	8	.....	.....	.....	.....
823	None	Untreated	.....	..do.....	..do.....	..do.....	1958	1963	10	1	10.0	Decay	.....
824	..do.....	Untreated (stubs)	.....	..do.....	..do.....	Syene, Wis.	1932	1954	19	19	100.0	..do.....	12.9
825	..do.....	..do.....	.....	..do.....	..do.....	Drummond, Wis.	1936	1962	43	43	100.0	..do.....	[3]23.1
826	..do.....	..do.....	.....	..do.....	..do.....	Verona, Wis.	1924	1946	29	29	100.0	..do.....	18.2
827	..do.....	..do.....	.....	..do.....	Iowa State University	Ames, Iowa	1910	1934	5	2	40.0	..do.....	27
	Willow, black												
828	Chromated zinc chloride	Steeping	.....	..do.....	Delta Experiment Station	Stoneville, Miss.	1948	1953	13	7	53.8	Decay and termites	5
829	..do.....	..do.....	.....	..do.....	..do.....	..do.....	1947	1959	13	12	92.3	..do.....	10
830	Creosote--diesel fuel oil	Hot bath--creosote, cold bath (50-50)	8.4	Round and split	..do.....	..do.....	1941	1959	13	11	84.6	Decay	17
	Willow, diamond[2]												
831	None	Untreated	.....	Round	Forest Products Laboratory	Syene, Wis.	1930	1943	13	13	100.0	..do.....	7.3
	Willow, white												
832	Creosote, coal-tar	Hot-and-cold bath (butts)	6.0 pounds per post	..do.....	Iowa State University	Ames, Iowa	1909	1937	15	14	93.3	..do.....	22
833	..do.....	..do.....	1.6 pounds per post	..do.....	..do.....	..do.....	1909	1937	18	14	77.8	..do.....	25
	Willow[2]												
834	Asphaltum	Hot bath (butts)	.....	..do.....	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1921	5	5	100.0	..do.....	10.8
835	Creosote, coal-tar	Hot-and-cold bath	.....	..do.....	..do.....	..do.....	1908	1939	37	27	73.0	..do.....	28
836	..do.....	Hot-and-cold bath (butts)	.....	..do.....	..do.....	..do.....	1908	1932	5	5	100.0	..do.....	19.8
837	Creosote--crude petroleum	Hot bath--petroleum: cold bath--creosote	.....	..do.....	..do.....	..do.....	1908	1929	8	8	100.0	..do.....	12.1
838	Creosote--diesel oil	Hot bath--creosote cold bath (50-50)	8.4	Round and split	Delta Experiment Station	Stoneville, Miss.	1946	1959	7	4	57.2	Decay and termites	14
839	Creosote--water-gas tar	Hot bath--water-gas tar, cold bath--creosote	.....	Round	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1939	5	2	40.0	..do.....	35
840	Nickel sulfate and arsenic acid--sodium chromate	Double diffusion (butts)	1.44	..do.....	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	25	5	20.0	..do.....	23
841	..do.....	..do.....	.67	..do.....	..do.....	..do.....	1946	1963	25	10	40.0	..do.....	19
842	..do.....	..do.....	.45	..do.....	..do.....	..do.....	1946	1963	25	24	96.0	..do.....	9
843	Pentachlorophenol, 10 percent in No. 2 fuel oil	Cold-soaking, 46 hours	3.8	..do.....	University of Illinois	Oregon, Ill.	1942-43	1962	10	3	30.0	Decay	23
844	Sodium fluoride	Steeping	.51	..do.....	U. S. Forest Service	Halsey, Nebr.	1925	1937	24	24	100.0	..do.....	6.0
845	Zinc chloride	Butt steeping	2.47	..do.....	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1963	23	23	100.0	..do.....	7.1
846	..do.....	..do.....	.40	..do.....	..do.....	..do.....	1946	1963	24	23	95.8	Decay and termites	8

Table 2.--Service tests of treated and untreated fence posts--Continued

Item No.	Species and preservative	Treatment (full length unless otherwise indicated)	Average retention of preservative	Form	Installed by	Location of test	Date installed	Date of last inspection	Number in test	Posts removed up to and at time of last inspection			Average life[1]
			Lb. per cu. ft.							No.	Percent	Cause	Yr
	Willow[2]--continued												
847	Zinc chloride	Butt steeping	0.27	Round	Tennessee Valley Authority	Wilson Dam, Ala	1946	1961	24	24	100.0	Decay and termites	6.8
848	do	Tire-tube	0.88-0.99	do	Forest Products Laboratory	Mazomanie, Wis.	1939	1956	9	9	100.0	Decay	9.8
849	do	Steeping	.52	do	U.S. Forest Service	Halsey, Nebr.	1925	1950	20	20	100.0	Decay and termites	11.8
850	do	do	.77	do	do	do	1925	1941	5	5	100.0	Decay	11.0
851	None	Untreated		do	do	do	1925	1934	10	10	100.0	Decay and termites	4.2
852	do	do		do	Tennessee Valley Authority	Wilson Dam, Ala.	1946	1950	25	25	100.0	do	3.0
853	do	do		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1916	5	5	100.0	Decay	5.2
	Yellow-poplar												
854	Creosote, coal-tar	Hot-and-cold bath		do	do	do	1908	1939	21	1	4.8	do	
855	Zinc sulfate and arsenic acid--sodium chromate	Double diffusion	2.0	do	U.S. Forest Service	Athens, Ga.	1955	1963	25	2	8.0	do	
856	do	do	3.0	do	do	do	1955	1963	25				
857	do	do	3.2	do	do	do	1955	1963	25	2	8.0	Decay	
858	do	Double diffusion. First solution heated to 200° F.	3.6	do	do	do	1955	1963	25	1	4.0	do	
859	None	Untreated		do	do	do	1955	1963	50	49	98.0	do	2
860	do	do		do	Maryland Agric. Expt. Sta.	College Park, Md.	1908	1914	5	5	100.0	do	4.2

[1] Average life is shown where all posts have been removed. Other values are estimates taken from a mortality curve or based on test time when 60 percent of the posts failed. Where the percentage of posts removed is 10 percent or less, no estimate on average life is given.

[2] Exact species unknown.

[3] Life estimated for few remaining posts when test was closed.

PUBLICATION LISTS ISSUED BY THE

FOREST PRODUCTS LABORATORY

The following lists of publications deal with investigative projects of the Forest Products Laboratory or relate to special interest groups and are available upon request:

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Note: Since Forest Products Laboratory publications are so varied in subject matter, no single catalog of titles is issued. Instead, a listing is made for each area of Laboratory research. Twice a year, December 31 and June 30, a list is compiled showingnew reports for the previous 6 months. This is the only item sent regularly to the Laboratory's mailing roster, and it serves to keep current the various subject matter listings. Names may be added to the mailing roster upon request.