

1916-01ServiceTest_of_CrossTies

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also say, in general, the urgent demand for statistics on the service of treated ties may not necessarily be prompted by a doubt as to the efficiency of tie treatment in general, but rather for purposes of comparison, in order that, among the many processes or methods of treatment that are being used one might be selected that was more suitable for the species of timber to be treated.

When the conditions of tie supply with a railroad are fixed, as they are in numerous cases, there being no choice in the source of supply or the kind of timber as well, certain of the many questions which arise in connection with timber treatment are curtailed; and railroads that are thus situated are not so likely to be interested in numerous solutions or methods. The great variety of timbers, climatic conditions, service conditions, the haulage distance from sources of supply, however, have rendered almost every kind of record on the service of cross ties pertinent information to one railroad or another.

A committee appointed by the American Wood Preservers' Association to report on *service test of cross ties* made a report at the annual meeting held in Chicago, in January. This committee had compiled over 1200 individual records, involving more than 50 species of timber. The work was done by R. H. Teesdale and C. P. Winslow, of the Forest Products Laboratory, of Madison, Wis. The report presents numerous tabulations, summarizing the more important records obtained. Of the records 287 relate to untreated ties, covering 42 species of timber, and of these 115 records are complete, or for a period equal to that of the life of the timber. These records were obtained from 27 different railroads. Of the treated ties there are 624 records, from 28 different railways, and 50 of such records are complete.

As for untreated ties, the completed records show a life of from twelve to thirteen years, for a relatively small number of juniper ties used by the Norfolk & Southern Ry. The shortest record is 2½ years, for a test on a relatively small number of gum ties on a railroad in Texas. Among the records for the empty-cell process of creosoting, only one is complete, and this shows an average life of ten years for oak ties in the Big Four road, but as none of the ties were removed by reason of decay, this one record is of no particular significance.

Of 162 records from 31 different railroads which have made tests of creosoting proper, fifteen records are complete. The best service reported is an average life of 20 years for hemlock ties, in the New York New Haven & Hartford R. R. tracks. This is a very good record, indeed, for hemlock ties, but even then the ties were removed because of rail cutting, and not because of decay. Six records of the open tank creosote treatment, none of which were complete, show a life of 9½ years for pine ties, in the Mexican Central Ry. tracks, all of the ties being still in service. Of 183 records relating to zinc-chloride treatment, 41 were complete.

The maximum life, as far as reported, show approximately 10.7 years for red oak ties, in tracks of the Illinois Central R. R., and 9 to 11.3 years for the Douglas fir ties in tracks of the Southern Pacific Co.

It will not be necessary here to go into summarization of tests of other kinds of woods or other processes, but it might be suggested that the tabulations and other data of the report submit valuable information for persons having in hand studies on various woods or processes. Although the number of records which the committee have handled thus far is large, additional ones are called for. One series of tests on which the committee is lacking data is on untreated ties of beech, birch, maple, gum, eastern and western hemlock, western larch and several species of pines. As for treated ties, the committee reports scarcity of records on the empty-cell processes, available ones on these being fewer than with other processes.

The compilation of records on treated and untreated ties used in electric railways is not as extensive as those used on steam roads, but the work has been taken up and some general information is available regarding untreated ties used on interurban lines, and in paved streets, in macadam streets and in unpaved streets.

Aluminum in Passenger Car Construction.

The materials of passenger car construction, since the idea of supplanting wood first had its inception, has been a subject that has received a great deal of attention. Aided by the widespread publicity given the so-called "all-steel" principles of construction, those whose interest in the subject has been merely casual have taken that term quite literally. Likewise have also certain roads and car builders with the result that they have come to realize that to accept and apply the term in its literal sense is, at least, not a rational thing to do. From the first it was realized that floors must be made of some material other than steel, and almost as soon did the builders conclude that steel was not suitable for head-lings, though in some cases it has been applied successfully. Interior steel sheathing very soon called for some form of interlining and at the present time, many are very favorably inclined to a reversion to wood as an interior finish, notwithstanding the supposedly greater fire risk involved in its use. Demonstration of the fitness of these materials for their respective purposes helps us to approach that selection that gives, in the light of our experience, the best results, and since we seem to be approaching a compromise between the two materials that have in succession virtually monopolized the field, it might be thought that we will shortly have the passenger car material question definitely settled. Contemporary development on another continent, however, serves to put the matter in doubt.

Heretofore our cut and try methods of car design and building have been with the idea of attaining inflam-

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SERVICE TESTS OF CROSS TIES

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REPORT OF COMMITTEE ON SERVICE TESTS OF CROSS TIES.

To the Members of the American Wood-Preservers' Association:

The instructions issued to your Committee on Service Tests of Cross Ties at the time of its appointment were substantially as follows:

First: To compile and tabulate in a usable form all the data which could be secured on service tests of ties in both steam and electric roads, indicating in each record the kind of wood and method of treatment and all other data which would be of value.

Second: To point out on what species of wood and character of treatments service records and data are especially lacking.

Third: To make recommendations as to how additional data might be effectively procured.

The Committee has so far as possible followed these instructions, and presents to you a report consisting briefly of the following:

1. A compilation of durability records of treated and untreated ties involving data on over 50 species and including over 1,200 individual records. This compilation has been under preparation by Messrs. Winslow and Teesdale of the Forest Products Laboratory at Madison, Wis., for some time, and it appears in this report as a contribution from its authors.

2. A series of tabulations, summarizing the more important and apparently effective records presented in the above mentioned compilation.

3. Discussion of data included in the report.

4. Information on ties used in electric railways.

5. Recommendations.

It seems advisable to discuss the contents of the report in the order enumerated above.

Compilation of Records.

The authors of the compilation present with it a short description of the procedure followed in its preparation, the nature of its contents, and how it may be most effectively used for reference purposes. Further discussion of this phase of the report hardly seems necessary, except to point out that the compilation is believed to be the most complete which has yet been published, and will serve both as a valuable reference to practically all known durability records, and as a basis on which to build in the future.

Summary Tables.

While the detailed compilation discussed above is of prime value in forming a complete reference to all available records, it is recognized

INSERTIONS

It is suggested that the following be inserted in the proper places in the report on "Service Tests of Cross Ties." If this is done the report will be much more easily understood.

Page 2, Line 18

Insert at end: "See tables, pages 26-74, inclusive, and text on page 10."

Page 2, Line 21

Insert at end: "See pages 11-25, inclusive."

Page 2, Line 27

Insert after title: "Pages 26-74, inclusive."

Page 2, Line 36

Insert after title: "Pages 11-25, inclusive."

Page 10, Paragraph 1

On first line, insert after "tables": "Pages 26-74, inclusive."

Page 10, Paragraph 5

On first line, insert after "Tables 1-30": "Pages 26-74, inclusive."

that it contains many records which are of little value in establishing the natural durability of the species, or in the effectiveness of treatment. This is due to the fact that, in some cases, individual records include results secured from several species, and from the available information it has been impossible to reclassify the data to show what was the result with each species separately; in other cases, the data regarding the method of treatment, absorption secured, character of track, conditions, etc., are insufficient to be of much value; while again in other cases, records may show a test started many years back, but apparently never followed up for a sufficient period to give valuable information.

For the foregoing reasons, a series of tabulations (Tables 1 to 7, inclusive) have been prepared to show in summarized form the results which have been secured from what may be termed the effective records which are available for untreated ties and ties treated by the processes in most general commercial use. These tables are classified, first by method of treatment, and secondly, by species, and serve as supplementary tabulations to the detailed compilations. Further information than is contained in the summary tables may be readily secured by reference to the detailed tables and from that point in many cases further data may be secured by correspondence with the individuals listed as authorities for the data.

While all possible care has been taken in the preparation of these summary tables, it is recognized that errors of greater or less importance may have inadvertently occurred. The Committee will accordingly appreciate it if those noting such errors will kindly call them to its attention.

Discussion of Data.

Following is a brief summary of the information contained in the summarized tables:

SUMMARY. (Approximate.)

Treatment	No. of Species	No. of Records			No. of Railroads		
		Completed	Unfinished	Total	Completed	Unfinished	Total
Untreated	42	115	172	287	15	21	27
Rueping	8	0	54	54	0	7	7
Lowry	3	1	5	6	1	1	2
Creosote (Full or Bethell)	27	15	147	162	9	29	31
Creosote (Open-Tank)	5	0	6	6	0	4	4
Zinc chloride	31	41	142	183	9	13	16
Card	21	0	91	91	0	3	3
Allardyce	18	9	25	34	3	4	4
Wellhouse	17	14	74	88	6	9	12
Total		195	716	911	27	47	54

It will be noted that the number of effective records is approximately 911, of which 716 are unfinished. Further information may be expected from these in the future. Furthermore, the total number of effective records is supplied by 55 railroads, of which 48 supplied the at present unfinished records.

Considering each table separately, the following points are noticeable.

Untreated Ties.—Of the total of 287 records, 200, or approximately 66%, are supplied by six railroads. Seventy-nine of the records are from the C. B. & Q.; 39 from the N. P.; 34 from the I. C.; 27 from the G. H. & S. A., and the remainder from the C. M. & St. P. and G. C. & S. F. Of the unfinished records, close to 50% are supplied by the C. B. & Q., which together with the I. C., N. P., and the C. M. & St. P., supply over 80%. Of the completed records, the longest life reported in the United States is 12 to 13 years for 1,185 juniper ties in the tracks of the Norfolk and Southern; the shortest record is approximately 2.5 years for 83 gum ties in the tracks of the G. H. & S. A.

Empty Cell Creosote Treatment.—This tabulation includes records on ties treated respectively by the Rueping and Lowry processes. It is of interest to note that of the total of 54 records of ties treated by the Rueping process none are yet completed. All of the records are covered by seven railroads, the I. C., and the A. T. & S. F. furnishing most of the records. The longest service so far reported is no removals of 146 pine ties after 9½ years in the Mexican Central Railway. The remaining records are on ties which have been in place from one to 11 years. The removals vary from nothing up to about 9%.

Of ties treated by the Lowry process, the total available effective records are six, located in the tracks of two railroads, (Big Four and D. L. & W.) One of the records, (the only one completed), shows an average life of 10 years for oak ties in the tracks of the Big Four Railroad with the added information that none were removed on account of rot. The remaining five records involve ties which have been in the tracks of the D. L. & W. for 1 to 5 years, with no removals reported so far.

Bethel and Full Cell Creosote Treatments.—Of a total of 162 records supplied by 31 railroads, 147 records from 29 railroads are unfinished. Of these, approximately 50% are supplied by the C. B. & Q. and 15% by the G. H. & S. A. Of the completed records, the best service reported in this country is an average life of 20 years for 400 hemlock ties laid in 1880 in the tracks of the N. Y., N. H., & H., with removals reported as due to rail-cutting and not to rot. The shortest service recorded is that of complete removal in 7 to 9 years of 20,000 yellow pine ties from the tracks of the D. L. & W., with the added information that many of them were killed by steaming during treat-

ment, and removals largely caused by crushing under tie plates. With the unfinished records, some of the ties have been in service as long as 23 years, while others have been installed for only 1 or 2 years. They should ultimately give information of much interest.

Open-Tank Creosote Treatments.—But six records, none of which are completed, are available. The best service so far reported is no removals of 29 pine ties after 9½ years in the tracks of the Mexican Central Railway.

Straight Zinc Chloride Treatment.—There are 183 records involved in this treatment, of which 142 are at present uncompleted. Of these unfinished records, over 45% are on ties in the tracks of the C. B. & Q. Railroad, the remainder being scattered over 12 other roads. The maximum life so far reported shows approximately 10.7 years for 3,080 red oak ties in the tracks of the I. C. Railroad, and from 9 to 11.3 years for many thousands of Douglas fir ties in the tracks of the Southern Pacific. The minimum life reported is complete removal, at 3 years of 8 redwood ties in the tracks of the G. C. & S. F. and similar results at 5½ years with 1,000 sap pine ties in the tracks of the G. H. & S. A. and an average life of 5 to 6 years in the tracks of the Wabash.

Combination Zinc and Creosote Treatments.—These are considered in two divisions. First, those treated by the Card process, and secondly, those treated by the Allardyce and other methods of combination.

Of the Card treatment there are available a total of 91 records, all of which are still unfinished. These are all included in the tracks of three railroads, the C. B. & Q. furnishing 83 records and the C. M. & St. P., seven. Of the unfinished records, the best results reported show after 7 years no removals of 596 hard maple ties in the tracks of the C. M. & St. P., while the poorest results reported show 67% removals on account of rail cutting of 160 loblolly pine ties after 6 years in the tracks of the C. B. & Q.

Of the Allardyce and other combination treatments, there are a total of 34 records, 25 of which are unfinished. These are included in four railroads,—the G. C. & S. F. and the G. H. & S. A. supplying by far the greater proportion. Of the completed records, the maximum life as reported is an average of 14 to 18 years for about 1,800 pine ties in the tracks of the G. H. & S. A. The minimum life is given as 100% removal of a few turkey oak ties after 3 years in the G. C. & S. F. Of the unfinished records, the best report is that of 41 Douglas fir, with only 5% removals in 8½ years in the tracks of the C. B. & Q.

It would appear from the foregoing that in order to round out and complete the data at present available, additional records are needed in the following:

1. Untreated ties of beech, birch, maple, gum, eastern and western hemlock, western larch and the various pines. These are species largely used for ties, and for which there are very little available durability data.

2. Untreated ties of Pinon pine, white fir, Alpine fir, red fir, (*Magnifica*) and Engleman spruce. These are species occurring in the West and Northwest, and offering the possibility of an increased use in the future.

3. Ties treated by the Lowry process and to somewhat less extent, by the Rueping process. Available records of these two processes are much fewer than with the other processes.

Information on Ties Used in Electric Railways.

Time has not permitted a thorough compilation of records on treated and untreated ties used in electric railways, but the following more or less general information may prove of interest.

1. *Untreated Ties: Interurban Lines.* The following estimates were secured from officials of six companies operating in the Middle West:

TIES IN INTERURBAN LINES.					
Cedar.	Untreated.	No tie plates.	7-8	years.	Michigan.
"	"	With " "	9-10	"	"
"	"	" " "	12-15	"	"
"	"	" " "	15-16	"	"
"	"	No " "	11-12	"	Illinois.
White oak	"	" " "	7-8	"	Michigan.
"	"	" " "	10-12	"	"
"	"	" " "	6-7	"	Indiana.

2. *Untreated Ties: Unpaved and Macadam Streets.* Officials of several companies operating in the Middle West supplied the following estimates:

Cedar.	Untreated.	11-12	Years.	Illinois.
White oak	"	8-10	"	"
Oak and beech. Reported as badly decayed and removed after 2 years from track laid on gravel ballast in Illinois.				

3. *Untreated Ties: Paved Streets.* A third and important condition under which ties are used is in tracks in paved streets. The situation is complicated not only by lack of authentic data, but by the variety of types of construction in use. Some of those in use in the Middle West are:

(a) A monolithic construction of 6-in. concrete under and between the ties and about 1-in. over the top of the tie, followed by a 1 to 2-in. sand cushion upon which the brick is placed.

(b) Six inches of concrete foundation, then about a 1-in. sand cushion upon which the tie is placed, then concrete between and over tie to about 1 in., followed by sand cushion and brick.

(c) Six to 8 in. of rock or gravel ballast on which the tie is placed, then concrete between and slightly over the tie, followed by sand cushion and brick.

Some light is thrown on the service secured from untreated ties in these types of track by the following summation of opinions expressed by officials of a number of companies operating in the Middle West:

SUBSTANCE OF OPINIONS AS EXPRESSED BY OFFICERS OF VARIOUS COMPANIES.

Locality	Species	Life Un-Treated Years	Remarks
Michigan	White oak	12-15	Life of tie equal to life of rail.
"	" "	20	Life of tie equal to life of rail.
"	" "	10	.....
Illinois	" "	20-25	Equal to life of rail, provided tie is not disturbed.
Indiana	" "	20	Life of tie equal to life of rail.
Illinois	} Hemlock Tamarack Cedar	.....	.....
		15-20	Life of rail,
	

There was also rather a consensus of opinion among the operators of the Michigan properties that the tie would last as long as the rail, provided it was not removed from the track, but that, at least with cedar ties, decay had been observed to advance quite rapidly after removal from the track.

In substantiation of the opinions expressed in Illinois, it was stated that untreated tamarack ties, which had been in place in a paved street for approximately 17 years, were examined when it became necessary to reconstruct the track and pavement. These ties were found in excellent condition, and were placed in the street when the new pavement was laid. This is the most striking case of long service in a paved street which has come to the attention of the writers.

Somewhat contradictory to the foregoing are the following data which were secured:

Michigan. Untreated ties in a paved street where repaving was under way were examined. These ties were reported as having been in service for 8 to 10 years. A number of cedar ties showed decay, especially on the ends, although the oak appeared in fair condition. Some of these ties had been removed from the street and placed in the storage yard, with a view to further use in open track. These ties were in bad condition, and most of them not fit for further use.

Figs. 1 and 2 illustrate the condition of two cedar ties, one of which had been removed from this street for approximately one month, and the other for approximately three months. It was reported that both of these ties looked perfectly sound when removed.

Michigan. Untreated red oak ties said to have been in a brick paved street laid on gravel for 8 years were examined as the entire reconstruction of the street was under way. They were practically all



Fig. 1. Section of cedar tie removed from paved streets in Michigan. Tie reported to have been removed in October, 1913, after 8 to 10 years' service. Photo taken in November, 1913.



Fig. 2.—Section of cedar tie removed from paved streets in Michigan. Tie reported to have been removed in June, 1913, after 8 to 10 years' service. Photo taken in November, 1913.

in the most advanced stages of decay. The middle portions of the ties were in most cases entirely destroyed, leaving only small disconnected sections under the rails.

Illinois. Ties were examined in the storage yard, which were said

to have been removed after 9 years' service in a paved street consisting of 6-in. rock ballast on which the tie was laid with concrete then placed between and over the ties and brick on top. Much decay on the bottoms and ends of the ties was noticed.

Other untreated ties seen in the storage yard, which were said to have been removed after 20 years' service from a brick paved street laid without concrete, showed bad decay.

Recommendations.

Your Committee respectfully recommends that, for the coming year, the attempt be made to continue the work along the following lines:

1. Use the detailed compilation of records as a reference and basis from which to proceed, additional data which can be secured being put in the form of this compilation and published separately each year without attempt to republish the compilations accompanying this report.
2. With completed records, as given in the summary tabulations, so far as possible secure additional information for those showing either exceptionally long or short service. This additional information to be included in subsequent reports of the Committee.
3. With the uncompleted records, make every effort to keep them constantly up to date, presenting to the Association each year such tabulations together with such special reports as it may be practicable and advisable to include.
4. Continue the attempt to secure authentic information of the service secured from treated and untreated ties in the tracks of electric railways, both interurban and city lines.

Sured

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DURABILITY RECORDS OF CROSS TIES

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The records embodied in the accompanying tables were compiled with a view to providing as complete and systematic a compilation as possible, to serve as a reference to all available records on the durability of treated and untreated cross ties. They comprise approximately 1,200 records on over 50 species, and include all records which it has been possible to locate by correspondence with railroads throughout the United States, and by intensive search of engineering literature extending over many years.

Some of the records have been available in published form for many years, and the experiments upon which they are based are concluded, while others are of comparatively recent origin.

The tabulation, therefore, is of value, both as a reference to the older and completed records, and to tests now under way, which it will be of interest to follow in the future.

In tabulating the data, the general procedure, so far as possible, was to include in each individual record ties of only one species, with the same method of treatment and average absorption, and subjected to approximately similar conditions in the track. For this reason, many records which were secured were segregated into a much larger number of individual records, and this accounts for the fact that over 1,200 records appear in the accompanying tabulations.†

Tables 1-30, inclusive, present the data in detail. The records are arranged alphabetically by Species, Table 1 covering ash, Table 2 beech, etc. Each table of species is then further classified alphabetically by Preservatives, this classification being further subdivided alphabetically by Processes. Throughout these tables, column No. 1, entitled "Index Number," is used for convenience in referring to individual records in any table, and the numbering permits of the ready insertion of additional records which may subsequently become available. Column No. 24, entitled "Reference Number," refers to the accompanying sheets entitled "List of References and Authorities Quoted" which give the source and authority for all of the data included in the tabulation.

†An exception to this general procedure occurred with a large number of records from C. B. & O. Railroad. These included many species and treatments, the ties being installed in a wide number of locations. To facilitate the preparation of the tabulation, the records were merely classified according to their location in the "Lines East or West" of the Mississippi.

TABLE 1. EFFECTIVE DURABILITY RECORDS.—UNTREATED TIES.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Ash	4	1	.	.....	.....	.....	4	113	4 yrs.—13 to 20% out	C. B. & Q.
Beech	5	2	1	100	Avg. life 3 yrs.	G. C. & S. F.	4	206	5 yrs.—76% out 4 yrs.—20% out 5 yrs.—71 to 87% out	"
Birch, Red	4	1	4	218	" " " "	C. B. & Q.	..	.....	.....	.....
Cedar	6	2	.	.....	.....	.....	1	83,200	10 yrs.—6% out	G. T.
	..	.	.	.....	.....	.....	1	500	13 yrs.—38% out	C. M. & St. P.
	..	.	.	.....	.....	.....	4	1,274	2-4 yrs.—none out	"
Chestnut	3	3	1	21,280	Avg. life 4.8 yrs.	I. C.	1	90	5 yrs.—9.3% out	C. B. & Q.
				2,816	" " 6.5 "	P. & R.	..	.....	.....	.....
Cottonwood	2	1	2	1	" " 4 "	C. B. & Q.	..	.....	.....	.....
Cypress	20	3	3	1,253	19 yrs.—100% out	G. H. & S. A.	9	14,958	5 yrs.—none out—10 yrs. 20-30% out—19 yrs. 50- 100% out	G. H. & S. A.
II	..	.	.	.....	.....	.....	4	228	4 yrs.. 3-4% out, 5 yrs. 35 to 40% out	C. B. & Q.
	..	.	.	.....	.....	.....	4	1,096	3 to 4 yrs.—none out	I. C.
Cypress, yellow	7	1	1	25,600	7 yrs.—100% out	I. C.	6	195,679	7 to 10 yrs. 40 to 80% out	"
Cypress, red	1	1	.	.....	.....	.....	1	1,200	14 yrs.—4% out	"
Elm, white	5	1	1	30	Avg. life 5 yrs.	C. B. & Q.	4	192	4 yrs.—3 to 30% out 5 yrs.—70 to 75% out	C. B. & Q.
Fir, red	5	.	5	1,270,241	Avg. life 7 to 9 yrs.	Germany	..	.....	.....	.....
Fir, Douglas	27	4	8	772	8.3 yrs.—100% out	N. P.	16	2,012	8.3 yrs. 0 to 98% out	N. P.
	.	.	.	.....	.....	.....	1	89	8.5 yrs. 45% out	C. B. & Q.
	.	.	.	.....	.....	.....	1	64	4 yrs.—none out	W. V. & N.
	.	.	.	.....	.....	.....	1	137	4 yrs.—none out	C. M. & St. P.
Fir, Oregon	2	1	.	.....	.....	.....	2	2,013	4 yrs.—none out	O. W. Ry. & N. Co.
Gum, red	6	2	1	31	Avg. life 4 to 5 yrs.	C. B. & Q.	2	154	5 yrs. 80 to 90% out 6 yrs. 100% out 5 yrs. 94 to 97% out	C. B. & Q.
Gum, Tupelo	5	2	3	42	" " 2.5 yrs.	G. H. & S. A.	2	135	5 yrs. 94 to 97% out	"
Gum, red	.	.	3	41	" " 2.5 "	.....	..	.....	.....	.....
Hemlock	13	3	2	201	" " 2 to 3 yrs.	G. C. & S. F.	4	187	4 yrs. 7 to 15% out 5 yrs. 70 to 85% out 8.5 yrs.—70 to 95% out	C. B. & Q.
	.	.	4	80	" " 6.5 yrs.	C. & N. W.	3	90	4 yrs.—0 to 44% out	C. & N. W.
Hemlock, western	2	1	2	203	" " 7.3 "	N. P.	..	.....	.....	.....
Hickory, pignut	4	1	.	.....	.....	.....	4	119	5 yrs.—50 to 70% out	C. B. & Q.

TABLE 1. EFFECTIVE DURABILITY RECORDS.—UNTREATED TIES.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Juniper	10	1	10	1,185	Avg. life 12 to 13 yrs.	N. & S.	..	.....	.....	.....
Larch, western	13	1	13	1,119	" " 6 to 8 yrs.	N. P.	2	.....	.....	.....
Maple	2	1	.	.....	.....	.....	2	100	3 yrs.—none out	C. M. & St. P.
Maple, hard	4	1	.	.....	.....	.....	4	120	4 yrs.—20 to 80% out	C. B. & Q.
Maple, soft	4	1	1	14	Avg. life 3 to 4 yrs.	C. B. & Q.	3	110	5 yrs.—86 to 96% out	"
Oaks, various	11	6	6	2,002,756	" " 10-16 yrs.	Germany	1	201,600	4-5 yrs.—76-97% out	B. & O.
.	.	.	1	.....	" " 13.5 yrs.	France	1	8,605	10 yrs.—47% out	Erie
.	.	.	.	.....	.....	.....	1	118,400	7 yrs.—46% out	Mo. P.
Oak, Black	1	1	1	25	Avg. life 4.6 yrs.	G. C. & S. F.	1	646,631	4 yrs.—25% out	M. & O.
Oak, Chestnut	1	1	1	424	11 yrs.—99% out	B. & O.	..	.....	.....	.....
Oak, Danish	1	1	.	.....	.....	.....	1	3,500	11 yrs.—15% out	Denmark
Oak, Pin	4	1	.	.....	.....	.....	4	123	4 yrs.—none out	C. B. & Q.
Oak, Red	13	3	1	93	Avg. life 4 yrs.	G. C. & S. F.	5	257	5 yrs.—46 to 52% out	"
.	.	.	.	.....	.....	.....	4	160,000	4 yrs.—0-4% out	.....
.	.	.	.	.....	.....	.....	3	200	5 yrs.—70% out	I. C.
Oak, Spanish	1	1	1	20	Avg. life 5 yrs.	G. C. & S. F.	..	.....	6 yrs.—92% out	C. M. & St. P.
Oak, Swedish	1	1	.	.....	.....	.....	1	13,000	5-7 yrs.—2-11% out	Denmark
Oak, Turkey	1	1	1	20	Avg. life 4.3 yrs.	G. C. & S. F.	1	.....	3 yrs.—none out	.....
Oak, White	1	.	.	.....	.....	.....	1	274	4 yrs.—20% out	I. C.
Mississippi	.	.	.	.....	.....	.....	1	274	4 yrs.—6% out	I. C.
Oak, White	.	.	.	.....	.....	.....	1	125	4 yrs.—6% out	I. C.
Tennessee	.	.	1	8,400	Avg. life 3-5 yrs.	I. C.	4	125	4-5 yrs.—0 to 4% out	C. B. & Q.
Oak, White	35	12	1	.....	" " 10 "	C. B. & Q.	6	3,743	3 to 4 yrs.—1-25% out	I. C.
.	.	.	1	16,915	" " 8.6 "	P. & R.	5	157,176	3-7 yrs.—21-89% out	"
.	.	.	1	300	" " 8.6 "	N. & S.	3	498,168	9-11 yrs. 13-40% out	"
.	.	.	1	196	" " 6.75 "	G. C. & S. F.	4	1,012,300	3 yrs.—11% out, 7 yrs. 92% out	C. R. I. & P.
.	.	.	1	57,000	14 yrs.—100% out	L. S. & I.	1	342,400	5 yrs.—30% out	St. L. I. M. & S
.	.	.	.	.....	.....	.....	1	9,758	8 yrs.—32% out	M. R. & B.
.	.	.	.	.....	.....	.....	1	500	18 yrs.—51% removed	C. M. & St. P.
.	.	.	.	.....	Avg. life 22 R. Rds.	.....	1	50	7.5 yrs.—36% out	C. & N. W.
.	.	.	.	.....	8.25 yrs.	.....	1	760	4 yrs.—none out	B. & O.
.	.	.	.	.....	.....	.....	2	355	4 yrs.—none out	C. M. & St. P.

TABLE 1. EFFECTIVE DURABILITY RECORDS.—UNTREATED TIES.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Oak, Willow	1	1	1	20	4.5 yrs.—100% out	G. C. & S. F.	2	240	5 yrs.—none out	A. T. & S. F.
Ohio,	2	1	2	260,360	Avg. life 5 yrs.	Germany	1	100	" " 7-8 yrs.	France
Pine	5	3	2	100	" " 2.57 yrs.	G. H. & S. A.	2	22,500	9 yrs.—19% out	Denmark
Pine, Baltic	2	1	1	100	Avg. life 5-9 yrs.	G. H. & S. A.	1	15	11 yrs.—19% out	"
Pine, Pacific	2	1	1	100	2 yrs.—100% out	G. C. & S. F.	5	271	16 yrs.—67% out	C. B. & Q.
Pine, Heart	7	1	7	2,649	Avg. life 5-9 yrs.	G. H. & S. A.	1	10	4 yrs.—25 to 44% out	C. B. & Q.
Pine, Loblolly	6	2	1	100	2 yrs.—100% out	G. C. & S. F.	1	10	5 yrs.—73 to 83% out	C. B. & Q.
Pine, Lodgepole	2	2	1	93	3 yrs.—91% out	G. C. & S. F.	1	2,100	6 yrs.—95% out	W. V. & N.
Pine, Longleaf	3	3	1	93	9 yrs.—100% out	G. C. & S. F.	1	99	4 yrs.—none out	C. B. & Q.
Pine, Riga	1	1	1	100	Avg. life 3.4 yrs.	G. C. & S. F.	1	7,500	11 yrs.—none out	C. M. & St. P.
Pine, Shortleaf	1	1	1	100	" " 7-11 yrs.	Denmark	1	14,688	14-15 yrs. 87% out	N. Y. C. & H. R.
Pine, Swedish	9	1	9	353,300	" " 5 yrs.	C. B. & Q.	1	21,805	4 yrs.—7% out	P. & R.
Pine, White	1	1	1	100	Avg. life 3.4 yrs.	G. C. & S. F.	1	15	7 yrs.—27% out	W. V. & N.
Pine, Yellow	3	3	1	100	" " 5 yrs.	C. B. & Q.	1	15	10 yrs.—42% out	C. M. & St. P.
Pine, Western	1	1	1	100	Avg. life 3.4 yrs.	G. C. & S. F.	1	15	7 yrs.—12.3% out	N. Y. C. & H. R.
Poplar	4	1	1	100	" " 5 yrs.	C. B. & Q.	1	15	13 yrs.—43% out	P. & R.
Sycamore	4	1	1	100	Avg. life 3.4 yrs.	G. C. & S. F.	1	15	4 yrs.—none out	W. V. & N.
Tamarack	11	5	1	7,500	Avg. life 7 to 8 yrs.	D. & I. M.	4	129	4 yrs.—15.31% out	C. B. & Q.
			4	132	" " 6 to 7 yrs.	C. & N. W.	4	140	5 yrs.—65 to 70% out	C. B. & Q.
			1	100	3.5 yrs.—100% out	G. C. & S. F.	1	2,966	4 yrs.—35% out	G. N.
			1	100	3.5 yrs.—100% out	G. C. & S. F.	4	172	5 yrs.—95% out	C. B. & C
			1	100	3.5 yrs.—100% out	G. C. & S. F.	1	172	4 yrs.—10-15% out	C. B. & C
			1	100	3.5 yrs.—100% out	G. C. & S. F.	1	172	5 yrs.—80 to 83% out	C. B. & C

TABLE 2. EFFECTIVE DURABILITY RECORDS.—TIES TREATED BY EMPTY CELL CREOSOTE PROCESSES.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
RUEPING										
Ash	2	1	.	.....	.....	.....	1	274	3 yrs.—none out	I. C.
	..	.	.	.....	.....	.....	1	274	4 yrs.—none out	"
Fir, Douglas	1	.	.	.....	.....	.....	1	40	8.5 yrs.—none out	C. B. & Q.
Gum, red	2	1	.	.....	.....	.....	2	114	8 yrs.—none out 9 yrs.—7.5% out	St. L. & S. F.
Gum	5	2	.	.....	.....	.....	1	203	4 yrs.—0.5% out	I. C.
	..	.	.	.....	.....	.....	4	15,500	5.7"—practically none out	A. T. & S. F.
Maple	2	1	.	.....	.....	.....	2	100	3 yrs.—none out	C. M. & St. P.
Oak, red	14	4	.	.....	.....	.....	2	197	6 yrs.— " "	St. L. & S. F.
			.	.....	.....	.....	4	445	8 yrs.— " "	"
			.	.....	.....	.....	2	548	3 yrs.— " "	I. C.
			.	.....	.....	.....	3	822	4 yrs.— " "	C. M. & St. P.
			.	.....	.....	.....	2	100	3 yrs.— " "	C. B. & Q.
			.	.....	.....	.....	1	15	1 yr.— " "	"
Pine	19	4	.	.....	.....	.....	1	.....	3 yrs.— " "	C. M. & St. P.
			.	.....	.....	.....	1	196	9.5 yrs.— " "	Mex. Cent.
			.	.....	.....	.....	4	195	7.5 yrs.— " "	G. H. & S. A.
			.	.....	.....	.....	1	2,176,417	2 yrs.— " "	A. T. & S. F.
			.	.....	.....	.....	12	90,630	10 yrs.—6 to 36% out; 11 yrs. 0 to 4% out	"
Pine, Loblolly	7	1	.	.....	.....	.....	2	822	3 yrs.—none out	I. C.
			.	.....	.....	.....	3	548	4 yrs.— " "	"
			.	.....	.....	.....	2	6,080	7 yrs.—1% out	"
Pine, Shortleaf	1	1	.	.....	.....	.....	1	49,000	7 yrs.—none out	C. M. & St. P.
Pine, Lodgepole	1	1	.	.....	.....	.....	1	25	8.5 yrs.— " "	C. B. & Q.
LOWRY										
Chestnut	1	1	.	.....	.....	.....	1	733	3 yrs.— " "	D. L. & W.
Oak	3	2	1	.....	Avg. life 10 yrs.	Big Four	1	845	1 yr.— " "	"
			.	.....	.....	.....	1	6	3 yrs.— " "	"
Pine	2	1	.	.....	.....	.....	2	136	Placed 1915	"

TABLE 3. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH CREOSOTE BY FULL CELL AND BETHELL PROCESSES, ETC.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Ash	3	1	.	.....	.....	.....	3	35	4-5 yrs.—none out	C. B. & Q.
Beech	8	4	1	356,650	Avg. life 25-30 yrs.	France	2	2000-6000	10 yrs.—0-63% out	Prussia
			.	.....	.....	.....	1	21,440	20 yrs.—50% out	Germany
			.	.....	.....	.....	4	468	4-5 yrs.—none out	C. B. & Q.
Birch, red	4	1	.	.....	.....	.....	4	148	2-4 yrs.—none out	"
Chestnut	3	2	.	.....	.....	.....	2	183	8 yrs.—none out	D. L. & W.
			.	.....	.....	.....	1	32	1 yr.—none out	Picatinny Arsenal
Cottonwood	2	1	.	.....	.....	.....	2	122	5 yrs.—none out	C. B. & Q.
Cypress	3	1	.	.....	.....	.....	3	54	4 yrs.—none out	"
Elm, white	4	1	.	.....	.....	.....	4	323	4-5 yrs.—2% broken	"
Fir, red	1	1	.	.....	.....	.....	1	224	1 yr.—no report	Anaconda Mg. Co.
Fir, Douglas	7	3	.	.....	.....	.....	5	442	8-3/10 yrs.—0-21.3% out	N. P.
			.	.....	.....	.....	1	1,395,975	2 yrs.—none out	P. Ry. & Tr. Co.
			.	.....	.....	.....	1	74	8.5 yrs.—1.4% out	C. B. & Q.
Fir, Oregon	1	1	.	.....	.....	.....	1	1,000	5 yrs.—0.2% out	P. Ry. & Tr. Co.
Gum, red	8	2	.	.....	.....	.....	2	133	5 yrs.—none out	C. B. & Q.
			.	.....	.....	.....	6	200	9 yrs.—8-43% out	G. H. & S. A.
Gum, Tupelo	8	2	.	.....	.....	.....	2	151	5 yrs.—none out	C. B. & Q.
			.	.....	.....	.....	6	201	9 yrs.—4-39% out	G. H. & S. A.
Hemlock	8	3	1	400	Avg. life 20 yrs.	NY,NH,&H	5	252	3-5 yrs.—none out	C. B. & Q.
			1	25,000	" " 5-12 yrs.	C. B. & Q.	1	5,000	10 yrs.—50-70% out	C. R. I. & P.

TABLE 3. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH CREOSOTE BY FULL CELL AND BETHELL PROCESSES, ETC.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Hickory, pignut	3	1	.	.....	.....	.....	3	24	2 yrs.—none out	C. B. & Q.
Juniper	2	1	1	25	Avg. life 17 yrs.	N. & S.	1	75	15 yrs.—4% out	N. & S.
Maple	2	1	.	.....	.....	.....	2	100	3 yrs.—none out	C. M. & St. P.
Maple, hard	5	1	.	.....	.....	.....	5	128	3-5 yrs.—none out	C. B. & Q.
Maple, soft	4	1	.	.....	.....	.....	4	201	4-5 yrs.—none out	"
Oak	4	2	1	67,678	Avg. life 19.6 yrs.	Germany	.	.....	.....	.....
			3	1,402,050	" " 12-20 yrs.	France	.	.....	.....	.....
91 Oak, mixed	1	1	.	.....	.....	.....	1	3,850	In service 5 yrs.—last report	Pa. System
Oak, pin	5	1	.	.....	.....	.....	5	323	3-5 yrs.—none out	C. B. & Q.
Oak, post	1	1	.	.....	.....	.....	1	50	2 yrs.—none out	Q. & C.
Oak, red	17	9	.	.....	.....	.....	1	200	4 yrs.—none out	St. L. & S. W.
			.	.....	.....	.....	1	3,789	5 yrs.—none out	Pa. System
			.	.....	.....	.....	1	872	4 yrs.—none out	B. & O.
			.	.....	.....	.....	6	405	3-6 yrs.—0-1.8% out	C. B. & Q.
			.	.....	.....	.....	1	82	4 yrs.—9% out	T. C. & I. Co.
			.	.....	.....	.....	2	102	3 yrs.—none out	C. M. & St. P.
			.	.....	.....	.....	3	582	5 yrs.—none out	I. C. & S.
			.	.....	.....	.....	1	7	6 yrs.—none out	G. C. & S. F.
			.	.....	.....	.....	1	7	9 yrs.—none out	Mex. Cent.
Oak, water	1	1	.	.....	.....	.....	1	50	2 yrs.—none out	C. S.
Oak, white	4	2	.	.....	.....	.....	3	40	2 yrs.—none out	C. B. & Q.
			.	.....	.....	.....	1	200	4 yrs.—none out	St. L. & S. W.

TABLE 3. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH CREOSOTE BY FULL CELL AND BETHELL PROCESSES, ETC.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Pine	18	7	1	6,000	Avg. life 16 yrs.	NYNH&H	1	16,000	1 yr.—none out	Fla. E. Coast
			1	150,000	Avg. life 19 yrs.	H. & T. C.	3	57	9.5 yrs.—none out	Mex. Cent.
			1	15,000	18 yrs.—45-55% out	L. & N.	1	1,893	16 yrs.—72% out	L. & N.
			.	.....	Records lost	.....	9	5,401	3-8 yrs.—0-2% out	G. H. & S. A.
			.	.....	.....	.....	1	183	4 yrs.—17% out	T. C. I. & R. R. Co.
Pine, Loblolly	9	5	.	.....	.....	.....	1	1,000	6 yrs.—none out	Ga. Rrd.
			.	.....	.....	.....	1	50	2 yrs.—none out	Q. & C.
			.	.....	.....	.....	4	209	4-5 yrs.—none out	C. B. & Q.
			.	.....	.....	.....	1	2,743	2 yrs.—none out	Pa. Sys.
			.	.....	.....	.....	2	599	4 yrs.—none out	St. L. & S. W.
17 Pine, Lodgepole	1	1	.	.....	.....	.....	1	39	8.5 yrs.—none out	C. B. & Q.
Pine, Longleaf	3	2	.	.....	.....	.....	1	250	23 yrs.—40% out	A. C. L.
			.	.....	.....	.....	2	600	4 yrs.—none out	St. L. & S. W.
Pine, Shortleaf	5	4	1	5,000	Avg. life 15.5 yrs.	C.R.P&N.S.	1	2,494	5 yrs.—none out	Pa. Sys.
			.	.....	.....	.....	2	563	4 yrs.—none out	St. L. & S. W.
			.	.....	.....	.....	1	150,000	2 yrs.—none out	H. & T. C.
Pine, Virginia	2	2	.	.....	.....	.....	1	10,000	8 yrs.—none out	C. R. R. of N. J.
			.	.....	.....	.....	1	10,000	4 yrs.—none out	P. & R.
Pine, Yellow	2	1	2	20,000	7-9 yrs.—all out	D. L. & W.	.	.....	.....	.....
Pine, Southern Yellow	2	1	1	6,000	Avg. life 16.4 yrs.	NYNH&H	1	500	9 yrs.—no results	NY,NH&H.
Poplar	3	1	.	.....	.....	.....	3	80	2 yrs.—none out	C. B. & Q.
Sycamore	3	1	.	.....	.....	.....	3	90	2 yrs.—none out	"
Tamarack	5	1	.	.....	.....	.....	5	225	3-5 yrs.—none out	"

TABLE 4. EFFECTIVE DURABILITY RECORDS.—TIES TREATED BY THE OPEN-TANK CREOSOTE PROCESS.

18

Species	Total Records		Completed Records				Uncompleted Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Fir, Douglas	1	1	.	..	.....	.....	1	32	8.5 yrs.—no results given	C. B. & Q.
Hemlock	1	1	.	..	.....	.....	1	33	8.5 yrs.—none removed 66%—good, 33%—partly decayed	C. & N. W.
Tamarack	1	1	.	..	.....	.....	1	19	7.5 yrs.—none removed	C. & N. W.
Oak, red	2	2	.	..	.....	.....	2	14	6 yrs.—none removed 9 yrs.—none removed	G. C. & S. F. Mex. Cent.
Pine	1	1	.	..	.....	.....	1	29	9.5 yrs.—none removed	Mex. Cent

TABLE 5. EFFECTIVE DURABILITY RECORDS—TIES TREATED WITH STRAIGHT ZINC CHLORIDE.

19

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Ash	2	1	.	.....	.....	.....	2	31	4 yrs.—none out	C. B. & Q.
Beech	6	3	.	.....	.....	.....	4	314	4 yrs.—none out 5 yrs.—1.3% out	"
			.	.....	.....	.....	1	99	10 yrs.—76% out	G. C. & S. F.
			.	.....	.....	.....	1	500	4 yrs.—0.2% out	C. M. & St. P.
Birch, Red	3	1	.	.....	.....	.....	3	103	4 yrs.—none out	C. B. & Q.
Chestnut	1	1	.	.....	.....	.....	1	21	3 yrs.—none out	C. M. & St. P.
Cypress	3	1	.	.....	.....	.....	3	55	4 yrs.—none out	C. B. & Q.
Elm, White	4	1	.	.....	.....	.....	4	296	4 yrs.—none out 5 yrs.—2.6% out	"
Fir, Douglas	23	3	8	161,719	Avg. life 9-11.3 yrs.	S. P.	6	267,420	6-11 yrs.—23-80% out	S. P.
			.	.....	.....	.....	6	749,908	0-15 yrs.—0-7.4% out	"
			.	.....	.....	.....	2	197	8.3 yrs.—1.4% out	"
			.	.....	.....	.....	1	91	8.5 yrs.—3.2% out	C. B. & Q.
Fir, Oregon	1	1	.	.....	.....	.....	1	5,414	5 yrs.—54% out	"
Gum, Red	9	2	.	.....	.....	.....	3	130	3 yrs.—none out 5 yrs.—7% out	"
			.	.....	.....	.....	6	244	9 yrs.—80-97% out	G. H. & S. A.
Gum, Tupelo	8	2	6	198	Avg. life 7-8 yrs.	G. H. & S. A.	2	117	5 yrs.—1.3% out	C. B. & Q.
Hackberry	1	1	.	.....	.....	.....	1	60	16 yrs.—75% out	"
Hemlock	16	5	.	.....	.....	.....	4	214	5 yrs.—0-1.4% out	"
			.	.....	.....	.....	7	19,626	6-9 yrs.—0-30% out	Pa. Sys
			.	.....	.....	.....	1	100	10 yrs.—30% out	G. C. & S. F.
			.	.....	.....	.....	1	25	7.5 yrs.—16% out	C. & N. W.
			.	.....	.....	.....	1	2,000	15 yrs.—25% out	C. R. I. & P.

TABLE 5. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH STRAIGHT ZINC CHLORIDE.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Hickory, pignut	3	1	.	.....	.....	.....	3	24	2 yrs.—none out	C. B. & Q.
Larch, Western	2	1	.	.....	.....	.....	2	193	7.3 yrs.—5% out	N. P.
Maple, hard	3	1	.	.....	.....	.....	3	65	2 yrs.—none out	C. B. & Q.
Maple, soft	4	1	.	.....	.....	.....	4	181	4 yrs.—none out 5 yrs.—3% out	"
Oak, black	1	1	1	34	Avg. life 8 yrs.	G. C. & S. F.	..	.....	.....	.....
Oak, pin	3	1	.	.....	.....	.....	3	69	2 yrs.—none out	C. B. & Q.
20 Oak, red	38	8	2	.....	Avg. life 8.5-12 yrs.	I. C.	5	292	4 yrs.—none out 5 yrs.—3% out	"
			1	3,080	Avg. life 10.7 yrs.	"	2	1,100	10 yrs.—none out 14 yrs.—13% out	"
			1	25	10 yrs.—100% out	N. & S.	1	35,120	8 yrs.—5% out	"
			1	.....	Avg. life 5-6 yrs.	Wabash.	4	68,330	3-4 yrs.—1% out	I. C.
			1	255,574	Estimated life 10 yrs.	G. T.	9	591,526	5-6 yrs.—0.4% out	"
			1	20	7.5 yrs.—100% out	G. C. & S. F.	1	135	8 yrs.—26% out	Pa. Sys.
			.	.....	.....	.....	5	538	3-4 yrs.—none out	C. M. & St. P.
			.	.....	.....	.....	2	7,384	6 yrs.—0.13% out 7 yrs.—3% out	"
			.	.....	.....	.....	2	88	10 yrs.—30% out	G. C. & S. F.
		
Oak, Turkey	1	1	1	20	7.5 yrs.—100% out	G. C. & S. F.	..	.....	.....
Oak, white	5	1	1	100	Avg. life 4.18 yrs.	"	1	101	10 yrs.—64% out	G. C. & S. F.
			.	.....	.....	.....	3	40	2 yrs.—none out	C. B. & Q.
Oak, willow	1	1	1	20	7.5 yrs.—100% out	G. C. & S. F.	..	.....	.....
Pine	9	3	3	225	Avg. life 15-16 yrs.	N. & S.	1	43	9.5 yrs.—none out	Mex. Cent.
			.	.....	.....	.....	1	300	13 yrs.—none out	N. Y. N. H. & H.
			.	.....	.....	.....	4	17,355	10-11 yrs.—35% removed	A. T. & S. F.

TABLE 5. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH STRAIGHT ZINC CHLORIDE.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Pine, Black Hills	1	1	.	.....	.....	.....	1	6,359	14 yrs.—6% out	C. B. & Q.
Pine, Loblolly	6	2	1	100	9 yrs.—100% out	G. C. & S. F.	5	1,370	3-4 yrs.—0.5% out	I. C.
			.	.....	.....	.....	4	293	4 yrs.—none out 5 yrs.—3-4% out	C. B. & Q.
Pine, Lodgepole	3	1	1	61	Avg. life 8.7 yrs.	C. B. & Q.	2	2,059	8 yrs.—4% out	C. B. & Q.
Pine, Longleaf	3	2	2	71	13 yrs.—100% out	NY,NH,&H.	1	6	10 yrs.—17% out	G. C. & S. F.
			.	.....	.....	.....	2	135	13 yrs.—10% out	NY,NH,&H.
21 Pine, Mountain	3	2	.	.....	.....	.....	1	10	10 yrs.—20% out	G. C. & S. F.
			.	.....	.....	.....	1	305	11 yrs.—7% out	A. T. & S. F.
Pine, sap	4	2	3	1,001	Avg. life 5.5 yrs.	G. H. & S. A.	..	.....	.....
Pine, Shortleaf	11	3	6	92,206	Avg. life 6-8 yrs.	S. P.	3	107	10 yrs.—60% out	G. C. & S. F.
			.	.....	.....	.....	2	1,000	8-12 yrs.—10% out	C. M. & St. P.
Poplar	3	1	.	.....	.....	.....	3	80	2 yrs.—none out 4 yrs.—5-10% out	C. B. & Q.
Redwood, California	.	..	1	8	3 yrs.—100% out	G. C. & S. F.	..	.....	.....
Sycamore	.	..	.	.....	.....	.....	3	90	2 yrs.—none out	C. B. & Q.
Tamarack	.	..	.	.....	.....	.....	4	212	4 yrs.—none out 5 yrs.—1% out	C. B. & Q.
			.	.....	.....	.....	1	49	9 yrs.—none out	G. C. & S. F.
			.	.....	.....	.....	1	2,580	11 yrs.—2.2% out	G. N.
			.	.....	.....	.....	4	388	7.5 yrs.—none out	C. & N. W.

TABLE 6. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH COMBINATION OF CREOSOTE AND ZINC CHLORIDE.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
CARD PROCESS										
Ash	4	1	.	..	.....	.....	4	374	4-5 yrs.—none out	C. B. & Q.
Beech	6	2	.	..	.....	.....	5	1257	3-4 yrs.—none out 5 yrs.—0.4% out	"
							1	344	3 yrs.—none out	C. M. & St. P.
Birch, Red	4	1	.	..	.....	.....	4	1069	4 yrs.—none out 5 yrs.—1% out	C. B. & Q.
Chestnut	2	1	.	..	.....	.....	2	254	5 yrs.—19% out	"
Cottonwood	2	1	.	..	.....	.....	2	446	5 yrs.—1 to 11% out	"
Cypress	4	1	.	..	.....	.....	4	673	4-5 yrs.—none out	"
Elm, White	6	1	.	..	.....	.....	6	1381	4 yrs.—none out 5-6 yrs.—0.3% out	"
Gum, red	3	1	.	..	.....	.....	3	840	5-6 yrs.—1% out	"
Gum, Tupelo	2	1	.	..	.....	.....	2	672	5 yrs.—1% out	"
Hackberry	1	1	.	..	.....	.....	1	45	3 yrs.—none out	"
Hemlock	5	2	.	..	.....	.....	1	1000	5 yrs.— "	C. M. & St. P.
							4	1296	4-5 yrs.— "	C. B. & Q.
Hickory, pignut	4	1	.	..	.....	.....	4	289	4 yrs.—none out 5 yrs.—1% out	"

TABLE 6. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH COMBINATION OF CREOSOTE AND ZINC CHLORIDE.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Maple	3	1	.	..	.....	.....	2	100	3 yrs.—none out	C. M. & St. P.
							1	596	6 yrs.—none out	"
Maple, Hard	6	2	.	..	.....	.....	5	1373	3-4 yrs.—none out 5 yrs.—0.5% out	C. B. & Q.
							1	596	7 yrs.—none out	C. M. & St. P.
Maple, Soft	4	1	.	..	.....	.....	4	721	4-5 yrs.—none out	C. B. & Q.
Oak, Pin	4	1	.	..	.....	.....	4	832	4-5 yrs.—none out	"
Oak, Red	7	2	.	..	.....	.....	6	1480	3-4 yrs.—none out 5-6 yrs.—1% out	"
							1	1237	4 yrs.—none out	B. & O.
Oak, White	5	1	.	..	.....	.....	5	765	4 yrs.—none out 5-6 yrs.—0 to 3% out	C. B. & Q.
Pine, Loblolly	5	1	.	..	.....	.....	5	1446	4-5 yrs.—0 to 8% out 6 yrs.—67% removed for rail-cutting	"
Poplar	4	1	.	..	.....	.....	4	624	4 yrs.—none out 5 yrs.—3-10% out	"
Sycamore	4	1	.	..	.....	.....	4	518	4 yrs.—none out 5 yrs.—1-3% out	"
Tamarack	6	2	.	..	.....	.....	5	1345	3-5 yrs.—none out	"
							1	8	1 yr.—none out	C. M. & St. P.

TABLE 6. EFFECTIVE DURABILITY RECORDS.—TIES TREATED WITH COMBINATION OF CREOSOTE AND ZINC CHLORIDE.—CONTINUED.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
ALLARDYCE, etc.										
Beech	1	1	.	..	.....	.....	1	50	9 yrs.—80% out	G. C. & S. F.
Fir, Douglas	1	1	.	..	.....	.....	1	41	8.5 yrs.—5% out	C. B. & Q.
Gum, Sweet	1	1	.	..	.....	.....	1	10	10 yrs.—65% out	G. C. & S. F.
Hemlock	1	1	2	99	Avg. life 7 yrs.	G. C. & S. F.	.	....	.....	.....
Oak, Black	1	1	.	..	.....	.....	1	50	10 yrs.—77% out	"
Oak, Spanish	1	1	.	..	.....	.....	1	10	12 yrs.—50% out	"
Oak, Turkey	1	1	.	..	.....	.....	1	10	10 yrs.—10% out	"
Oak, White	1	1	.	..	.....	.....	1	100	10 yrs.—71% out	"
24 Oak, Willow	1	1	.	..	.....	.....	1	10	9 yrs.—100% out	"
							1	11	3.5 yrs.—100% out	G. C. & S. F.
Pine, Loblolly	2	1	.	..	.....	.....	2	101	9 yrs.—100% out	"
Pine, Lodgepole	1	1	.	..	.....	.....	1	77	8.5 yrs.—3% out	C. B. & Q.
Pine, Longleaf	1	1	.	..	.....	.....	1	50	10 yrs.—14% out	G. C. & S. F.
Pine, Shortleaf	1	1	.	..	.....	.....	1	50	10 yrs. 44% out	"
Tamarack	2	1	1	50	9 yrs.—100% out	G. C. & S. F.	1	51	7 yrs. 90% out	.....
Gum	3	1	.	..	.....	.....	3	45	9 yrs.—25-57% out	G. H. & S. A.
Oak, Black	1	1	1	76	Avg. life 1.84 yrs.	G. C. & S. F.	.	....	.....	.....
Oak, Turkey	1	1	1	10	3 yrs.—100% out	"	.	....	.....	.....
Pine	7	2	4	1894	Avg. life—14 yrs.	G. H. & S. A.	3	980	5-7 yrs.—1% out	G. H. & S. A.
Pine, Sap	3	1	.	..	.....	.....	3	1003	9 yrs.—6-52% out	"
Pine, Shortleaf	1	1	.	..	.....	.....	1	50	4 yrs.—86% out	C. M. & St. P.

TABLE 7. EFFECTIVE DURABILITY RECORDS.—TIES TREATED BY THE WELLHOUSE PROCESS.

Species	Total Records		Completed Records				Unfinished Records			
	Rec.	R. R.	Number		Results	R. R.	Number		Results	R. R.
			Rec.	Ties			Rec.	Ties		
Beech	1	1	.	.....	.....	.....	1	100	10 yrs.—none out	G. S. & S. F.
Cottonwood	2	1	.	.....	.....	.....	2	137	12 to 15 yrs.—66-89% out	C. B. & Q.
Cottonwood, White	1	1	.	.....	.....	.....	1	49	15 yrs.—84% out	.....
Gum	4	1	4	250	Avg. life 12-16 yrs.	N. & S.	..	....	.....	.....
Gum, Sweet	1	1	.	.....	.....	.....	1	51	9 yrs.—80.5% out	A. T. & S. F.
Hemlock	44	5	1	21,850	Avg. life 11.8 yrs.	C. R. I. & P. Pa. System	1	200	7 yrs.—none out	Pa. System S. C. & S. R. R. G. C. & S. F. C. & N. W.
			1	200			8 yrs.—30% out			
			1	100			8 yrs.—21% out			
			39	1535			7.5 yrs.—0-5% removed			
Oak, Black	2	1	.	.....	.....	.....	2	119	10 yrs.—42% out	G. C. & S. F.
25 Oak, Red	2	2	1	20	7 yrs.—100% out	G. C. & S. F.	1	48	9 yrs.—40% out	A. T. & S. F.
Oak, Spanish	1	1	.	.....	.....	.....	1	20	10 yrs.—45% out	G. C. & S. F.
Oak, Turkey	1	1	.	.....	.....	.....	1	20	10 yrs.—90% out	"
Oak, White	2	1	.	.....	.....	.....	2	200	10 yrs.—23% out	"
Oak, Willow	2	2	1	20	8 yrs.—100% out	G. C. & S. F.	1	35	4 yrs.—20% out	T. C. & I.
Pine, Colorado	5	1	1	50	Avg. life 11.8 yrs.	A. T. & S. F.	4	784	15.1 yrs.—37% out	A. T. & S. F.
Pine, Loblolly	1	1	.	.....	.....	.....	1	100	10 yrs.—95% out	G. C. & S. F.
Pine, Longleaf	1	1	.	.....	.....	.....	1	100	10 yrs.—55% out	"
Pine, Red Norway	1	1	1	86	Avg. life 15 yrs.	D. & I. R.	..	....	.....	.....
Pine, Shortleaf	2	2	.	.....	.....	.....	1	100	10 yrs.—80% out	G. C. & S. F. C. M. & St. P.
							1	500	11 yrs.—10% out	
Pine, White	1	1	1	85	Avg. life 15 yrs.	D. & I. R.	..	....	.....	.....
Tamarack	14	5	1	100	10 yrs.—100% out	G. C. & S. F.	1	200	7 yrs.—1% out	F. W. & C. C. & N. W.
			1	200			7.5 yrs.—1% out			
			1	85			" " 15 yrs.			

LIST OF REFERENCES & AUTHORITIES QUOTED

Ref. No.	Information Obtained from	Year	Vol. No.	Page	Authority
1.00	Am. Ry. Eng. Ass'n. - Proceed.	1909	10	619	
1.05	Letter to Forest Service	1914			Stevens, F.S. - Eng. M. of W. P. & R. Ry.
1.10	Am. Ry. Eng. Ass'n. - Proceed.	1911	12	360	
1.15	Letter to Forest Service	1914			Wood, W.B. - Gen. Mgr. Grand Rapids & Ind. Ry.
1.25	do	1914			Clark, W.A. - Ch. Eng. D. & I. R. Ry.
1.26	do	1914			Ray, G.J. - Ch. Eng. D. L. & W. Ry.
1.30	Am. Ry. Eng. & M. of W. Ass'n. Proceed.	1907	8	469	
1.41	Letters to Forest Service	1915			Johnston, C.E. - Ch. Eng. Kansas City Southern Ry.
1.76	Letter to Forest Service	1914			Wilgus, H.S. - Eng. M. of W. Pittsburg, S. & M. Ry.
1.86	do	1914			Murray, O.C. - Vice Pres. Wash. Terminal Ry.
2.00	Am. Soc. Civil Eng. - Transactions	1899	42	793	
2.20	do	1901	45	548	
2.40	do	1885	14	157	
3.00	Am. Ry. Eng. Ass'n. - Proceed. also Appendix "B"	1912	13	872	
3.10	Am. Ry. Eng. Ass'n. - Proceed.	1913	14	727	
4.00	Letters to Forest Service	1912			Stimson, Earl - Ch. Eng. M. of W. B. & O. Ry.
4.10	Letter to Forest Service	1915			Angier, F.J. - Supt. Timber Preser. B. & O. Ry.
5.00	Letters to Forest Service	1912	16	881	Waterman, J.H. - Supt. Timber Preser. C. B. & Q. Ry.
5.10	Am. Ry. Eng. Ass'n.	1915			Bush, D.L. - Gen. Mgr. C. M. & St. P. Ry.
6.00	Letters to Forest Service	1912			Boles, F.S. - Tie Agent C. M. & St. P. Ry.
6.10	do	1915			Van Yock - Gen. Mgr. Sunset Line
7.00	Report and blueprints also Letter to Forest Service	1915			Collingham, I.A. - Asst. Gen. Mgr. G. H. & S. A. Ry.
8.00	Records - C. & E. I. Ry.	1910			Chicago Tie Preservation Co.
9.00	Report - Danish State & Private Ry.	1910			Callstrom, A. (Dec. 1904)
10.10	Am. Ry. Eng. Ass'n. - Proceed.	1910	11	110	
11.00	Letters & Report to Forest Service	1911			Rex, G.E. - Mgr. Treating Plants A.T. & S.F. Ry.
12.00	Letter to Forest Service	1913			Parks, W.L. - Vice Pres. Illinois Central Ry.
12.10	do	1914			Parks, W.L. & Lambke, G.A. - Illinois Central Ry.
12.20	Report of L.A. Downs, Asst. Ch. Eng. Main	1910			to H.R. Safford - Ch. Eng. M. of W. I.C. & N. Ry.
13.00	Not. Electric Light Ass'n. Proceed.	1910		356	
14.00	Letters to Forest Service	1912			Moon, D.C. - Gen. Mgr. N.Y.C. Lines

Ref. No.	Information Obtained from	Year	Vol. No.	Page	Authority
15.00	Letter to Forest Service	1913			Osgood, J.O. - Ch. Eng. C.R.R. of N. J.
16.00	do	1914			Lamb, E.T. - Pres. Norfolk & Southern Ry.
20.00	do	1912			Peck, G.L. - Gen. Mgr. Penn. Lines West
20.10	do	1914			Foley, John - Forester Penn. Ry.
21.00	Forest Service Project No. 38				
22.00	do		41		
23.00	do		42		
24.00	do		44		
25.00	do		50		
26.00	do		51		
27.00	do		111		
29.00	Railway Gazette	1900	32	23	Schneid - Officer in German Ry.
29.20	do	1901	33	164	Dudley, P.H.
29.40	Am. Ry. Eng. & M. of W. Ass'n. - Proceed.	1905	6	760	
29.50	Railway Gazette	1901	33	616	Dudley, P.H.
29.60	do	1895	27	667	Schneid - Officer in German Ry.
29.70	Railroad Gazette	1880			Translation - (Pring, Chas. Fomb, Cologne & Minden R.R.)
30.00	Letter to Forest Service. also Report to A.R.E.A.	1912			Hixon, W.G. - Ch. Oper. Officer S.L. & S.F. Ry.
30.10	Letter to Forest Service	1914			Handricks, Y.K. - Asst. Ch. Eng. S.L. & S.F. Ry.
31.00	Street Railway Journal	1898			Britton, F.H. - Pres. & Gen. Mgr. St. L. & S.W. Ry.
32.00	Letter to Forest Service	1912			Willis, D.D.
	do	1914			Cabin, E.E. & Scott, W.R. - Asst. Gen. Mgr. S.P. Ry.
	do	1914			Ware, Chas. - Gen. Mgr. U.P. Ry.
33.00	Am. Wood Preservers Ass'n.	1911		123	Angier, F.J. - Supt. Timber Preser. B. & O. Ry.
33.10	Letter to Forest Service	1910			Clark, W.A. - Ch. Eng. D. & I. R. Ry.
33.20	do	1914			Bollenkne, C.B. - Mgr. Barret M. Ry. Co.
38.00	do	1914			Baches, W.J. - Eng. M. of W. N.Y. M.H. & H. Ry.
39.00	do	1914			Honolulu Rapid Transit Co.
40.00	do	1914			Davis, J.R.W. - Eng. M. of W. Great Northern Ry.
41.00	Forest Service Project No. 126				
42.00	Letter to Forest Service	1914			Wood, B.A. - Ch. Eng. M. of W. M. & O. Ry.
43.00	do	1914			Crawford, C.B. - Mgr. Am. Crosscutting Co.
44.00	do	1915			Boulie, P.E. - Treating Insp. 1915
45.00	Letter to Forest Service	1915			Flex, G.E. - Mgr. Treating Plants A.T. & S.F. Ry.

INDEX BY PRESERVATIVE

PRESERVATIVE	PROCESS	SPECIES	Table No.
Asphalt, Timber		Oak, Red	20
Barium Chloride, Copper & Zinc Sulphate	Thilmany	Pine, White	25
Carbolineum		Fir, Oregon	9
do		Pine	23
do	Avenarius	Cedar	4
do	do	Cypress	7
do	do	Pine	23
do	do	Redwood, California	27
Copper Sulphate		Pine	23
do	Boiled	Fir	9
do	Bouchevie	Poplar	26
do	Pressure	Fir	9
do	Steeped	Fir	9
do	do	Pine	23
do	Thilmany	Various	30
Copper & Iron Sulphate	Bouchevie	Pine, Sap	25
Copper & Zinc Sulphate, Barium Chloride	Thilmany	Pine, White	25
Cresosinate & Coal Tar Cresosate		Pine, Southern Yellow	25
Cresosate		Beech	2
do		Cypress	7
do		Fir	9
do		Fir, Oregon	9
do		Gum	10
do		Hemlock	12
do		Oak	18
do		Oak, Mixed	18
do		Oak, Post	19
do		Oak, Red	20
do		Oak, White	22
do		Pine	23
do		Pine, Lablolly	24
do		Pine, Longleaf	25
do		Pine, Shortleaf	25
do		Pine, Southern Yellow	25
do		Pine, Yellow	25
do		Various	30
do	Bethel	Gum, Red	10
do	do	Oak	18
do	Full Cell	Ash	1
do	do	Beech	2
do	do	Birch, Red	3
do	do	Chestnut	5
do	do	Cottonwood	6

PRESERVATIVE	PROCESS	SPECIES	Table No.
Cresosate	Full Cell	Cypress	7
do	do	Elm, White	8
do	do	Fir, Red	9
do	do	Fir, Douglas	9
do	do	Gum, Red	10
do	do	Gum, Tupelo	11
do	do	Hemlock	12
do	do	Hickory, Pignut	13
do	do	Juniper	14
do	do	Maple	15
do	do	Maple, Hard	16
do	do	Maple, Soft	17
do	do	Oak, Pin	19
do	do	Oak, Red	20
do	do	Oak, Water	21
do	do	Pine	23
do	do	Pine, Heart	24
do	do	Pine, Lablolly	24
do	do	Pine, Lodgepole	25
do	do	Poplar	26
do	do	Redwood, Baltic	27
do	do	Spruce	27
do	do	Sycamore	28
do	do	Tamarack	29
do	Bussani	Gum, Red	10
do	do	Oak, Red	20
do	do	Pine	23
do	Hayford	Pine, Virginia	25
do	Low Pressure	Gum, Red	10
do	Lowry	Beech	2
do	do	Chestnut	5
do	do	Gum	10
do	do	Oak	18
do	do	Pine	23
do	do	Pine, Lodgepole	25
do	Low Pressure	Chestnut	5
do	do	Oak, Red	20
do	do	Pine	23
do	No Steaming	Gum, Red	10
do	Open Tank	Fir, Douglas	9
do	do	Hemlock	12
do	do	Tamarack	29
do	Reeping	Ash	1

PRESERVATIVE	PROCESS	SPECIES	Table No.
Cresote	Roeping	Beech	2
"	"	Fir, Douglas	9
"	"	Fir, Red	9
"	"	Gum	10
"	"	Gum, Red	10
"	"	Maple	15
"	"	Oak, Red	20
"	"	Pine	23
"	"	Pine, Loblolly	24
"	"	Pine, Lodgepole	25
"	"	Pine, Shortleaf	25
"	Sealy Steaming	Hemlock	12
"	"	Pine, Shortleaf	25
"	"	Pine, Shortleaf	25
Coal Tar	"	Chestnut	5
Wood Tar	"	Gum	10
"	"	Oak, Pin	19
"	"	Oak, Red	20
"	"	Oak, White	22
"	"	Pine, Scrill	23
"	"	Pine, Georgia Yellow	25
"	"	Pine, Pitch	25
"	"	Poplar	26
"	Brush	Oak, White	22
"	"	Pine, Georgia Yellow	25
"	Dipped	Chestnut	5
"	"	Oak Chestnut	18
"	"	Oak, Red	21
"	"	Oak, White	22
"	"	Beech	2
"	"	Oak, Red	20
"	"	Oak, Red	20
Cresote and Crude Oil	"	Pine, Southern Yellow	25
Cresote, Coal Tar and Cres Resinate	"	Pine, Shortleaf	25
Cresal Calcium	Low Pressure	Pine	23
"	No Steaming	Elm	8
"	"	Maple	15
Diamond Blue Preservative	"	Pine	23
Diamond Wood Preserves	"	Gum, Red	10
"	"	Oak, Red	20
"	"	Pine, Sap	25
Liquid, J.M. Long's	"	Beech	2
"	"	Oak, Red	20

PRESERVATIVE	PROCESS	SPECIES	Table No.
Liquid, J.M. Long's	"	Pine, Loblolly	24
Mercuric Chloride	Kyan	Hemlock	12
"	"	Oak	18
"	"	Pine	23
"	"	Spruce	27
"	"	Various	30
"	Pressure	Various	30
Oil + Zinc Chloride	"	Pine, Longleaf	25
Oil, Bakusfield	"	Pine, Loblolly	24
"	"	Pine, Mountain	25
"	"	Pine, Shortleaf	25
"	+ Zinc Chloride	Pine, Mountain	25
Oil, Beaumont	"	Pine, Loblolly	24
"	"	Pine, Longleaf	25
"	+ Zinc Chloride	Pine, Loblolly	24
Oil, California + "	"	Redwood, California	27
Oil, Crude	"	Beech	2
"	"	Cypress	7
"	"	Elm, White	8
"	"	Maple, Soft	17
"	"	Oak, Red	20
"	"	Various	30
"	Boiled	Gum	10
"	+ Zinc	Hemlock	12
"	"	Tamarack	29
Oil, Crude Asphaltic	"	Oak, Red	20
Oil, Fuel	Low Pressure	Chestnut	5
"	"	Oak, Red	20
Oil, Semi-refined	Full Cell	Maple	15
"	"	Oak, Red	20
Salts, Barschall	Hasselmann	Beech	2
"	"	Fir	9
"	"	Hemlock	12
"	"	Oak, Black	18
"	"	Oak, Red	20
"	"	Oak, Spanish	21
"	"	Oak, Turkey	21
"	"	Oak, White	22
"	"	Oak, Willow	22
"	"	Pine	23
"	"	Pine, Loblolly	24
"	"	Pine, Longleaf	25
"	"	Pine, Shortleaf	25

PRESERVATIVE	PROCESS	SPECIES	Table No.
Salts, Barschall	Hasselmann	Tamarack	29
Salts, Great Salt Lake	soaked	Fir, Oregon	9
Spiritine	"	Pine, Loblolly	24
"	"	Pine, Longleaf	25
"	"	Various	30
Tar	"	Pine, Yellow	25
Teredo Proof Paint	"	Oak, Red	20
Timber Asphalt	"	Cedar	4
Unknown	"	Fir	9
"	"	Gum, Red	10
"	"	Oak, Black	18
"	"	Various	30
Untreated	"	Ash	1
"	"	Beech	2
"	"	Birch, Red	3
"	"	Cedar	4
"	"	Chestnut	5
"	"	Cottonwood	6
"	"	Cypress	7
"	"	Cypress, Red	7
"	"	Cypress, Yellow	7
"	"	Elm, White	8
"	"	Fir	9
"	"	Fir, Douglas	9
"	"	Fir, Oregon	9
"	"	Gum, Red	10
"	"	Gum, Tupelo	11
"	"	Hemlock	12
"	"	Hemlock, Western	12
"	"	Michigan, Pignut	13
"	"	Juniper	14
"	"	Larch, Western	14
"	"	Maple	15
"	"	Maple, Hard	16
"	"	Maple, Soft	17
"	"	Oak	18
"	"	Oak, Black	18
"	"	Oak, Chestnut	18
"	"	Oak, Quercus	18
"	"	Oak, Mississippi White	21
"	"	Oak, Pin	19
"	"	Oak, Post	19
"	"	Oak, Red	20
"	"	Oak, Spanish	21
"	"	Oak, Swedish	21
"	"	Oak, Tennessee White	21
"	"	Oak, Turkey	21
"	"	Oak, White	22
"	"	Oak, Willow	22
"	"	Pine	23
"	"	Pine, Baltic	23
"	"	Chia	22a

Preservative	Process	Species	Table No.
Untreated	"	Pine, Dantzie	23
"	"	Pine, Heart	23
"	"	Pine, Loblolly	24
"	"	Pine, Lodgepole	25
"	"	Pine, Longleaf	25
"	"	Pine, Rigra	25
"	"	Pine, Shortleaf	25
"	"	Pine, Swedish	25
"	"	Pine, Western Yellow	25
"	"	Pine, White	25
"	"	Pine, Yellow	25
"	"	Poplar	26
"	"	Spruce	27
"	"	Sycamore	28
"	"	Tamarack	29
Various	"	Fir	9
"	"	Pine	23
Vulcanized	"	Gum	10
"	"	Pine	23
"	Heat + Pressure	Various	30
Woodline	Dipped	Pine, Longleaf	25
"	Painted	Pine, Longleaf	25
Zinc + Crude Oil	"	Hemlock	12
"	"	Tamarack	29
Zinc Chloride	"	Ash	1
"	"	Beech	2
"	"	Fir	9
"	"	Fir, Oregon	9
"	"	Oak	18
"	"	Pine, Black Hills	23
"	"	Pine, Loblolly	24
"	"	Redwood, Baltic	27
"	Boiled	Fir, Douglas	9
"	"	Fir, Grand	9
"	"	Oak, Red	20
"	"	Pine, Lodgepole	25
"	"	Pine, Longleaf	25
"	"	Pine, Shortleaf	25
"	Burnett	Beech	2
"	"	Birch	3
"	"	Chestnut	5
"	"	Cypress	7
"	"	Elm, White	8

PRESERVATIVE	PROCESS	SPECIES	Table No.
Zinc Chloride	Burnett	Fir	9
do	do	Fir, Douglas	9
do	do	Fir, Oregon	9
do	do	Fir, Red	9
do	do	Gum	10
do	do	Gum, Red	10
do	do	Gum, Tupelo	11
do	do	Hackberry	11
do	do	Hemlock	12
do	do	Hickory, Pignut	13
do	do	Larch, Western	14
do	do	Maple, Hard	16
do	do	Maple, Soft	17
do	do	Oak	18
do	do	Oak, Black	18
do	do	Oak, Pin	19
do	do	Oak, Red	20
do	do	Oak, Turkey	21
do	do	Oak, Water	21
do	do	Oak, White	22
do	do	Oak, Willow	22
do	do	Pine	23
do	do	Pine, Loblolly	24
do	do	Pine, Lodgepole	25
do	do	Pine, Longleaf	25
do	do	Pine, Mountain	25
do	do	Pine, Sap	25
do	do	Pine, Shortleaf	25
do	do	Poplar	26
do	do	Redwood, California	27
do	do	Spruce	27
do	do	Sycamore	29
do	do	Tamarack	29
do	do	VARIOUS	30
do	Impregnated	Larch	14
do	Pressure	Beech	2
do	Steeping	Pine	25
Zinc Chloride + Oil		Pine, Longleaf	25
do + Bakersfield Oil	Burnett	Pine, Mountain	25
do + Beaumont Oil		Pine, Loblolly	24
do + California Oil		Redwood, California	27
Zinc Creosote		Gum	10
do		Gum, Red	10

Preservative	Process	Species	Table No.
Zinc Creosote	—	Oak	18
do	—	Oak, Black	18
do	—	Oak, Turkey	21
do	—	Pine	23
do	—	Pine, Sap	25
do	—	Pine, Shortleaf	25
do	—	Various	30
do	Allardycoc	Beech	2
do	do	Gum, Sweet	10
do	do	Fir, Douglas	9
do	do	Fir, Red	9
do	do	Hemlock	12
do	do	Oak, Black	18
do	do	Oak, Spanish	21
do	do	Oak, Turkey	21
do	do	Oak, White	22
do	do	Oak, Willow	22
do	do	Pine, Loblolly	24
do	do	Pine, Lodgepole	25
do	do	Pine, Longleaf	25
do	do	Pine, Shortleaf	25
do	do	Tamarack	29
do	Beaumont	Oak, White	22
do	do	Pine, Longleaf	25
do	Card	Ash	1
do	do	Beech	2
do	do	Birch, Red	3
do	do	Chestnut	5
do	do	Cottonwood	6
do	do	Cypress	7
do	do	Elm, White	8
do	do	Gum, Red	10
do	do	Gum, Tupelo	11
do	do	Hackberry	11
do	do	Hemlock	12
do	do	Hickory, Pignut	13
do	do	Maple	15
do	do	Maple, Hard	16
do	do	Maple, Soft	17
do	do	Oak, Pin	19
do	do	Oak, Red	20
do	do	Oak, White	22
do	do	Pine, Loblolly	24

Preservative	Process	Species	Table No.
Zinc Creosote	Card	Poplar	26
do	do	Sycamore	28
do	do	Tamarack	29
do	do	Pine	23
do	Giussani	Oak, Red	20
do	Low Pressure	Beech	2
do	Rutgers	Maple	15
do	Two Movement	Pine, White	25
Zinc + Copper Sulphate, Barium Chloride	Thillman	Ash	1
Zinc Tannin	Wellhouse	Beech	2
do	do	Cedar	4
do	do	Cottonwood	6
do	do	Cottonwood, White	6
do	do	Fir	9
do	do	Gum	10
do	do	Gum, Sweet	10
do	do	Hemlock	12
do	do	Maple	15
do	do	Oak, Black	18
do	do	Oak, Red	20
do	do	Oak, Spanish	21
do	do	Oak, Turkey	21
do	do	Oak, White	22
do	do	Oak, Willow	22
do	do	Pine, Colorado	23
do	do	Pine, Loblolly	24
do	do	Pine, Longleaf	25
do	do	Pine, Mountain	25
do	do	Pine, Red Norway	25
do	do	Pine, Sap	25
do	do	Pine, Shortleaf	25
do	do	Pine, White	25
do	do	Tamarack	29
do	do	Various	30

INDEX NUMBER	DESCRIPTION OF MATERIAL				SERVICE CONDITIONS									RESULTS					REMARKS	REF. NUMBER			
	DIMENSIONS	FORM	PREPARATION	NUMBER OF PIECES IN TEST	AVG. ABSORPTION #/TIE #/CULT.	DATE PLACED	LOCALITY	COMPANY NAME	BALLAST	DRAIN-AGE	RAIL WEIGHT #	SPRINKS	TIE PLATES	TRAFFIC	DATE REPAIR MADE	TIME SERVED YEARS	% RIVET EJECT	CAUSE OF REMOVAL			CON. DITION	AVG LIFE YEARS	
TABLE 1 - ASH																							
CREOSOTE - FULL CELL																							
1.1				19	9.62	1910	Lines East	C.B.T.Q.	Sherridan	—	90	—	All	—	1914	4	0	—	—	—	—	—	5.00
1.2				1	9.62	1909	Lines West	do	Burnt Clay	—	85	—	Yes	—	—	—	—	—	—	—	—	—	5.00
1.3				15	9.62	1910	do	do	Lyons Stone	Very Dry	90	—	—	—	—	—	—	—	—	—	—	—	5.00
CREOSOTE - RUBPING																							
2.1			Well Seasoned	274	5.00	1909	Fulton, Ky.	I.C.	Gravel	—	90	—	Economy	—	1913	4	0	—	Good	—	—	—	12.00
2.2			do	274	5.00	1910	Greenville, Miss.	do	Dirt	—	75	—	do	—	—	3	0	—	do	—	—	—	12.00
UNTREATED																							
3.1				54	—	1909	Lines East	C.B.T.Q.	Cinders, Gravel	—	75-85	—	Yes	—	1914	5	7.6	Not	—	—	—	—	5.00
3.2				14	—	1910	do	do	do	—	90	—	All	—	—	—	13.8	do	—	—	—	—	5.00
3.3				30	—	1909	Lines West	do	Cinders, Gravel	—	75-85	—	Yes	—	—	—	7.7	do	—	—	—	—	5.00
3.4				15	—	1910	do	do	Lyons Stone	—	90	—	do	—	—	—	2.0	do	—	—	—	—	5.00
ZINC CHLORIDE																							
4.1				16	0.5	1910	Lines East	C.B.T.Q.	Gravel	—	90	—	All	—	1914	4	0	—	—	—	—	—	5.00
4.2			Seasoned - 1 yr.	15	0.5	1910	Lines West	do	Lyons Stone	—	90	—	Yes	—	—	—	0	—	—	—	—	—	5.00
4.3			Seasoned	275	0.5	1909	Hannaco, W. Va.	I.C.	Old Rock	—	90	—	3" Tapped Economy	—	1913	4	0	—	Good	—	—	—	12.00
4.4			do	274	0.5	1910	Bloomington, Ill.	do	Old Gravel	—	75	—	do	—	—	3	0	—	do	—	—	—	12.00
4.5			do	274	0.5	1909	Fulton, Ky.	do	do	—	90	—	3" Tapped Economy	—	—	—	0	—	do	—	—	—	12.00
4.6			do	274	0.5	1910	Lula, Miss.	do	New Gravel	—	90	—	do	—	—	3	0	—	—	—	—	—	12.00
4.7			do	274	0.5	1910	Greenville, Miss.	do	Dirt	—	75	—	3" Tapped Economy	—	—	3	1.0	Broken	Good	—	—	—	12.00
ZINC CREOSOTE - CARD																							
5.1				14.8	0.5 zinc	1909	Lines East	C.B.T.Q.	Cinders, Gravel	—	75-85	—	Partly	—	1914	5	0	—	—	—	—	—	5.00
5.2				12.3	do	1910	do	do	do	—	90	—	do	—	—	—	0	—	—	—	—	—	5.00
5.3				88	do	1909	Lines West	do	Cinders, Gravel	—	75-85	—	Yes	—	—	—	0	—	—	—	—	—	5.00
5.4				15	do	1910	do	do	Lyons Stone	—	90	—	do	—	—	—	0	—	—	—	—	—	5.00
ZINC TANNIN - WELLHOUSE																							
6.1				—	—	—	—	—	—	—	—	—	—	1885-8	9-12	100	—	—	—	—	—	—	2.00
TABLE 2 - BEECH																							
CREOSOTE																							
1.1				1900-3000	232-396	1885-6	Prussia	Imperial RR	—	—	Poor	—	—	1895-6	10	63	Decay	—	—	—	—	—	29.00
1.2				do	do	do	do	do	—	—	Good	—	—	do	10	0	—	—	—	—	—	—	do
1.3	6 1/2 x 10 x 8-10			4000	—	—	Germany	do	—	—	—	—	—	—	—	—	—	—	—	—	—	—	do
1.4	do			—	66.0	—	do	Union Ry	—	—	—	—	—	1896	—	—	—	—	—	—	—	—	13.00
1.5	do			—	79.2	—	do	do	—	—	—	—	—	—	—	—	—	—	—	—	—	—	do
1.6				21440	—	—	1885	do	College Station	—	—	—	—	1880	20	46.9	—	—	—	—	—	—	29.70
1.7				—	—	—	France	—	—	—	—	—	—	1895	—	—	—	—	—	—	—	—	10.10
1.8				—	—	—	6.8	1907	C.R.I.P.	—	—	—	—	1908	1	—	—	—	—	—	—	—	1.00
1.9				—	—	—	Germany	Strumar R.R.	—	—	—	—	—	—	—	—	—	—	—	—	—	30	2.00
CREOSOTE - FULL CELL																							
2.1				206	—	11.12	1909	Lines East	C.B.T.Q.	Cinders, Gravel	—	75-85	Partly	—	1914	5	0	—	—	—	—	—	5.00
2.2				99	—	—	1910	do	Gravel	—	90	—	do	—	—	—	0	—	—	—	—	—	do
2.3				119	—	—	1909	Lines West	do	—	85-90	—	Yes	—	—	—	0	—	—	—	—	—	do
2.4				44	—	—	1910	do	Lyons Stone	—	90	—	do	—	—	—	0	—	—	—	—	—	do

U - Includes Beech, Elm, Gum, Chestnut, Maple
 P - Prelim. Air Pressure 75# per Sq. In. - 1/2 Hour - Max Oil Pressure 175# per Sq. In. - 2 Hours - Final Vacuum - 24 inch - 20 Minutes
 D - Includes Pine, Spruce, Fir, Elm, Maple, Red Oak

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
2.5	7' x 9' x 8-6"	Seasoned	250	2.5 Gal	0.675 Gal	1910	Windsor, Ohio	B.T.Q.	Imperial RR	—	—	Good	—	—	—	1913	4	0	—	—	—	—	Includes Gum	29.00
2.6	—	Seasoned	253	—	—	1908	Bunton, Ill.	D.L.T.W.	do	—	—	do	—	—	—	—	7	—	—	—	—	—	Includes Birch & Maple	44.00
2.1	5 1/2 x 10 1/2 x 5 1/2"	Seasoned 6 mo.	356650	59-66	—	—	France	Custom	—	—	—	—	—	—	—	—	—	—	—	25-30	—	Wear	2.20	
CREOSOTE - LOWRY																								
0.3.1				6288	2.5 Gal	—	1910	Buffalo, N.Y.	N.Y.C.	Shoe & Gravel	—	20x100	do	17% Nitel	Heavy	1912	2	0	—	—	—	—	The plates with flange through middle	14.00
0.3.2				7488	do	—	do	Eric, Pa.	do	Cinders	—	80	do	None	do	do	do	0	—	—	—	—	do	14.00
0.3.3				7964	do	—	do	Sandusky, N.Y.	do	Gravel	—	20x100	do	do	do	do	do	0	—	—	—	—	do	14.00
0.3.4				5706	do	—	do	Normalk Dix.	do	Cinders	—	do	do	6.5% Nitel	do	do	do	0	—	—	—	—	The plates with flange through middle	14.00
0.3.5				6000	do	—	do	Air-Line Dix.	do	Gravel	—	80	do	None	do	do	do	0	—	—	—	—	do	14.00
0.3.6				6000	do	—	do	Elkhart Dix.	do	do	—	65	do	Yes	do	do	do	0	—	—	—	—	The plates with flange through middle	14.00
0.3.7	6'-8" x 8"	Seasoned	5000	2.75	—	—	1911	Cleveland, Ohio	L.S.M.C.	Stone	Good	80	do	None	Heavy	do	1	0	—	—	—	—	do	3.10
0.3.8	7'-9" x 8-6"	Seasoned 5-15 mo.	812	5.5 Gal	—	—	1913	Buffalo, N.Y.	D.L.T.W.	do	do	141	do	Screen	do	1915	2	0	0	0	0	—	Includes Birch & Maple	44.00
0.3.9	—	Seasoned	158000	3.3 Gal	—	—	1910-11	do	do	do	do	10-91	do	do	do	1915	2	0	0	0	0	—	Includes Birch, Maple, Sapling, Gum Elm, Red Oak	44.00
CREOSOTE AND CRUDE OIL																								
4.1				5	—	—	1909-11	Badley, Ill.	C.B.T.Q.	Gravel	—	75	—	Yes except under joints	—	—	—	—	—	—	—	—	—	5.00
CREOSOTE - RUBPING See ASH for Nos. 1-2.1																								
5.1		Seasoned	274	—	—	5	1909	Lula, Miss.	I.C.	Gravel	—	75	—	3 1/2" Sellers	—	1912	3	—	—	—	—	—	40" Tudor bars	12.00
5.2		do	248	—	—	—	1910	Bloomington, Ill.	I.C.	Old Gravel	—	75	—	do	—	1913	3	0	—	Good	—	—	Weber angle bars	12.00
LIQUID - U.M. LONES																								
6.1		Seasoned	49	—	0.287	1910	Greenville, Miss.	I.C.	Dirt	—	75	—	do	3 1/2" Economy	—	1913	—	0	—	Fair	—	—	Show signs of surface decay where covered by dirt	12.00
OIL - CRUDE																								
7.1				6	—	—	1911	Badley, Ill.	C.B.T.Q.	Gravel	—	75	—	Yes except under joints	—	—	—	—	—	—	—	—	—	5.00
SALTS (BARSCHALL-HASSELLMANN)																								
8.1				98	—	—	1902	Pelican, Tex.	G.C.T.S.F.	Sand	Poor	60	Cut	—	Heavy	1905	3.75	100	—	3	—	—	Started to fail in 1904	11.00
UNTREATED																								
9.1				110	—	—	1909	Lines East	C.B.T.Q.	Cinders, Gravel	—	75-85	Partly	—	1914	5	8.2	Not	—	—	—	—	5.00	
9.2				23	—	—	1910	do	do	Gravel	—	90	—	do	—	—	—	—	—	—	—	—	5.00	
9.3				58	—	—	1909	Lines West	do	Cinders, Gravel	—	75-85	Yes	—	—	—	—	—	—	—	—	—	5.00	
9.4				15	—	—	1910	do	do	Burnt Clay	—	90	—	do	—	—	—	—	—	—	—	—	5.00	
9.5				100	—	—	1902	Stouffville, Tex.	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1906	4.25	100	—	Not	—	—	97% out in 1905	11.00
ZINC CHLORIDE																								
10.1				1000-3000	232-396	—	1885-6	Prussia	Imperial RR	—	—	Poor	—	—	—	1895-6								

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
ZINC TANNIN - WELLHOUSE																								
2.1	PRESERVATIVE NOT KNOWN			875		0.48	1828	Milwaukee, Wis	CLINW							1906	18			Decay			Ideal condition - Lashed water plank in (covered) shed - Now requires replacement	1.80
CARBOLINEUM - AVENARIUS																								
3.1	Seasoned						1865	Scraper, Mass	N.N.H.H							1914	44	100					Removed 1927 - No further data	38.00
4.1	Seasoned						190-25	Honolulu	Honolulu (Hawaii)						Yes		1914	9-6					Decay around spike holes	39.00
TABLE 5 - CHESTNUT																								
CREOSOTE - FULL CELL																								
1.1	7'-9'-8'-6"		Steamed	88			1907	Boston, N.J.	D.L.W.	Stone	Good	101	Cut	Wellington		1915	8							44.00
1.2	do		do	95			do	do	do	do	Good	101	do	do		do	8							do
CREOSOTE - LOWRY																								
2.1	7'-9'-8'-6"		Seasoned	733	3.5 Gal		1912	Paterson, N.J.	D.L.W.	Stone	Good	101	Sawn	D.L.W.		1915	3	0						44.00
CREOSOTE - LOW PRESSURE																								
3.1			Seasoned	32	3.5 Gal	8.5	1910	Lower N.J.	Peelony							1911	1	0						22.00
OIL-FUEL - LOW PRESSURE																								
4.1			Seasoned	278	2.26 Gal	6.7	1910	do	do							do	1	0						do
UNTREATED																								
5.1				165			1905	Lines East	C.B.T.Q.	Coak's Sewer		75-85		Partly		1914	5	26.8						5.00
5.2				90			do	Lines West	do	do		do		Yes		do	5	2.3						do
5.3				4,37,683			1905	N.J. + Penn	C.B.T.Q.							1909		82.5						do
5.4				2,280			1905	New York	L.C.							1910	1.5	80.0			4.8			do
5.5				375.0			1907	Penn.	P.P.R.							do	1.3	92.0			11.0			do
5.6				281.6			1912	do	do							do	7	85.0			6.5			do
5.7	7'-9'-8'-6"		Seasoned	16			1912	Paterson, N.J.	D.L.W.	Stone	Good	101	Sawn	D.L.W.		1915	3							44.00
WOOD TAR CREOSOTE - DIPPED 1 HOUR																								
6.1				2			1894	Albany, Pa	A. Lines							1914								20.10
WOOD TAR CREOSOTE																								
7.1				32			1894	Newark, Del.	A. Lines							1914								20.10
ZINC CHLORIDE - BURNETT																								
8.1				21		0.5	1911	Hartford, Mass	C.M.H.P.	Gravel	Good	90	Sawn	Yes	Heavy	1914	3	0						27.00
ZINC CREOSOTE - CARD																								
9.1				165		0.5 Zinc	1909	Lines East	C.B.T.Q.	Coak's Sewer		75-85		Partly		1914	5	19.2						5.00
9.2				89		30 Creos.	do	Lines West	do	do		do		Yes		do	5	19.0						do
TABLE 6 - COTTONWOOD																								
CREOSOTE FULL CELL																								
1.1				85		9.96	1909	Lines East	C.B.T.Q.	Coak's Sewer		75-85		Partly		1914	5	0						5.00
1.2				37			do	Lines West	do	do		do		Yes		do	5	0						do
UNTREATED																								
2.1				56			do	Lines East	do	do		do		Partly		do	5	94.8						do
2.2				30			do	Lines West	do	do		do		Yes		do	5	100						do
ZINC CREOSOTE - CARD																								
3.1				286		0.5 Zinc	do	Lines East	do	do		do		Partly		do	5	11.0						do
3.2				160		30 Creos.	do	Lines West	do	do		do		Yes		do	5	1.35						do
ZINC TANNIN - WELLHOUSE																								
4.1				87			1882	Topeka, Kas	A.T.S.F.							1893	11.6	88.5						8.00
4.2				50			do	La Junta, Colo.	do							1897	15	66.0						do
COTTONWOOD, WHITE																								
5.1				49			do	La Junta, Colo.	A.T.S.F.							1897	15	84						2.00
TABLE 7 - CYPRESS																								
CARBOLINEUM - AVENARIUS																								
1.1							1894	San Antonio, Tex								1897	3	0						31.00
0 - Average life estimated by Forest Service																								

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
ZINC CHLORIDE - PRESSURE																								
12.1				91002			1852	Germany	Hanover							1867	15	34.5						240,270
12.2				600			do	do	Grassbrook							do	15	42.0						do
ZINC CREOSOTE - ALLARDYCE																								
13.1				50		0.26 Zinc	1902	Bonham, Tex	G.C.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	80						11.00
ZINC CREOSOTE - CARD																								
14.1				433		0.5 Zinc	1909	Lines East	C.B.T.Q.	Coak's Sewer		75-85		Partly		1914	5	8.4						5.00
14.2				370		do	1910	do	do	Sherridan Gravel		90		All		do	4	0						do
14.3				37		do	1911	do	do	do		75		Yes		do	3	0						5.00
14.4				240		do	1909	Lines West	do	Coak's Sewer		75-85		do		do	5	0						5.00
14.5				177		do	1910	do	do	Lyons Stone		90		do		do	4	0						5.00
14.6	7'-9'-8'-6"		Sawn Heavy	1107		0.5 Zinc	1911	Windsor, Ohio	B.Y.O.	Gravel	Good	90	Cut	Shoulder	Heavy	1915	4	0						4.90
14.7	6'x8'x8"		Seasoned	344		30 Creos.	1912	Lake, Wis.	C.M.H.P.	Cinder	do	85	do	None	Average	1915	3	0						6.00
ZINC CREOSOTE - RUTBERS																								
15.1				50		0.5 Zinc	1902	Bonham, Tex	G.C.S.F.	Sand	Poor	60	Cut	None	Heavy	1908	8	100						11.00
ZINC TANNIN - WELLHOUSE																								
16.1				100		0.87	1902	do	do	Sand	Poor	60	Cut	None	Heavy	1912	10	0						11.00
TABLE 3 - RED BIRCH																								
CREOSOTE FULL CELL																								
1.1				45			1910	Hanover, Ill.	C.B.T.Q.	Sherridan Gravel		90		All		1914	4	0						5.00
1.2				30			do	Blanding, Ill.	do	do		do		do		do	4	0						do
1.3				14			1911	Banders, Ill.	do	Gravel		75		Except		do	3	0						5.00
1.4				59			1910	Barr, Colo.	do	Lyons Stone	Very Dry	90		Yes		1912	2	0						5.00
UNTREATED																								
2.1				91			1909	Lines East	C.B.T.Q.	Coak's Sewer		75-85		Partly		1914	5	100						5.00
2.2				49			1910	do	do	Sherridan Gravel		90		All		do	4	do						do
2.3				48			1909	Lines West	do	Coak's Sewer		75-85		Yes		do	5	do						do
2.4				30			1910	do	do	Lyons Stone		90		do		do	4	96						do
ZINC CHLORIDE - BURNETT																								
3.1				45		0.5	1910	Hanover, Ill.	C.B.T.Q.	Sherridan Gravel		90		All		1914	4	0						5.00
3.2				28		0.5	do	Blanding, Ill.	do	do		do		do		do	4	0						5.00
3.3				50		0.5	do	Barr, Colo.	do	Lyons Stone	Very Dry	do		Yes		do	4	0						5.00
ZINC CREOSOTE - CARD																								
4.1				433		0.5 Zinc	1909	Lines East	C.B.T.Q.	Coak's Sewer		75-85		Partly		1914	5	1						5.00
4.2				276		do	1910	do	do	Gravel		90		All		do	4	0						5.00
4.3				238		do	1909	Lines West	do	Coak's Sewer		75-85		Yes		do	5	0						5.00
4.4				122		do	1910	do	do	Lyons Stone		90		do		do	4	0						5.00
TABLE 4 - CEDAR																								
UNTREATED																								
1.1				329,774			1905-6	Nebraska	C.B.T.Q.							1910	4	17.5						1.10
1.2				430,300			1901	Wyo. + Mont.	do							do	9	11.5						1.10
1.3				83,200			1900	Canada	S.T.							do	10	6.1						1.10
1.4				11,117			1898	West Mich.	C.R.Pind.							1914	16	100						1.10
1.5				397,440			1903-4	Ont. Canada	T.N.O.							1910	6m7	27.6						1.10
1.6				110,880			1897-90	Yer	Rothland							1910	10m11	56.0						1.10
1.7	7'-8'-8'			14.33			1904	Mohall	B.N.	Gravel	Good	8.68	8 1/2	None		1914	10	28.8						48.00
1.8	do			16.5			do	do	do	do	do	do	do	do		do	10	38.8						48.00
1.9	do	P		30.0			1902	London, Wis	C.M.H.P.			85	Canadian	do		1915	13	38.0						8.10
1.10	6'-8'-8'	Sawed		1.72			1911	Florida, Wis	do	Cinders	do	80	do	do		Average	do	do						do
1.11	do	do		5.6			1912	do	do	do	do	65	do	do		do	do	do						do
1.12	do	do		5.8			1912	do	do	do	do	65	do	do		do	do	do						do
1.13	do	do		30.0			do	do	do	do	do	65	do	do		do	do	do						do

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
	CREOSOTE																							
2.1				500			1876	Bond Brook, N.Y.	C.R.R. & N.D.							1913	15	100		Not Cut		10% removed 1989 - Last ones removed in 1985. Includes Cedar in fairly good condition 24 yrs. Some grounds for delivering some time still in service.	15.00	
2.2							1878	Lehigh and Susquehanna Divisions	do								do	do	do					
	CREOSOTE - FULL CELL																							
2.3				15			1910	Manover, Ill.	C.B. & Q.	Sheridan Gravel		90		All		1914	4	0					5.00	
2.4				10			do	Blending, Ill.	do	do		do		do		do	do	do					5.00	
2.5				29			do	Barr, Colo.	do	Lyons Stone	Very Dry	do		Yes		do	do	do					5.00	
	OIL - CRUDE																							
3.1				3			1911	Baders, Ill.	do	Gravel		75		Except under joints		1912	1	0					5.00	
	UNTREATED																							
4.1				114			1909	Lines East	do	Ordery Gravel Burnt Clay		75-85 90		Partly		1914	5	34.2	Not				5.00	
4.2				25			1910	do	do	Gravel		90		All		do	4	40	do				5.00	
4.3				60			1909	Lines West	do	Ordery Gravel Burnt Clay		75-85 90		Yes		do	5	38.3	do				5.00	
4.4				29			1910	do	do	Lyons Stone		90		do		do	4	3	do				5.00	
4.5	7'9" x 9'			6675			do	La Fayette Iron Works	do	do		80	Screw	Clark Tension		do	4.5	0		Good			7.00	
4.6	7'8" x 9'			500			1905	Box Man v. 304 Leaf	do	do				None		do	9	31.8				24% out due to wrot	7.00	
4.7	do			300			do	do	do	do				None		do	9	37.8				31.6% do	7.00	
4.24	7'4" x 8'			2290			1909	do	do	do		80	Screw	Clark		do	5	0		Good		May need renewal next year	7.00	
4.25	do			3637			do	do	do	do		do	do	do		do	5	0		do		do	7.00	
4.26		None		282			1895	Walrus Cutoff	do	Dirt				Yes		do	19	36.5					Teche Cypress	7.00
4.27		do		588			do	do	do	do				None		do	19	99.0					do	7.00
4.28		do		44			do	do	do	Rock				Yes		do	19	100					Mermentau	7.00
4.29		do		73			do	do	do	Earth				None		do	19	57.5					do	7.00
4.30		Sawed		641			do	do	do	Rock				Yes		do	19	100					Calcasieu	7.00
4.31		do		374			do	do	do	Earth				do		do	19	91.4					do	7.00
4.32		do		634			do	do	do	do				None		do	19	78.7					do	7.00
4.33		Well Seasoned		274			1909	Lula, Miss.	I.C.	New Gravel		75		3 Strapped Sellers		do	do	do					Damaged by derangement	12.00
4.34		do		274			do	do	do	do		do		do		do	do	do					do	12.00
4.35		do		274			1910	Greenville, Miss.	do	Dirt		do		3 Strapped Sellers		1913	0						Weber Joints	12.00
4.36				242328			1908-4	Missouri	C.B. & Q.							1910	6-7	18					Sumner	1.10
4.37				175500			1907	Louisiana	C.R.I. & R.							do	3	19					Includes White Oak	do
4.38				236160			1905	Arkansas	M.H. & L.							do	5	62					Includes White Oak + Red Oak	do
4.39				274			1910	Greenville, Miss.	I.C.	Dirt		75		3 Strapped Sellers		1913	3	0					Weber Joints	12.00
	ZINC CHLORIDE - BURNETT																							
5.1				15		0.5	1910	Manover, Ill.	C.B. & Q.	Sheridan Gravel		90		All		1914	4	0					5.00	
5.2				10		do	do	Blending, Ill.	do	do		do		do		do	4	0					5.00	
5.3				30		do	do	Barr, Colo.	do	Lyons Stone	Very Dry	do		Yes		do	4	0					5.00	
	ZINC CREOSOTE - CARD																							
6.1				394		0.5 Zinc SD Cream	1909	Lines East	C.B. & Q.	Ordery Gravel Burnt Clay		75-85 90		Partly		1914	5	0					5.00	
6.2				24		do	1910	do	do	Gravel		90		All		do	4	0					5.00	
6.3				208		do	1909	Lines West	do	Ordery Gravel Burnt Clay		75-85 90		Yes		do	4	0					5.00	
6.4				47		do	1910	do	do	Lyons Stone		90		do		do	4	0					5.00	
	CYPRESS - RED																							
7.1				1200			1895	Louisiana	I.C.							1909	14	4					12.20	
Ⓞ Average life (Estimated by Forest Service) for Index Nos 4.26 and 4.27 combined was 13.97 years. Ⓛ do do do do 4.28 and 4.29 do do 2.95 do Ⓜ do do do do 4.30, 4.31 and 4.32 do do 15.67 do																								

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	UNTREATED																						
8.1				1679			1906	Memphis	I.C.							1909	3	35					12.20
8.2	7'9"			48000			1902	do	do							do	7	40					do
8.3	do			19200			1900	do	do							do	9	60					do
8.4	do			67200			1899	do	do							do	10	60					do
8.5	6'x8"			34000			1901	do	do							do	8	60					do
8.6	7'x9"			25600			1902	Vicksburg	do							do	Over 7	80					do
8.7	do			25600			do	do	do							do	do	100					do
	TABLE 8 ELM - WHITE																						
1.1				106		12.97	1909	Lines East	C.B. & Q.	Ordery Gravel Burnt Clay		75-85 90		Partly		1914	5	2.8	Broken				5.00
1.2				99		do	1910	do	do	Gravel		90		All		do	4	0					do
1.3				58		do	1909	Lines West	do	Ordery Gravel Burnt Clay		75-85 90		Yes		do	5	0					do
1.4				60		do	1910	do	do	Lyons Stone		90		do		do	4	0					do
	CRUDE OIL																						
2.1				2			1911	Baders, Ill.	do	Gravel		75		Except under joints		do	3	0					do
	UNTREATED																						
3.1				89			1909	Lines East	do	Ordery Gravel Burnt Clay		75-85 90		Partly		do	5	75.2	Not				do
3.2				30			1908	do	do	Gravel		90		On Curves		do	6	100	do				76% Not - 20% Broken - 4% Burned
3.3				25			1910	do	do	Sheridan Gravel		90		All		do	4	32.0	do				do
3.4				48			1909	Lines West	do	Ordery Gravel Burnt Clay		75-85 90		Yes		do	5	70.0	do				do
3.5				30			1910	do	do	Lyons Stone	Very Dry	90		do		do	4	3.0	do				do
	ZINC CHLORIDE - BURNETT																						
4.1				77		0.5	1909	Lines East	do	Ordery Gravel Burnt Clay		75-85 90		Partly		do	5	2.6					do
4.2				146		do	1910	do	do	Sheridan Gravel		90		All		do	4	0					2 Split - 1 Broken - 1 Shaky
4.3				43		do	1909	Lines West	do	Ordery Gravel Burnt Clay		75-85 90		Yes		do	5	0					do
4.4				30		do	1910	do	do	Lyons Stone	Very Dry	90		do		do	4	0					do
	ZINC CREOSOTE - CARD																						
5.1				444		0.5 Zinc SD Cream	1909	Lines East	do	Ordery Gravel Burnt Clay		75-85 90		Partly		do	5	0					do
5.2				195		do	1908	do	do	Gravel		90		On Curves		do	6	0					do
5.3				149		do	1910	do	do	do		90		All		do	4	0					do
5.4				165		do	do	do	do	Piling driven in Sand		66		None		do	4	0.6					do
5.5				244		do	1909	Lines West	do	Ordery Gravel Burnt Clay		75-85 90		Yes		do	5	2.8					do
5.6				121		do	1910	do	do	Lyons Stone	Very Dry	90		do		do	4	0					do
	ELM																						
6.1			Seasoned	9		0.5	1910	Greenville, Miss.	I.C.	Dirt		75		3 Strapped Sellers		1913	3	0			show surface decay		Show decay where in contact with earth - Weber Joints.
	TABLE 9 - FIR - RED																						
0.1.1	7'x8" x 8'			224	104 Gal.	2.75	1910	Bulle, Mont.	Annapolis Wire Co	Rock	Poor	90	Single	Bolds 5-7	Heavy	1911	1						24.00
2.1				61			1906	Sheridan, Wyo.	C.B. & Q.	Balluff's Gravel		85		Sellers		1914	8	19.7	Decay				Includes Lodgepole Pine
	COPPER SULPHATE BOILED																						
3.1				36640			1850	Berlin, Germany	R.M. R.R.							1866	16	66.2			14		29.70
	COPPER SULPHATE - STEEPED																						
4.1				60000			1851	do	L-B. R.R.							1868	17	69.0			13.9		do
0 - Preliminary Temp. 215° for 1-4 Hours - Maximum Pressure 20-100 # per sq. in. for 1-3 Hours.																							

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
COPPER SULPHATE - PRESSURE																									
5.1				11,044			1899	SO	Germany	N.W.R.R.						1866	16	20.9			16		29.70		
CRESOTE																									
6.1										STARR											14-16		2.40		
SALTS - BARNHALL HASSELLMAN																									
7.1				15597			1902			C.B. & G.						1908	6	100				Dead failure	1.00		
PRESERVATIVE NOT KNOWN																									
8.1				313808			1906		Wyoming							1910	4	175				Includes Pine	1.10		
UNTREATED (SEE CEDAR TABLE 4-42)																									
9.1				882 407					Germany	Six Ry's						1880						7.2	28.25		
9.2				79200			1876										11	98.9				7.0	29.70		
9.3				146800			1884			Schleswig							18	98.7				8.6			
9.4				98543			1886			L. Drenke							12	100				7.9			
9.5				68291			1864			T. Inter							13	82.8				9.4			
VARIOUS PROCESSES																									
10.1	6 5/8" x 8"			83341																		14	13 Railroads - Includes Pine		
ZINC CHLORIDE - BURNETT																									
11.1				12,800 000		0.27	1885			S.P.						1908	18				10-12	Includes Pine	1.00		
11.2				4,826,648		0.35-0.5	1899			C.B. & G.							6				10-12		Not where covered with salts		
11.3						0.25	1902			U.P.							9								
11.4						0.78	1904			G.N.							4	4	0						
11.5				161,515			1884		Germany	Rh.-Sud. Ry.						1879	24	48.3				22.8	Life untreated 72 years	28.70	
ZINC CHLORIDE																									
12.1									Switzerland	S.N.-O.B.											12-14		7-8	2.00	
ZINC TANNIN - WELLHOUSE																									
13.1	7 5/8" x 8"					0.78	1886			U.R.			Cut									6-8	Split in Spiking		
FIR - DOUGLAS																									
14.1	7 5/8" x 8"	Sawn	Seasoned	173		6.2	1906	Hayward, Wash	N.P.	Gravel	Good	85	Cut	Flat	Heavy	1915	8.3	21.3			Fair			25.00	
14.2	"	"	"	46		"	"	"	"	"	"	"	"	"	"	"	"	"	15.3						"
14.3	"	"	"	100		"	"	"	"	"	"	"	"	"	"	"	"	"	8.0						Rail Cut
14.4	"	"	"	71		"	"	"	"	"	"	"	"	"	"	"	"	"	7.0						Turned over
14.5	"	"	"	52		"	"	"	"	"	"	"	"	"	"	"	"	"	0						Sawn spikes present near joints
14.6	"	"	"	138,995		8-10	"	"	"	O.B. & G.			"	"	"	1918	2	0							1.00
14.7	"	"	"	74		7.456	1905	Elbering, Mo	C.B. & G.				"	"	"	1914	8.5	1.4							Topkilled 2 1/2 yrs after laying
CRESOTE - OPEN TANK																									
14.1	"	"	"	32		3.99	"	"	"	"			"	"	"	"	8.5								"
CRESOTE - RUEPING																									
14.2	"	"	"	40		5.755	"	"	"	"			"	"	"	"	8.5	0							"
UNTREATED																									
15.1	7 5/8" x 8"	Hewn	Green	95			1907	Plains, Mont	N.P.	Gravel	Excellent	72+85	Sawn	See Remarks	Heavy	1915	8.3	98.0				7.63	Re-charged to green in 1910	25.00	
15.2	"	"	"	94		"	"	"	"	"	"	85	Cut	Wagoner	"	"	"	"	80.0			7.58		"	
16.1	"	"	"	108		"	"	"	"	"	"	"	"	"	"	"	"	"	99.2			7.78		"	
16.2	"	"	"	264		"	1906	Hayward, Wash	"	"	Good	"	"	"	"	"	"	"	67.0			"		"	
16.3	"	"	"	46		"	"	"	"	"	"	"	"	"	"	"	"	"	85.8			"		"	
16.4	"	"	"	47		"	"	"	"	"	"	"	"	"	"	"	"	"	85.1			"		"	
16.5	"	"	"	100		"	"	"	"	"	"	"	"	"	"	"	"	"	70.0			"		"	
16.6	"	"	"	100		"	"	"	"	"	"	"	"	"	"	"	"	"	99.0			"		"	
16.7	"	"	"	91		"	1907	Plains, Mont	"	"	Excellent	"	"	"	"	"	"	"	100.0			7.56		"	
16.8	"	"	"	90		"	"	"	"	"	"	"	"	"	"	"	"	"	100.0			7.71		"	

16.9	7 5/8" x 8"	Hewn	Seasoned	32			1907	Plains, Mont	N.P.	Gravel	Excellent	72	Cut	Flat	Heavy	1915	8.3	99.0	Drainage		7.63			25.00	
16.10	"	"	"	90		"	"	"	"	"	"	85	Cut	Wagoner	"	"	"	"	94.4			7.38		"	
16.11	"	"	"	90		"	"	"	"	"	"	"	"	"	"	"	"	"	92.9			7.56		"	
16.12	"	"	"	90		"	"	"	"	"	"	"	"	"	"	"	"	"	97.8			7.56		"	
16.13	"	"	"	180		"	"	"	"	"	"	"	"	"	"	"	"	"	98.9			7.78		"	
16.14	"	"	"	99		"	"	"	"	"	"	"	"	"	"	"	"	"	93.5			7.56		"	
16.15	"	"	"	100		"	1906	Hayward, Wash	"	"	Good	"	"	"	"	"	"	"	74.0			"		"	
16.16	"	"	"	58		"	"	"	"	"	"	"	"	"	"	"	"	"	85.0			"		"	
16.17	"	"	"	96		"	"	"	"	"	"	"	"	"	"	"	"	"	69.8			"		"	
16.18	"	"	"	91		"	"	"	"	"	"	"	"	"	"	"	"	"	64.8			"		"	
16.19	"	"	"	550		"	"	"	"	"	"	"	"	"	"	"	"	"	73.4			"		"	
16.20	"	"	"	99		"	"	"	"	"	"	"	"	"	"	"	"	"	98.0			"		"	
16.21	"	"	"	294		"	"	"	"	"	"	"	"	"	"	"	"	"	71.8			"		"	
16.22	6 5/8" x 8"	Hewn	Seasoned	64			1910	Ontario, Wash	N.P.	"	"	"	"	"	"	"	"	"	0			"		Bodily rail worn	
16.23	"	"	"	100		"	1906	Hayward, Wash	N.P.	"	"	85	"	"	"	"	"	"	8.3	0		"		Topkilled in Summer months show	
16.24	"	"	"	89		"	1905	Elbering, Mo	C.B. & G.	"	"	"	"	"	"	"	"	"	0			"		Partly decayed	
16.25	7 5/8" x 8"	Sawn	Well Seasoned	137		"	1911	M. Brown Iowa	C.N. & O.P.	Gravel	Good	65	Cut	None	Average	1915	4	0						Common locate	
16.26	"	"	"	150		"	1912	"	"	"	Fair	90	"	"	"	"	"	"	5	0					Topkilled 2 1/2 yrs after laying
ZINC CHLORIDE - BURNETT																									
17.1	7 5/8" x 8"	Sawn	Partly Seasoned	217		0.243	1895	Various Places	S.P.	"	"	75-78	Cut	See Remarks	Heavy	1914	13	100	All decayed		11.34	Avg. life estimated by Forest Service	32.00		
17.2	"	"	"	4043		"	1896	"	"	"	"	"	"	"	"	"	"	"	13	100			10.97	"	
17.3	"	"	"	1941		"	1897	"	"	"	"	"	"	"	"	"	"	"	13	100			10.74	"	
17.4	"	"	"	20536		"	1898	"	"	"	"	"	"	"	"	"	"	"	14	100			11.21	"	
17.5	"	"	"	12951		"	1899	"	"	"	"	"	"	"	"	"	"	"	14	100			10.46	"	
17.6	"	"	"	26146		"	1900	"	"	"	"	"	"	"	"	"	"	"	13	100			9.31	"	
17.7	"	"	"	43681		"	1901	"	"	"	"	"	"	"	"	"	"	"	13	89.57			10.95	"	
17.8	"	"	"	52204		"	1902	"	"	"	"	"	"	"	"	"	"	"	12	99.3			9.43	"	
17.9	"	"	"	44056		"	1903	"	"	"	"	"	"	"	"	"	"	"	11	99.6			9.72	"	
17.10	"	"	"	42541		"	1904	"	"	"	"	"	"	"	"	"	"	"	10	55.3			9.44	"	
17.11	"	"	"	53983		"	1905	"	"	"	"	"	"	"	"	"	"	"	9	65.7			8.45	"	
17.12	"	"	"	43478		"	1906	"	"	"	"	"	"	"	"	"	"	"	8	42.9			"	"	
17.13	"	"	"	28673		"	1907	"	"	"	"	"	"	"	"	"	"	"	7	59.0			"	"	
17.14	"	"	"	44689		"	1908	"	"	"	"	"	"	"	"	"	"	"	6	23.4			"	"	
17.15	"	"	"	62146		"	1909	"	"	"	"	"	"	"	"	"	"	"	5	7.4			"	"	
17.16	"	"	"	134774		"	1910	"	"	"	"	"	"	"	"	"	"	"	4	0.9			"	"	
17.17	"	"	"	144444		"	1911	"	"	"	"	"	"	"	"	"	"	"	3	0			"	"	
17.18	"	"	"	142 111		"	1912	"	"	"	"	"	"	"	"	"	"	"	2	0			"	"	
17.19	"	"	"	154293		"	1913	"	"	"	"	"	"	"	"	"	"	"	1	0			"	"	
17.20	"	"	"	112155		"	1914	"	"	"	"	"	"	"	"	"	"	"	0	0			"	"	
17.21	"	"	"	90		0.786	1907	Plains, Mont	N.P.	Gravel	Excellent	85	Sawn	Sellers	"	1915	8.3	11						More rail worn than the untreated	
17.22	"	"	"	107		"	1907	"	"	"	"	"	"	"	"	"	"	"	8.5	3.7					No decay in 1915
17.23	"	"	"	91		0.262	1905	Elbering, Mo	C.B. & G.	"	"	"	"	"	"	"	"	"	8.5	3.2					Topkilled 2 1/2 yrs after laying
ZINC CHLORIDE - BOILED																									
18.1	"	"	"	61			1904	Sheldon, Wyo.	"	"	Poor	"													

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
19.1	CREOSOTE 7'x8' Sawn	Sundried-Red	1000	—	8.0	1909	Dodson, Ore.	G.M.+H.C.	Gravel	Good	C.S. Sept 75	—	—	Heavy	1914	5	0.2	—	—	—	—	—	—	5.00	
20.1	UNTREATED	Sawn	1006	—	—	—	—	—	—	—	—	—	—	—	—	1913	4	0	—	—	—	—	25% show surface decay	—	
20.2	—	Sawn	1007	—	—	—	—	—	—	—	—	—	—	—	—	—	4	0	—	—	—	—	—	—	
21.1	ZINC CHLORIDE - BURNETT	Sawn	977	—	0.25	1909	—	—	—	—	—	—	—	—	—	1914	5	0.4	—	—	—	—	—	—	
21.2	—	Not Seasoned	975	—	—	—	—	—	—	—	—	—	—	—	—	—	5	0.4	—	—	—	—	—	—	
21.3	—	Sundried-Red	1969	—	—	—	—	—	—	—	—	—	—	—	—	—	5	0.4	—	—	—	—	—	—	
21.4	—	—	45 M.	—	—	1903	Nevada	O.S. Line	—	—	—	—	—	Wahington	—	11	5.00	—	—	Split	7+8	Wahington Top plates shorten life due to 18 months	32.00		
21.5	—	—	36 M.	—	—	—	—	—	—	—	—	—	—	—	—	11	5.00	—	—	—	—	—	—		
21.6	—	—	18 M.	—	—	—	—	Utah	—	—	—	—	—	—	—	11	84.0	—	—	—	6+12	Soil seemed to neutralize Zinc Chloride	—		
21.7	—	—	20 M.	—	—	—	—	Beppo, Utah	—	—	—	—	—	—	—	11	70.0	—	—	—	—	—	Salty nature of subsoil ends from 2 to 3 years life	—	
21.8	—	—	6 M.	—	—	—	—	Lay, Utah	—	—	—	—	—	—	—	11	90.0	—	—	—	—	—	7 Maximum life 12 years	—	
21.9	—	—	46 M.	—	—	—	—	Hoyup, Utah	—	—	—	—	—	—	—	11	—	—	—	—	—	—	—	Slow some rot where gravel dust used	—
21.10	—	—	3 M.	—	—	—	—	Byron, Utah	—	—	—	—	—	—	—	11	97.0	—	—	Good	—	—	6 The remainder removed in 1914	—	
21.11	—	—	300000 per year	—	0.25	1915-14	Main Line	—	—	—	—	—	—	Wahington	—	—	—	—	—	—	—	—	74.9 97% of failures due to decay	—	
22.1	ZINC CHLORIDE	—	5414	—	—	1903	Brush-shops Colo.	C.B.+Q.	Slag	—	75-95	—	Partly	—	1912	9	54	All causes	—	—	—	—	Triangular ties	5.00	
23.1	SALT TREATED (GREAT SALT LAKE UTAH)	—	15000	—	—	1899	Great Salt Lake	O.S.L.	—	—	—	—	—	—	1904	5	—	—	—	—	—	—	Show no advantage over untreated ties	32.00	
TABLE 10 GUM-RED																									
11	CREOSOTE - FULL CELL	—	—	85	—	9.83	1909	Lines East	C.B.+Q.	Oakley gravel Burnt Clay	—	75-95	—	Partly	—	1914	5	0	—	—	—	—	—	5.00	
12	—	—	—	48	—	—	—	Lines West	—	—	—	—	—	Yes	—	—	5	0	—	—	—	—	—	5.00	
13	6'x8' Sawn	—	28	33.31	12.52	1905	Bay View, San Jose, Tex.	G.M.+S.A.	—	—	—	—	Screw	—	—	—	9	42.8	—	—	—	—	Started to fail 1908	7.00	
14	—	—	39	—	—	—	—	—	—	—	—	—	—	Glendon	—	—	9	33.3	—	—	—	—	do 1912	—	
15	—	—	45	—	—	—	—	—	—	—	—	—	—	None	—	—	9	53.3	—	—	—	—	do 1912	—	
16	—	—	26	38.45	14.45	—	—	—	—	—	—	—	—	Screw	—	—	9	7.7	—	—	—	—	No steaming	—	
17	—	—	29	—	—	—	—	—	—	—	—	—	—	Glendon	—	—	9	17.2	—	—	—	—	—	—	
18	—	—	33	—	—	—	—	—	—	—	—	—	—	None	—	—	9	21.2	—	—	—	—	—	—	
2.1	CREOSOTE - GIUSSANI	—	—	43	—	—	—	Pacific Mo.	S.L.+S.F.	—	—	—	—	—	—	9	18.6	—	—	—	—	—	Includes Red Oak	30.00	
2.2	—	—	—	18	—	—	—	—	—	—	—	—	—	—	—	9	27.7	—	—	—	—	—	Incomplete record	—	
3.1	CREOSOTE - NO STEAMING	—	—	83	—	—	—	—	—	—	—	—	—	—	—	9	3.6	—	—	—	—	—	—	—	
4.1	CREOSOTE - LIVE STEAM IN SUPERHEATED COILS	—	—	24	—	—	—	—	—	—	—	—	—	—	—	9	4.2	—	—	—	—	—	—	—	
5.1	CREOSOTE - BETHEL	—	—	76	—	—	—	—	—	—	—	—	—	—	—	9	1.3	—	—	—	—	—	—	—	
6.1	CREOSOTE - RUEPING	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
6.2	6'x8' Sawn	Seasoned by	74	9.53	—	1906	S.A. Clark, Mo.	—	Gravel	Good	75-95	—	None	Heavy	—	8	0	—	—	Good	—	—	—	Rail changed 1909	—
6.3	—	Sawn	247	9.88	—	—	—	—	—	—	—	—	—	—	—	8	0	—	—	—	—	—	—	Includes Red Oak	—
7.1	7'x8' Sawn	—	500	0.736	0.216	1907	Pacific, Mo.	G.M.+S.A.	Slag	—	—	—	—	—	—	7	0	—	—	Good	—	—	—	—	
① Maximum Pressure 100 # per Sq. in. - Time 1.2 Hours ② Preliminary steaming 2.5 Hours - Preliminary Vacuum 25 inch 1.25 Hours - Maximum Pressure 100 # per Sq. in. for 2.75 Hours ③ Left in Licks for six months - Penetration of saline constituents of water only 3 to 4 inches - Deposit on ties were soluble ④ Preliminary Pressure of 2.5 # for 4 Hours ⑤ Preliminary Pressure of 80 # for 0.5 Hours - Maximum Oil Pressure 180 # at 175° F. for 2 Hours - Final Vacuum of 24 inch for 1.5 Hours																									

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
8.1	TREATMENT NOT KNOWN	—	—	4	—	—	1905	Pacific, Mo.	S.L.+S.F.	—	—	—	—	—	—	1914	9	100	—	—	—	—	—	30.00	
9.1	UNTREATED	—	—	100	—	—	1909	Lines East	C.B.+Q.	Oakley gravel Burnt Clay	75-95	—	Partly	—	—	—	5	87.2	Not	—	—	—	—	5.00	
9.2	—	—	—	54	—	—	—	Lines West	—	—	—	—	—	Yes	—	—	5	88.8	—	—	—	—	—	—	
9.3	—	—	—	31	—	—	1908	Chicago, Ill.	—	Gravel	90	—	DeCurves	—	—	—	6	100	—	—	—	—	—	—	
9.4	6'x8' Sawn	—	—	11	—	—	1905	Bay View, San Jose, Tex.	G.M.+S.A.	—	—	—	—	—	—	—	3	100	—	—	2.6	—	—	—	
9.5	—	—	—	16	—	—	1905	—	—	—	—	—	—	Glendon	—	—	3	100	—	—	—	2.4	—	—	
9.6	—	—	—	14	—	—	—	—	—	—	—	—	—	None	—	—	3	100	—	—	—	—	—	—	
10.1	ZINC CHLORIDE - BURNETT	—	—	75	—	0.5	1909	Lines East	C.B.+Q.	Oakley gravel Burnt Clay	75-95	—	Partly	—	—	—	5	6.6	Not split	—	—	—	—	5.00	
10.2	—	—	—	12	—	—	1911	—	—	Gravel	75	—	Partly	—	—	—	3	0	—	—	—	—	—	—	
10.3	—	—	—	43	—	—	1909	Lines West	—	Oakley gravel Burnt Clay	75-95	—	Yes	—	—	—	5	7.0	Not	—	—	—	—	—	
10.4	6'x8' Sawn	—	—	40	0.7285	0.2738	1905	Bay View, San Jose, Tex.	G.M.+S.A.	—	—	—	—	—	—	—	9	80.0	—	—	7.0	—	—	Arg. life estimated by Forest Service	7.00
10.5	—	—	—	45	—	—	—	—	—	—	—	—	—	Glendon	—	—	9	93.2	—	—	7.0	—	—	—	
10.6	—	—	—	44	—	—	—	—	—	—	—	—	—	None	—	—	9	78.5	—	—	6.7	—	—	—	
10.7	—	—	—	32	0.8107	0.3047	—	—	—	—	—	—	—	Screw	—	—	9	87.5	—	—	7.3	—	—	—	
10.8	—	—	—	34	—	—	—	—	—	—	—	—	—	Glendon	—	—	9	97.0	—	—	7.0	—	—	Failure started 1909	—
10.9	—	—	—	49	—	—	—	—	—	—	—	—	—	None	—	—	9	89.0	—	—	7.3	—	—	—	
11.1	ZINC CREOSOTE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
11.2	6'x8' Sawn	Seasoned by	12	10.216	0.2738	—	—	—	—	—	—	—	—	Screw	—	—	9	25.0	—	—	—	—	—	7.00	
11.3	—	—	—	16	—	—	—	—	—	—	—	—	—	Glendon	—	—	9	36.3	—	—	—	—	—	—	
12.1	ZINC CREOSOTE - CARD	—	—	17	—	—	—	—	—	—	—	—	—	None	—	—	9	35.3	—	—	—	—	—	Started to fail 1910	—
12.2	—	—	—	414	—	0.5 Zinc 5.0 Creosote	1909	Lines East	C.B.+Q.	Oakley gravel Burnt Clay	75-95	—	Partly	—	—	—	5	1.0	Split	—	—	—	—	2% more split or broken	5.00
12.3	—	—	—	232	—	—	—	—	—	—	—	—	—	Yes	—	—	5	0.5	—	—	—	—	—	—	
13.1	ZINC CREOSOTE - ALLARDYCE	—	—	194	—	—	1908	—	—	Gravel	90	—	—	—	—	—	6	0.5	—	—	—	—	—	—	
14.1	ZINC TANNIN - WELLHOUSE	—	—	—	—	—	1902	Braumton, Pa.	G.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	65	—	—	—	—	—	Started to fail 1905	11.00
15.1	WOOD TAR CREOSOTE	—	—	—	—	—	1882	Tapeka, Kas.	A.T.+S.F.	—	—	—	—	—	—	1891	9	80.5	—	—	—	—	—	2.00	
16.1	CREOSOTE - LOWRY	—	—	—	—	—	1902	Phila. & Chester	P. Lines	—	—	—	—	—	—	1914	12	44	Decay	—	5	—	Not complete	20.10	
17.1	CREOSOTE - RUEPING	—	—	—	—	—	1909	Kankakee, Ill.	J.C.	Old Rock	—	90	—	—	—	1915	4	0.49	Broken	Good	—	—	—	Included oak	1.00
18.1	CRUDE OIL - BOILED	—	—	—	—	—	1902	Braumton, Pa.	G.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	0	—	—	—	—	—	Continuous Angle bars	12.00

① All seasoned 30 days after Zinc Treatment or Creosote Treatment
 ② Preliminary Air 75 # per Sq. in. for 0.5 Hours - Max Oil Pressure 175 # per Sq. in. for 2 Hours - Final Vacuum 24 inch for 20 Minutes

CREOSOTE-FLEPPING

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
17.2		Sawn	Air Seasoned	390		5.00	1707	Hutchinson No.	FT+S.F.	Peck						1914	7	0					75.00
17.3		do	do	280		5.00	do	do	do	Clintons		85	do	do	3009 686	do	7	0					75.00
17.4		do	do	132		5.00	do	Pleena No.	do	Peck		90	do	do	709 161	do	7	0					75.00
17.5		do	do	19 497		5.00	1910	Hutchinson of	do	do		90	Screw	48		1915	5	0					75.00

① Preliminary air - 100^o Pressure for 30 min. Creosote at 200^o Pressure for 2 hrs. 30 min at 186^o F. Final vacuum - 23 inch. 1 hr. 30 min
 ② Preliminary air - 100^o Pressure for 30 min. Creosote at 175 Pressure for 3 hrs. at 194^o F. Final vacuum - 23 inch. 2 hr.
 ③ Tons Traffic per annum

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
YULCANIZED																							
19.1		Sawn	Sawed & d. before & after treatment	100			1897	Norfolk Va. Div.	N.S.							1914	9	100			4.5	Started to fail 1899 All out 1906	16.00
19.2		Hewn	do	100			do	do	do							do	8	100			2.83	do 1899 do 1905	do
19.3		Sawn	do	25			do	do	do					Servis		do	12	100			6.72	do 1899 do 1909	do
19.4		Hewn	do	25			do	do	do					do		do	8	100			2.96	do 1899 do 1905	do
ZINC CHLORIDE - BURNETT																							
See ASH - Index No's. 4.3 to 4.7 inclusive																							
20.1				5			1902	Baymont Bx Division	G.C.+S.F.	Sawn	Poor		Cut	None	Heavy	1912	10	33				Started to fail in 1911	11.00
20.2									I.C.												10.12		33.00
21.1				693.324		0.5	1904		G.C.+S.L.							1908	4	0				Includes Oak	1.00
ZINC CREOSOTE																							
ZINC TANNIN - WELL HOUSE																							
22.1		Hewn	Sawed & d. before & after treatment	100	4.22		1897	Norfolk Va. Div.	N.S.					Servis		1914	15	51			13	Started to fail in 1907	16.00
22.2		do	do	25			do	do	do					do		do	15	64			16	do 1907	do
22.3		Sawn	do	100	1.56		do	do	do					do		do	17	77			14	do 1905	do
22.4		do	do	25			do	do	do					do		do	15	100			12	do 1903	do

TABLE II GUM-TUPELO

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
CREOSOTE - FULL CELL																								
1.1				97		10.99	1909	Lines East	C.B.+G.	Ordinary Barrel		75.85		Partly		1914	5	0						5.00
1.2				54		do	do	Lines West	do	do		do		Yes		do	5	0						do
1.3	6'8" x 8"	Sawn	Sawed & d. after treatment	33	29.82	11.21	1905	Bay View and San Leon, Tex.	G.H.+S.A.					Screw		do	9	24.3						7.00
1.4	do	do	do	36	do	do	do	do	do					Glendon		do	9	30.6						do
1.5	do	do	do	44	do	do	do	do	do					None		do	9	38.6						do
1.6	do	do	do	23	35.14	13.21	do	do	do					Screw		do	9	4.3						do
1.7	do	do	do	30	do	do	do	do	do					Glendon		do	9	16.7						do
1.8	do	do	do	35	do	do	do	do	do					None		do	9	28.6						do
UNTREATED																								
2.1				88			1909	Lines East	C.B.+G.	Ordinary Barrel		75.85		Partly		1914	5	97.8						5.00
2.2				47		do	do	Lines West	do	do		do		Yes		do	5	94.2						do
2.3	6'8" x 8"	Sawn	do	13			1905	Bay View and San Leon, Tex.	G.H.+S.A.					Screw		do	9	100			2.6			7.00
2.4	do	do	do	15			do	do	do					Glendon		do	5	100			2.6			do
2.5	do	do	do	14			do	do	do					None		do	5	100			2.3			do
ZINC CHLORIDE - BURNETT																								
3.1				76		0.5	1909	Lines East	C.B.+G.	Ordinary Barrel		75.85		Partly		1914	5	1.32						5.00
3.2				41		do	do	Lines West	do	do		do		Yes		do	5	1.32						do
3.3	6'8" x 8"	Sawn	do	30	0.5955	0.2239	1905	Bay View and San Leon, Tex.	G.H.+S.A.					Screw		do	9	26.6			7.0	Started to fail in 1908	7.00	
3.4	do	do	do	37	do	do	do	do	do					Glendon		do	9	89.2			7.0	do 1910	do	
3.5	do	do	do	46	do	do	do	do	do					None		do	9	91.5			7.0	do 1910	do	
3.6	do	do	do	22	0.6224	0.234	do	do	do					Screw		do	9	100			7.2	do 1910	do	
3.7	do	do	do	33	do	do	do	do	do					Glendon		do	9	90.9			7.9	do 1910	do	
3.8	do	do	do	30	do	do	do	do	do					None		do	9	83.3			8.0	do 1911	do	
ZINC CREOSOTE - CARD																								
4.1				435		0.5 Zinc	1909	Lines East	C.B.+G.	Ordinary Barrel		75.85		Partly		1914	5	1.0						5.00
4.2				237		do	do	Lines West	do	do		do		Yes		do	5	0				2% split and broken	do	
4.3	6'8" x 8"	Sawn	do	12	0.5862 Zinc	0.2329 Zinc	1905	Bay View and San Leon, Tex.	G.H.+S.A.					Screw		do	9	83.3			7.4	Started to fail in 1910	7.00	
4.4	do	do	do	14	do	do	do	do	do					Glendon		do	9	80.0				do 1911	do	
4.5	do	do	do	16	do	do	do	do	do					None		do	9	75.0			7.9	do 1912	do	

0 Average 1/4 estimated by Forest Service
 0 No Steaming

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
HACKBERRY																														
5.1	ZINC CHLORIDE - BURNETT			60			1894	Gillette, Wyo.	C.B.+Q.							1910	16	75		Fair		Ideal Climate	33.00							
6.1	ZINC CREOSOTE - CARD			45		0.5 Zinc 5.00 Crdo.	1911	Utica, Neb.	C.B.+Q.	Burnt Clay	Good	85		None	Heavy	1914	3	0		Fair			5.00							
TABLE 12 HEMLOCK																														
1.1	CREOSOTE - FULL CELL			37		7.87	1909	Lines East	C.B.+Q.	Ordinary Gravel		35-85		Partly		1914	5	0					5.00							
1.2				50			1910	do	do	Gravel		90		All		do	4	0					do							
1.3				17			1911	do	do	do		75		Except		do	3	0					do							
1.4				46			1909	Lines West	do	Ordinary Gravel		85-90		Yes		do	5	0					do							
1.5				32			1910	do	do	Lynns Stone	Very Dry	90		do		do	4	0					do							
1X1	CREOSOTE			400			1880	Marlow, Mass.	K.N.H.+H	Gravel	Good	56	Cut		Main Line	1914	22	100	Rail Cut	20	Not rotten but rail cut, one in use as sign post - Last removed in 1912	3.00								
1X2							1888	Somerset, Mass.	do	do					do	1911		100		20		3.00								
1X3				5000			1872	Chicago, Ill.	C.R.I.+P.	Gravel					Heavy	1882	10	50-70	Railroad	Fair	Not properly treated	2.40								
2.1	CREOSOTE - OPEN TANK			33		14.3	1907	Wausau, Wis.	C.T.N.W.	Gravel	Good	90	Cut	Wahkiakum	Light	1915	8.5	0		62% good	33% Partly decayed	26.00								
3.1	CREOSOTE - SEELEY			25000			1869		C.B.+Q.							1908					15-12	Failure - Dry rot	1.30							
4.1	MERCURIC CHLORIDE - KYAM			100,000			1884		B.T.H.							1908					10-14	Splintered	1.00							
5.1	SALTS (BARSCHALL HASSELMANN)			100			1902	Beaumont, Tex.	G.C.T.S.F.	Sand		60	Cut	None		1910	6	100			3.25	Avg. life estimated by Forest Service 87% out in 1905	11.00							
UNTREATED																														
6.1				85			1909	Lines East	C.B.+Q.	Ordinary Gravel		35-85		Partly		1914	5	84.4					5.00							
6.2				25			1910	do	do	Gravel		90		All		do	4	7.8					do							
6.3				47			1909	Lines West	do	Ordinary Gravel		35-85		Yes		do	5	70.2					do							
6.4				30			1910	do	do	Lynns Stone		90		do		do	4	15					do							
6.5	Cedar Index Nos 1.5 and 1.6			101			1902	Beaumont, Tex.	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1908	2	100					11.00							
6.6	6" x 8" Summerized Soaked			20			1907	Wausau, Wis.	C.T.N.W.	do	do	90	do	do	Light	1915	8.5	90	Decay	Partly decayed	6.5		26.00							
6.7	do do do			20			do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		do							
6.8	do do do			20			do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		do							
6.9	do do do			20			do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		do							
6.10	do do do			20			do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		do							
6.11	do do do			20			do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		do							
6.12	do do do			50			do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		do							
7.1	ZINC CHLORIDE - BURNETT			70.			1909	Lines East	C.B.+Q.	Ordinary Gravel		35-85		Partly		1914	5	14					5.00							
7.2				56			1910	do	do	Gravel		90		All		do	4	0					do							
7.3				43			1909	Lines West	do	Ordinary Gravel		85-90		Yes		do	5	0					do							
7.4				45			1910	do	do	Lynns Stone	Very Dry	90		do		do	4	0					do							
7.5							1836	Vermont	Ver. Cont.							1882	26				Sound	Found on old siding not in use for 20 years	2.40							
7.6				11393			1896	Lines West	Pb System							1905	8	22					1.30							
7.7				713			1898	do	do							do	7	8					1.30							

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
7.8				2048			1899	Western Line	Pb System							1905	6	0					1.30	
7.9				521			1900	do	do							do	5	0					do	
7.10				695			1896	Chicago, Ill.	Pb System							do	9	0					do	
7.11				3499			1897	do	do							do	8	30					do	
7.12				275			1898	do	do							do	7	0					do	
7.13				1000			1899	do	do							do	6	0					do	
7.14				5934		0.22	1888	Evansville, Ill.	C.T.N.W.							1906	18					Started to fail 1908 44% more decayed	11.00	
7.15				100		0.62	1902	Beaumont, Tex.	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	30					1.00	
7.16				2,043,336		0.50	1903	do	C.T.N.W.							1908	5						26.00	
7.17	6" x 8" Hemw. Seasoned			25		0.26	1907	Wausau, Wis.	do	Gravel	Good	90	Cut	Wahkiakum	Light	1914	7.6	16.0	Decay	60% good			5.00	
7.18				8			1909	Tioga, Ill.	C.B.+Q.							do	3	0					2.40	
7.19				2000			1866	Chicago, Ill.	C.R.I.+P.	Fine Gravel						Heavy	1881	15	25	Fair		Some decay on top - sides and center 50% Rail worn 1/2"	do	
7.20							1878	Navasota, Ill.	C.R.I.+P.	Lynns Stone						1883	16-17				Good		do	
8.1	ZINC CREOSOTE - ALLARDYCE			50		0.24 Zinc 5.00 Crdo.	1902	Beaumont, Tex.	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1911	9	100			9	Avg. life estimated by Forest Service	11.00	
ZINC CREOSOTE - CARD																								
9.1				511		0.5 Zinc 5.00 Crdo.	1909	Lines East	C.B.+Q.	Ordinary Gravel		35-85		Partly		1914	5	0					1% split	5.00
9.2				288			1910	do	do	Gravel		90		All		do	4	0					do	
9.3				277			1909	Lines West	do	Ordinary Gravel		35-85		Yes		do	5	0					do	
9.4				210			1910	do	do	Lynns Stone	Very Dry	90		do		do	4	0					do	
9.5				49		0.3 Zinc 5.00 Crdo.	1902	Beaumont, Tex.	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	88			5	Avg. life estimated by Forest Service	11.00	
9.6	1" x 8" x 8" Hemw. Seasoned			107		0.5 Zinc 5.00 Crdo.	1910	Beaumont, Tex.	C.H.T.H.P.	Gravel	Good	75	St. Louis	A.S. Hemlock	Average Heavy	1915	4	0		Good			Includes Hemlock	6.10
9.7	ZINC AND CRUDE OIL			5			1911	Bakers, Ill.	C.B.+Q.	Gravel						1912	1	0						5.00
ZINC TANNIN - WELLHOUSE																								
10.1				1287			1897		S.C.+S.R.R.							1905	8	30					1.30	
10.2				200			1892	Hanna	Pb System	Rock						do	13	100			10.71		29.40	
10.3				21,830			1896	W. Mo. River	C.R.I.+P.	Various						1898	12	68.1	Various		11.8		2.00	
10.4				200			1891	Pittsburg Pa.	Pb System							do	7	0					do	
10.5				72,194			1884-91	Jillmore's	C.R.I.+P.	Poor	Poor					1908	7-12	70				Includes Tamarack	do	
10.6				5641,731		0.50	1886	do	do							do							do	
10.7				152,000		0.30	do	do	U.P.							do							do	
10.8				100		0.54	1902	Beaumont, Tex.	G.C.T.S.F.							1911	8	21					do	
10.9	6" x 8" Hemw. Seasoned			55		0.532	1907	Wausau, Wis.	C.T.N.W.	Gravel	Good	90	St. Louis	A.S. Hemlock	Light	1915	7.5	3.6					Replacement began in 1909	11.00
10.10				40		0.564	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		11.1% Partly decayed	26.00
10.11				41		0.408	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		7.5% do	do
10.12				40		0.464	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		9.8% do	do
10.13				40		0.428	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		7.5% do	do
10.14				37		0.376	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		19.9% do	do
10.15				41		0.340	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		2.19% do	do
10.16				40		0.384	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		10.0% do	do
10.17				24		0.728	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		8.8% do	do
10.18				25		0.60	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		4.0% do	do
10.19				40		0.592	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		5.0% do	do
10.20				47		0.576	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		12.8% do	do
10.21				40		0.468	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		2.5% do	do
10.22				40		0.564	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		15.0% do	do
10.23				40		0.428	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do		7.5% do	do

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
11.24	6'8"x8'	Hewn	Seasoned 15% Gravel	40	—	0.512	1907	Commonly this	C.H.W.	Gravel	Good	90	Cut	Wet Sellers	Light	1915	7.5	0	—	Good	—	5.3% Partly decayed	25.00	
11.25	"	"	" 14% " "	40	—	0.428	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	10.0% " "	"	
11.26	"	"	" 12% " "	40	—	0.452	"	"	"	"	"	"	"	"	"	"	"	5.0	—	"	"	5.0% " "	"	
11.27	"	"	" 11% " "	40	—	0.352	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	10.0% " "	"	
11.28	"	"	" 11% " "	39	—	0.498	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2.5% " "	"	
11.29	"	"	Seasoned 17% Sellers	25	—	0.728	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	4.0% " "	"	
11.30	"	"	" 14% " "	25	—	0.584	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	— " "	"	
11.31	"	"	" 10% " "	40	—	0.512	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7.5% Partly decayed	"	
11.32	"	"	Seasoned 16% Sellers	44	—	0.476	"	"	"	"	"	"	"	"	"	"	"	"	2.0	—	"	16.0% " "	"	
11.33	"	"	Seasoned 17% Sellers	39	—	0.516	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	19.9% " "	"	
11.34	"	"	" 16% " "	41	—	0.556	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	4.4% " "	"	
11.35	"	"	" 15% " "	43	—	0.452	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	— " "	"	
11.36	"	"	" 14% " "	39	—	0.448	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	26.0% Partly decayed	"	
11.37	"	"	" 13% " "	40	—	0.388	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	5.0% " "	"	
11.38	"	"	" 12% " "	40	—	0.376	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	17.5% " "	"	
11.39	"	"	" 11% " "	40	—	0.428	"	"	"	"	"	"	"	"	"	"	"	"	2.5	—	"	2.5% " "	"	
11.40	"	"	" 10% " "	40	—	0.388	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	17.5% " "	"	
11.41	"	"	Seasoned 16% Sellers	25	—	0.564	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	32.0% " "	"	
11.42	"	"	" 13% " "	21	—	0.484	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	4.8% " "	"	
11.43	"	"	" 10% " "	40	—	0.544	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7.5% " "	"	
11.44	"	"	Seasoned 18% Sellers	49	—	0.500	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	8.2% " "	"	
11.45	"	"	Seasoned 15% Sellers	53	—	0.356	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	26.5% " "	"	
11.46	"	"	" 15% " "	51	—	0.356	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	39.2% " "	"	
11.47	"	"	"	51	—	0.436	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	17.6% " "	"	
HEMLOCK - WESTERN																								
12.1	UNTREATED																							
12.2	7'8"x8'	Hewn	Gravel	100	—	—	1907	Haywood, Mont.	N.P.	Gravel	Good	85	Cut	Wet Sellers	Heavy	1915	8.5	100	Decay	Poor	7.30	—	25.00	
TABLE 13 HICKORY-PIGNOT																								
CREOSOTE - FULL CELL																								
1.1	—	—	—	4	—	—	1910	Blanding, Ill.	C.B.+9	Sheldon sand	—	90	—	All	—	1912	2	0	—	—	—	—	5.00	
1.2	—	—	Seasoned 1st after treatment	14	—	—	"	Barr, Colo.	"	Lyon Stone	Very Dry	"	—	"	—	"	2	0	—	—	—	—	"	
1.3	—	—	—	6	—	—	"	Hannover, Ill.	"	Sheldon Sand	—	"	—	"	—	"	2	0	—	—	—	—	"	
UNTREATED																								
2.1	—	—	—	65	—	—	1909	Lines East	"	Ordin. gravel Barr Clay	—	85-85	—	Partly	—	1914	5	53.8	—	—	—	—	"	
2.2	—	—	—	30	—	—	"	" West	"	"	—	"	—	All	—	"	5	70.0	—	—	—	—	"	
2.3	—	—	—	9	—	—	1910	" East	"	Gravel	—	90	—	"	—	"	4	44.0	—	—	—	—	"	
2.4	—	—	—	15	—	—	"	" West	"	Lyon Stone	—	"	—	"	—	"	4	0	—	—	—	9-split-6 Partly rotten and split	"	
ZINC CHLORIDE - BURNETT																								
3.1	—	—	—	4	—	0.5	1910	Blanding Ill.	"	Gravel	—	90	—	All	—	1912	2	0	—	—	—	—	"	
3.2	—	—	Seasoned 1st after treatment	15	—	"	"	Barr, Colo.	"	Lyon Stone	Very Dry	"	—	"	—	"	4	2	0	—	—	—	—	"
3.3	—	—	—	5	—	"	"	Hannover Ill.	"	Gravel	—	"	—	"	—	"	4	2	0	—	—	—	—	"

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ZINC CREOSOTE - CARD																							
4.1	—	—	—	164	—	0.51mc 8.0 Creos.	1909	Lines East	C.B.+0	Ordin. gravel Barr Clay	—	85-85	—	Partly	—	1914	5	1.0	—	—	—	—	5.00
4.2	—	—	—	89	—	"	"	" West	"	"	—	85-90	—	All	—	"	5	0	—	—	—	—	"
4.3	—	—	—	20	—	"	1910	" East	"	Gravel	—	90	—	"	—	"	4	0	—	—	—	—	"
4.4	—	—	—	16	—	"	"	" West	"	Lyon Stone	Very Dry	90	—	"	—	"	4	0	—	—	—	—	"
TABLE 14 JUNIPER																							
CREOSOTE - FULL CELL																							
0.1.1	—	Hewn	Seasoned 10% April 3, 1914 after treatment	25	—	8	1899	Herrick W. Div.	N.P.S.	—	—	—	—	One-half Tropical	—	1914	15	44	—	—	17	Started to fail in 1909 - 2 nd Curve Major part breaks every 4th Trc Started to fail in 1911	16.00
0.1.2	—	"	"	75	—	8	"	"	"	—	—	—	—	"	—	"	4	15	4	—	—	—	"
UNTREATED																							
0.2.1	—	Hewn	Seasoned 13% Sellers	50	—	—	1899	Herrick W. Div.	N.P.S.	—	—	—	—	—	—	1914	—	100	—	—	8.0	Started to fail 1901 About 1908	16.00
0.2.2	—	"	" 14% " "	100	—	—	"	"	"	—	—	—	—	Part	—	"	15	87	—	—	12.9	" 1908	"
0.2.3	—	"	"	100	—	—	"	"	"	—	—	—	—	Lynx traps	—	"	15	78	—	—	13.2	" 1908	"
0.2.4	—	"	"	100	—	—	"	"	"	—	—	—	—	—	—	"	15	77	—	—	13.9	" 1908 This corner failed	"
0.2.5	—	"	"	100	—	—	"	"	"	—	—	—	—	Gold	—	"	15	75	—	—	13.0	Started to fail 1907 1st of 1st Trc Failed - started to rot	"
0.2.6	—	"	"	100	—	—	"	"	"	—	—	—	—	—	—	"	15	73	—	—	13.2	Started to fail 1905 Collet's 2 nd hole at corner	"
0.2.7	—	"	"	120	—	—	"	"	"	—	—	—	—	—	—	"	15	79	—	—	14.0	Started to fail 1907 Collet's 2 nd hole at corner	"
0.2.8	—	"	"	100	—	—	"	"	"	—	—	—	—	—	—	"	15	62	—	—	14.6	at corner slope Started to fail 1905	"
0.2.9	—	"	"	125	—	—	"	"	"	—	—	—	—	Servis	—	"	13	100	—	—	11.3	" 1905 about 1910	"
0.2.10	—	"	"	200	—	—	"	"	"	—	—	—	—	—	—	"	15	81	—	—	12.2	" 1901	"
LARCH																							
ZINC CHLORIDE - IMPREGNATED																							
3.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15-17	—	2.00
LARCH - WESTERN																							
UNTREATED																							
4.1	7'8"x8'	—	Seasoned	27	—	—	1907	Phon, Mont.	N.P.	Gravel	Excellent	85	—	Wet Sellers	—	1915	8.33	100	—	—	6.89	—	25.00
4.2	"	—	Green	26	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	6.89	—	"
4.3	"	—	Seasoned	90	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.15	—	"
4.4	"	—	Green	91	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.15	—	"
4.5	"	—	Seasoned	90	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.55	—	"
4.6	"	—	Green	90	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.52	—	"
4.7	"	—	Seasoned	90	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.33	—	"
4.8	"	—	Green	91	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.36	—	"
4.9	"	—	Seasoned	90	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.42	—	"
4.10	"	—	Green	91	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.26	—	"
4.11	"	—	Seasoned	90	—	—	"	"	"	"	"	"	"	"	—	"	"	98.9	—	—	7.78	—	"
4.12	"	—	Green	92	—	—	"	"	"	"	"	"	"	"	—	"	"	98.9	—	—	7.78	—	"
4.13	"	—	Seasoned	91	—	—	"	"	"	"	"	"	"	"	—	"	"	100	—	—	7.34	—	"

0 Average 1/6 estimated by Forest Service

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ZINC CHLORIDE - BURNETT																							
S.1	7'8" x 8"	None	Seasoned	101	-	0.716	1907	Penn. Marl	H.P.	Gravel	Excess	85	Screw	Flat	None	1914	7.3	0	-	-	-	Perfect condition	25.00
S.2	"	"	"	92	-	"	"	"	"	"	"	"	"	"	"	"	2.7	-	-	-	"	"	"
TABLE 15 - MAPLE																							
CREOSOTE FULL CELL																							
0.1.1	6'8" x 8"	-	Seasoned 8-18 Mo.	50	-	12	1911	Hartford, Ws.	CH&S.P.	Gravel	Good	90	Screw	Flat	Heavy	1914	3	0	-	-	-	14% Partly split	27.00
0.1.2	"	"	"	50	-	"	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	14% "	"
CREOSOTE - RUPPING																							
0.2.1	6'8" x 8"	-	Seasoned 8-18 Mo.	50	-	8.9	"	"	"	"	"	"	Screw	Flat	"	"	3	0	-	-	-	15% Partly Split	"
0.2.2	"	"	"	50	-	"	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	15% "	"
CREOSOL - CALCIUM																							
See ELM Index No 6.1																							
OIL SEMI-REFINED - FULL CELL																							
0.3.1	6'8" x 8"	-	Seasoned 6-18 Mo.	50	-	12.6	1911	Hartford Ws.	CH&S.P.	Gravel	Good	90	Screw	Flat	Heavy	1914	3	0	-	-	-	8% 15% Partly Split	27.00
0.3.2	"	"	"	50	-	"	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	"	"
0.3.3	"	"	"	50	-	0.5	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	"	"
0.3.4	"	"	"	50	-	0.5	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	"	"
3.5	"	"	"	50	-	-	18678	Knock Chalk	CR&S.P.	Rock	-	-	-	-	-	1893	16.7	-	-	-	Good	-	2.40
UNTREATED																							
4.1	6'8" x 8"	-	Not Seasoned	50	-	-	1911	Hartford Ws.	CH&S.P.	Gravel	Good	90	Screw	Flat	Heavy	1914	3	0	-	-	-	92% Partially decayed	29.00
4.2	"	"	"	50	-	-	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	"	"
ZINC CREOSOTE - CARD																							
S.1	7'8" x 9"	-	-	596	-	-	1908	Brimmer, Ma.	"	Burnt Clay	-	85	-	None	-	1914	6	0	-	-	-	2" Curva - Laid in cut	0.00
0.5.2	"	-	Seasoned 6-18 Mo.	50	-	0.5 Zinc	1911	Hartford Ws.	"	Gravel	Good	90	Screw	Flat	Heavy	"	3	0	-	-	-	16% Partly Split	27.00
0.5.3	"	-	"	50	-	"	"	"	"	"	"	90	"	"	"	"	3	0	-	-	-	"	"
ZINC CREOSOTE - TWO MOVEMENT																							
6.1	6'8" x 8"	-	Seasoned 6-18 Mo.	50	-	-	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	2% Partially decayed 8% partly split	"
6.2	"	"	"	50	-	-	"	"	"	"	"	"	"	"	"	"	3	0	-	-	-	"	"
ZINC TANNIN - WELL HOUSE																							
See ASH Index No 6.1																							

0 - Max Pressure 175 lbs per sq in - Max Temperature 180°F Time 2.5 Hours Final Vacuum 26 inch Time 15 Minutes.
 1 - Prelim Pressure 90 lbs per sq in for 30 Min - Max Pressure 140 lbs per sq in at 180°F for 3.83 Hours - Final Vacuum 26 inch for 15 Minutes.
 2 - Max Pressure 175 lbs per sq in at 180°F for 3.6 Hours - Final Vacuum 20 inch for 15 Minutes.
 3 - Prelim Vacuum 26" for 30 Minutes - Max Pressure 200 lbs per sq in at 160°F for 3.14 Hours.
 4 - Prelim Vacuum 26 inch for 1 hour - Max Pressure 175 lbs per sq in at 190°F for 4.8 Hours - Final Vacuum 26 inch for 30 Minutes.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
TABLE 16 - MAPLE HARD																							
CREOSOTE - FULL CELL																							
1.1	-	-	-	30	-	5.92	1909	Lines East	C.B. & Q.	Badgers Gravel	-	75-85	-	Partly	-	1914	5	0	-	-	-	-	5.00
1.2	-	-	-	18	-	"	"	do West	"	"	"	85-90	-	Yes	-	"	5	0	-	-	-	-	"
1.3	-	-	-	30	-	"	1910	do East	"	Gravel	-	90	-	All	-	"	4	0	-	-	-	-	"
1.4	-	-	-	15	-	"	"	do West	"	Lyons Stone	Very Dry	90	-	Yes	-	"	4	0	-	-	-	-	"
1.5	-	-	-	15	-	"	1911	do East	"	Gravel	-	75	-	Except under joints	-	"	4	0	-	-	-	-	"
UNTREATED																							
2.1	-	-	-	31	-	-	1909	do East	"	Badgers Gravel	-	75-85	-	Partly	-	"	5	90.0	-	-	-	-	"
2.2	-	-	-	30	-	"	"	do West	"	"	"	85-90	-	Yes	-	"	5	86.6	-	-	-	-	"
2.3	-	-	-	24	-	"	1910	do East	"	Gravel	-	90	-	All	-	"	4	80.0	-	-	-	-	"
2.4	-	-	-	15	-	"	"	do West	"	Lyons Stone	Very Dry	90	-	Yes	-	"	4	20.0	-	-	-	-	"
ZINC CHLORIDE - BURNETT																							
3.1	-	-	-	30	-	0.5	1910	Hanover, Ill.	"	Shendon Brand	-	90	-	All	-	1912	2	0	-	-	-	7% split	"
3.2	-	-	-	20	-	"	"	do East	"	"	-	90	-	"	-	"	2	0	-	-	-	-	"
3.3	-	-	-	15	-	"	"	do East, Colo.	"	Lyons Stone	Very Dry	90	-	Yes	-	"	2	0	-	-	-	-	"
ZINC CREOSOTE - CARD																							
4.1	-	-	-	386	-	0.5 Zinc	1909	Lines East	"	Badgers Gravel	-	75-85	-	Partly	-	1914	5	0.5	-	-	-	-	"
4.2	-	-	-	207	-	"	"	do West	"	"	"	85-90	-	Yes	-	"	5	0	-	-	-	-	"
4.3	-	-	-	175	-	"	1910	do East	"	Gravel	-	90	-	All	-	"	4	0	-	-	-	-	"
4.4	-	-	-	65	-	"	"	do West	"	Lyons Stone	-	90	-	Yes	-	"	4	0	-	-	-	-	"
4.5	-	-	-	540	-	"	1911	Union, Neb.	"	Burnt Clay	Good	85	-	"	Plenty	"	4	3	0	-	-	-	In perfect condition
4.6	7'8" x 9"	Seasoned	Seasoned 8 Mo.	596	-	0.5 Zinc	1908	Brimmer, Ma.	CH&S.P.	Burnt Bumbo	Fair	85	Cut	None	Heavy	1915	7	0	-	-	Good	2" Curva - appear to be good for 4-7 yrs more	6.00
TABLE 17 - MAPLE SOFT																							
CREOSOTE - FULL CELL																							
1.1	-	-	-	38	-	17.80	1909	Lines East	C.B. & Q.	Badgers Gravel	-	75-85	-	Partly	-	1914	5	0	-	-	-	-	5.00
1.2	-	-	-	48	-	"	"	do West	"	"	"	85-90	-	All	-	"	5	0	-	-	-	-	"
1.3	-	-	-	30	-	"	1910	do East	"	Gravel	-	90	-	"	-	"	4	0	-	-	-	-	"
1.4	-	-	-	15	-	"	"	do West	"	Lyons Stone	-	90	-	"	-	"	4	0	-	-	-	-	"
CRUDE OIL																							
2.1	-	-	-	4	-	-	1911	Badgers, Ill.	"	Gravel	-	75	-	No Proof under joints	-	"	3	0	-	-	-	-	"
UNTREATED																							
3.1	-	-	-	57	-	-	1909	Lines East	"	Badgers Gravel	-	75-85	-	Partly	-	"	5	97.0	-	-	-	-	"
3.2	-	-	-	28	-	"	"	do West	"	"	"	"	-	All	-	"	5	93.0	-	-	-	-	"
3.3	-	-	-	25	-	"	1910	do East	"	Gravel	-	90	-	"	-	"	4	76.0	-	-	-	-	"
3.4	-	-	-	14	-	"	"	do West	"	Lyons Stone	-	90	-	"	-	"	4	100	-	-	-	-	"
ZINC CHLORIDE - BURNETT																							
4.1	-	-	-	75	-	0.5	1909	do East	"	Badgers Gravel	-	75-85	-	Partly	-	"	5	3	Split	-	-	-	"
4.2	-	-	-	41	-	"	"	do West	"	Badgers Gravel	-	85-90	-	All	-	"	5	2	Hot	-	-	-	14% split
4.3	-	-	-	50	-	"	1910	do East	"	Gravel	-	90	-	"	-	"	4	0	-	-	-	-	2% decayed
4.4	-	-	-	15	-	"	"	do West	"	Lyons Stone	-	90	-	"	-	"	4	0	-	-	-	-	"
ZINC CREOSOTE - CARD																							
5.1	-	-	-	383	-	0.5 Zinc	1909	do East	"	Badgers Gravel	-	75-85	-	Partly	-	"	5	0	-	-	-	-	21% split
5.2	-	-	-	202	-	"	"	do West	"	"	"	85-90	-	All	-	"	5	0	-	-	-	-	4% split 1% Burned
5.3	-	-	-	75	-	"	1910	do East	"	Gravel	-	90	-	"	-	"	4	0	-	-	-	-	3% Decayed
5.4	-	-	-	61	-	"	"	do West	"	Lyons Stone	-	90	-	"	-	"	4	0	-	-	-	-	"

50

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
TABLE 18 OAK																								
1.1	CREOSOTE							France																10.10
1.2				General Treatment				Belgium	Belgian R.R.							1895						25	Used 10-12 Yrs on main line than on Spaten Tracks	29.20
1.3				15.4				Germany	Union Rys			105	100	Yes	Heavy							24		13.00
1.4				67678			1854									1880						19.6		29.70
1.5					24.3											1896						28		13.00
1.6						8-12	1886		High Valley							1908	22						Includes Pine - More than doubled life	1.00
2.1	CREOSOTE - BETHEL							France	South Ry															
2.2	SILVIA 8.5					9.5																		
2.3				Reynolds 242,050	11-13																	13-15		2.20
2.4				460,000	12																	15-20	Decay & split	
2.5				700,000	10-11																	15	Decay	
2.6																						12	Decay & cutting	
2.7	CREOSOTE - LOWRY																							
2.8	Gum - Index No. 76.1					2.5 Gal. 3.5 Gal. 3.0 Gal.		1905	Mich. Div. Alfred Pa. Baltimore, Md.	Big River D.L.V.W. do	Stone	Good	105	101	Screw	DLW		1914	9			10	Have removed an amount of rot which crushed by derailment	43.00
3.1	MERCURIC CHLORIDE - KYAN																							do
3.1	UNTREATED							1840		C.T.O.														
Sec CHESTNUT Index No. 3.3-3.5																								
4.1				201600			1910	OHIO	B.T.O.															
4.2				8605			1903		Eric															
4.3				694,300			1902	ONIA	RSY															
4.4				118,400			1906	La. & Ark.	Mo.P.															
4.5				646,631			1897	Mass. & Ala.	W.T.O.															
4.6				1,334,215					Germany	12 R.R.s.														
4.7				167,000			1893		Altoona															
4.8				180,204			1896		do	do														
4.9				140,108					do	do														
4.10				565,261			1845		do	do														
4.11				615,968					do	do														
4.12									France															
4.13				7 1/2 x 8 1/2																				
5.1	ZINC CHLORIDE					17.6		Switzerland	A.R.R.															
5.2				6 1/2 x 10 1/2					Germany															
5.3				168,690			1854		do	do														
5.4				18,600					do	do														
ZINC CHLORIDE - BURNETT																								
Sec BEECH Index No. 11.6																								
6.1				6 1/2 x 10 1/2	24.2			Germany	Union RR															
ZINC CREOSOTE																								
Sec GUM Index No. 21.1																								
7.1				6 1/2 x 10 1/2				Germany & Austrian Ry.																
OAK - BLACK																								
8.1	SALTS - BARSCHALL HASSELMANN					118		1902	Baumton, Pa.	G.C.Y.S.F.	Sand	Poor	60	Cut	None	Heavy	1908	.6	100			384	Started to fail 1905 88% re- moved in 1905	11.00
Q-Average life estimated by Forest Service																								

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1.1	TREATED - PROCESS NOT KNOWN							1904	Illinois	C.B.T.Q.														
UNTREATED																								
10.1				40885	25			1902	Baumton, Pa.	G.C.Y.S.F.	Sand	Poor	60	Cut	None	Heavy	1908	6	100			46	Started to fail 1905 82% out by 1907	11.00
ZINC CHLORIDE - BURNETT																								
11.1					34		0.35		do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
ZINC CREOSOTE																								
12.1					76				do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
ZINC CREOSOTE - ALLARDYCE																								
13.1					60			0.20 Zinc 30 Creos.	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
ZINC TANNIN - WELLHOUSE																								
14.1					96		0.33		do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
14.2					33		0.33		do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
14.3					11,816			1899		C.T.E.I.														
14.4					221,568			1900		do														
14.5					172,477			1901		do														
14.6					194,430			1902		do														
14.7					92,317			1903		do														
14.8					181,426			1904		do														
14.9					363,409			1905		do														
14.10					448,113			1906		do														
14.11					146,329			1907		do														
OAK - CHESTNUT																								
15.1	UNTREATED							1904	Indiana Ind.	B.V.O.S.W.														
WOOD TAR CREOSOTE - DIPPED 1 HOUR																								
16.1					1			1894	Altoona Pa.	Pa. Spaten														
OAK - DANISH																								
17.1				3500				1898	Denmark	Witterdal														
OAK - MIXED																								
18.1				3800	30-40			1910	Woodslee, Ohio	Pa. Spaten														
TABLE 19 OAK PIN																								
CREOSOTE - FULL CELL																								
1.1				164		6.17	1909	Lines East	C.B.T.Q.	Doyle's Special Barn's Clay														
1.2				24			1910	do do	do	Gravel														
1.3				3			1911	do do	do	do														
1.4				87			1909	do West	do	Doyle's Special Barn's Clay														
1.5				45			1910	do do	do	Lyns Stone	Very Dry													
UNTREATED																								
2.1				54			1909	Lines East	C.B.T.Q.	Doyle's Special Barn's Clay														
2.2				30			do	do West	do	do														
2.3				24			1910	do East	do	Gravel														
2.4				15			do	do West	do	Lyns Stone	Very Dry													

Q Average life estimated by Forest Service
 O includes Red Oak - Number given is number treated for the year given and not the number of ties placed in track
 Percentages are based on number of ties treated.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
3.1	WOOD TAR CREOSOTE			18			1902	Ohio v. Chester	Pa. Sp. Br.						1914		100		200			Record not complete	20.10	
4.1	ZINC CHLORIDE - BURNETT			15			1910	Haver, Ill.	C.B.T.Q.	Sheldon Gravel		90	All		1912	2	0						5.00	
4.2				9			1910	Blondy, Ill.				90	Yes			2	0							5.00
4.3				45			1910	Barre, Colo.		Lyons Stone		90	Yes			2	0							5.00
5.1	ZINC CREOSOTE - CARD			385			1909	Lines East		Gravel		85-90	Partly		1914	5	0							4.00
5.2				201			1910	do		Gravel		90	All		1914	5	0					1% split	4.00	
5.3				126			1910	do		Gravel		90	All		1914	5	0						4.00	
5.4				120			1910	do		Lyons Stone		90	All		1914	5	0						4.00	
6.1	CREOSOTE 7'x9'x8'			50			1910	Birmingham	Q.C.	Slag		75	None		1912	2	0						3.10	
7.1	UNTREATED			50			1910	Alabama	I.C.T.						1914	4	0					4% results yet, 24% decayed measured with oak	21.00	
TABLE 20 OAK-RED																								
1.1	CREOSOTE			200			1910	Texas	Sh.L.S.W						1914	4	0					Seasoned 10 mo after treatment	30.10	
1.2	7'x8'x8'			3789	3.5 Gal		1907	Sci.Ohio	Pa.Sy.Br.						1912	5	0					Max Pressure 175 # per sq. in Max Temp. 160°F for 4 1/2 hours	20.00	
1.3	7'x9'x8'	Seasoned Hewn	Seasoned	372	4		1911	Windsor, Ohio	B+O	Gravel	Good	90	Cut	Shoulder Hoops	1915	4	0						4.10	
2.1	CREOSOTE - FULL CELL			60			1910	Lines West	C.B.T.Q.	Lyons Stone	Very Dry	90	Yes		1914	5	0						5.00	
2.2				60			1909	do		Gravel		85-90	Yes			4	0						4.00	
2.3				97			1908	Lines East		Gravel		90	On Curves			6	0						4.00	
2.4				108			1909	do		Gravel		90	On Curves			6	0						4.00	
2.5				58			1910	do		Gravel		90	Partly			5	1.8					Split	4.00	
2.6				25			1911	do		Gravel		75	All			4	0					1 split - 1 decayed	4.00	
2.7	7'x9'x8'			82			1910	Enley, Ala.	T.C.T. Co.							4	9						4.00	
3.1	6'x8'x8'	Hewn		50			1911	Hartford, Wis.	C.M.T.S.P.	Gravel	Good	90	Swamp	Yes	Heavy	1914	3	0				2% Partly decayed	21.00	
3.2				52			1911	do		Gravel	Good	90	Swamp	Yes	Heavy	1914	3	0				5.6% Partly Split	27.00	
3.3				99			1909	Taylorville Ind.	I.C.T.S.			65	Light			5	0						25.00	
3.4				53			1910	do		Gravel		65	Light			5	0						15% Partly Split + Decay	25.00
3.5				430			1910	do		Gravel		65	Light			5	0						15% Partly Split + Decay	25.00
3.6	CREOSOTE - GIUSSANI			7			1905	Dumont, Tex.	B.C.T.S.F.	Sand		60	Cut	None	Heavy	1911	6	0					11.00	
3.7	CREOSOTE - LOW PRESSURE			7			1910	Dumont, Tex.	B.C.T.S.F.	Sand		60	Cut	None	Heavy	1914	9	0					3.00	
4.1	7'x9'x8'	Seasoned Hewn	Seasoned	104			1910	Alabama	I.C.T. REG.													No results yet	21.00	
4.2				65	4.24 Gal		1910	Dover, N.J.	Partly Seasoned														22.00	
5.1	CREOSOTE AND CRUDE OIL			5			1911	Bakers, Ill.	C.B.T.Q.	Gravel		75	Swamp		1912	1	0						5.00	
6.1	CREOSOTE AND CRUDE ASPHALTIC OIL			167			1909	Taylorville Ind.	I.C.T.S.	Gravel	Fair	65	Cut	None	Light	1911	2	0					13.3% split. Absorption not accurate	23.00

① Max Pressure of 175 # per sq. in. at 180°F for 48 hours - Final Vacuum 26 inch for 30 minutes
 ② Preliminary Temperature 225°F for 4 hours - Max Pressure 45.5 # per sq. in. at 170°F for 4 hours
 ③ " " " 3 hours - " 38.5 " " 175°F for 3 hours
 ④ " " " 233°F for 18 hours - " 37.0 " " 185°F for 15 1/2 hours
 ⑤ Preliminary Vacuum of 20 inch for 1 hour - Max Pressure 16 # per sq. in. at 208°F for 10 hours - Final Vacuum 10 inch for 30 minutes
 ⑥ Preliminary Temperature 224°F for 1 hour - Max Pressure 20 # per sq. in. for 3 hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
0.71	6'x8'x8'	Hewn	Seasoned	88	16.4		1906	St. Clair, Mo.	Sh.L.S.F.	Gravel	Good	90	Cut	None	Heavy	1914	8	0				Nails changed 1909	20.00	
0.72				214	15.2		1910	do		Gravel		90	Cut	None	Heavy	1914	8	0					4.00	
0.73				67	9.53		1910	do		Gravel		90	Cut	None	Heavy	1914	8	0					4.00	
0.74				176	12.4		1910	do		Gravel		90	Cut	None	Heavy	1914	8	0					4.00	
0.75				84	9.43		1910	do		Gravel		90	Cut	None	Heavy	1912	6	0					4.00	
0.76				108	9.22		1910	do		Gravel		90	Cut	None	Heavy	1914	6	0					4.00	
0.77				274			1910	Birmingham, Ill.	I.C.	Old Gravel		75	Cut	None	Heavy	1913	3	0					4.00	
0.78				274			1909	Fulton, Mo.		Gravel		90	Cut	None	Heavy	1914	4	0					4.00	
0.79				274			1910	Lula, Miss.		New Gravel		75	Cut	None	Heavy	1914	4	0					4.00	
0.710				274			1910	Greenville, Mo.		Dirt		75	Cut	None	Heavy	1914	4	0					4.00	
0.711				274			1909	Waukegan, Ill.		Old Gravel		90	Cut	None	Heavy	1914	4	0					4.00	
0.712				50			1911	Hartford, Wis.	C.M.T.S.P.	Gravel	Good	90	Cut	None	Heavy	1914	3	0					2% decayed 8% split	27.00
0.713				50			1911	do		Gravel	Good	90	Cut	None	Heavy	1914	3	0					4.00	
7.14				15			1911	Bakers, Ill.	C.B.T.Q.	Gravel		75	Cut	None	Heavy	1912	1	0					5.00	
8.1	LIQUID, J.M. LONGS			50			1910	Greenville, Mo.	I.C.	Dirt		75	Cut	None	Heavy	1913	3	0					12.00	
9.1	OIL, CRUDE			3			1911	Bakers, Ill.	C.B.T.Q.	Gravel		75	Cut	None	Heavy	1912	1	0					5.00	
10.1	OIL, CRUDE ASPHALTIC			172			1909	Taylorville Ind.	I.C.T.S.	Gravel	Fair	65	Cut	None	Light	1914	5	0					13.8% split. Absorption not accurate	23.00
11.1	OIL, FUEL - LOW PRESSURE			331	3.05 Gal		1910	Dover, N.J.	Partly Seasoned													No results yet	22.00	
12.1	OIL, SEMI REFINED - FULL CELL			50			1911	Hartford, Wis.	C.M.T.S.P.	Gravel	Good	90	Cut	None	Heavy	1914	3	0					4% Partly decayed + split	27.00
12.2				50			1911	do		Gravel	Good	90	Cut	None	Heavy	1914	3	0					4.00	
13.1	PRESERVED DIAMOND WOOD			500	0.52 Gal	0.15 Gal	1907	El Paso	G.H.T.S.A.	Slag													Time of treatment 13 min.	7.00
14.1	SALTS, BARSCHALL HASSELMAN			19			1902	Dumont, Tex.	B.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1908	6	100			3.89	App. 4.1% estimated by Forest Service started to rot in 1909, removed 1905	11.00	
15.1	TIMBER ASPHALT			1011	175-542		1911	Windsor, Ohio	B+O	Gravel	Good	90	Cut	Shoulder Hoops	1915	4	0					Open tank Max. Temp. 208°F 10 1/2 hours	30.00	
16.1	UNTREATED			50			1908	Lines East	C.B.T.Q.	Gravel		90	On Curves		1914	6	92						4.00	
16.2				108			1909	do		Gravel		85-90	Partly			5	69						4.00	
16.3				25			1910	do		Gravel		90	Full			4	3.9						4.00	
16.4				59			1909	Lines West		Gravel		85-90	Yes			5	71.4						4.00	
16.5				15			1910	do		Gravel		90	do			4	0						4.00	
16.6				51800			1903	Tennessee	I.C.							1910	7	3.5					1.10	
16.7				22400			1905	do								1910	5	11.0					1.10	
16.8	6'x8'x8'	Hewn		100			1911	Hartford, Wis.	C.M.T.S.P.	Gravel	Good	90	Cut	None	Heavy	1914	3	0					55% Partly decayed 9% Part split	27.00
16.9				50			1911	do		Gravel	Good	90	Cut	None	Heavy	1914	3	0					4.00	
16.10				50			1911	do		Gravel	Good	90	Cut	None	Heavy	1914	3	0					4.00	
16.11				38400			1909	Tennessee	I.C.							1910	6	11.0					1.10	
16.12				48000			1903	do								1910	7	2.4					4.00	
16.13				93			1902	Dumont, Tex.	B.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1911	9	100			4		4% life estimated by Forest Service started to rot in 1909, removed 1905	11.00

See CYPRESS Index No. 4, 38
 ① Preliminary Pressure 80 # per sq. in. for 30 minutes - Max. Press. 180 # per sq. in. at 175°F for 2 hours 10 minutes - Final Vacuum 26 inch for 1 hour 30 minutes
 ② Preliminary Temperature 225°F for 12 hours - Max. Pressure 45.5 # per sq. in. at 170°F for 4 hours - Final Vacuum 26 inch for 30 minutes
 ③ Preliminary Temperature 224°F for 1 hour - Max. Pressure 16 # per sq. in. at 208°F for 10 hours - Final Vacuum 10 inch for 30 minutes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
WOOD TAR CREOSOTE																								
17.1				250			1895	Harrisburg, Pa. Pa. System								1904	100		slightest decay			3.0	Includes black oak	20.10
17.2				16			1896	Baltimore, Md.														4.0		
17.3				27																		6.8		
17.4				55																		5.3		
17.5				180			1895	Camden, N.J.														4.0		
WOOD TAR CREOSOTE - DIPPED																								
18.1				250			1895	N.Y. Phila.														5.7		
18.2				250																		4.5		
18.3				297			1896	Camden, N.J.														5.3		
18.4				391																		5.5		
18.5				2910																		6.4		
ZINC CHLORIDE - BOILED																								
19.1				3			1902	Brownwood, Tex. G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy									No record after 1909	11.00
ZINC CHLORIDE - BURNETT																								
20.1				109		0.5	1909	Lanes East C.B.T.P.	Oyster Shell Burnt Clay		75-85		Partly			5	4.6		Decay					5.00
20.2				56							85-90		Yes											
20.3				47							90		All											
20.4				20							75		Except											
20.5				60							90		Yes											
20.6				550			1900	Myrtle S.D.	Lyons Stone	Poor	75		All			Heavy		14	13.0		Rat	Good	8% will live 15 yrs - Most of logs removed and under ballast rail changed - 3% grade 12 curves	35.00
20.7				550		0.333												1910	10					3.00
20.8				35120			1904	Jackson, Ill.								Heavy		1914	8	5.0		Rail wear	Fair	
20.9				185,803			1905	Fulton, Tenn.	J.C.									1909	4-6	7.5				
20.10				400			1903	Dubuque, Ia.											6					
20.11				6412x			1906	Louisiana											3					
20.12				5309			1901												4					
20.13				4000			1904	Mississippi											5	0.05				1.30
20.14				7000			1904												5	1.0				12.20
20.15				432			1904												5	4.0				
20.16				30000			1904	Tennessee										2-5	1.0					
20.17				3000			1903												6					
20.18				121,383															6	1.0				
20.19				38,400			1904												6	3.4				
20.20				26021			1905												4	1.1				
20.21				19008			1904	Omaha, Neb.											5					
20.22				20000			1903	Dubuque, Ia.											6	0.1				
20.23				200,000			1903	Chicago											5-6	0.01				
20.24																								
20.25				275		0.5	1909	Waukegan, Ill.	Gravel		90		1 Triangular			1913	4	0			10-12	Good	Continuous angle bars	33.00
20.26				274				Fulton Ky.			90							4	0					12.00
20.27				274			1910	Greenville, N.C.	Dirt		75							3	0					
20.28			Seasoned	274				Olancho, Ill.	Rock		75		2 Triangular					3	0					Weber joints
20.29				274			1909	Lula, Miss.	Gravel		75							3	0					Weber angle bars
20.30				6412x			1904	Omaha, Neb.			90							4						2 1/2" Tapered bars
20.31				3080		0.52	1903	Gibbs, Tenn.	Rock		85		None				1911	5						Sampled by Disinfectant
20.32								North end West Line										94.0	11		10.7		50% of 1910 removals were good for 1 year more	12.10
																					85-95			

© Preliminary Steamy 20# per sq. in. for 3 hours - Preliminary Vacuum 5.24 inch for 1 hour - Max. Pressure 100# per sq. in. for 1.5 hours.
 © Steamed at 20# per sq. in. for 4 hours - Vacuum 1 hour - 10% wgt. ELM, ASH and LARCH.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
20.33				135			1897	Pittsburg, Mo. Pa. System								1915	8	26						
20.34	6"x8"x8'	Heavn	Seasoned	176		0.5	1911	Madison, Wis. C.M.T.S.P.	Gravel	Good	75	Cut	None	Average		1915	4	0						1.30
20.35				50				Hartford, Wis.		Good	90	Screw	Flat Plate	Heavy		1914	3	0						6.00
20.36				50							90						3	0						1% partly decayed - 6% split
20.37				209							90						3	0						
20.38				53							90						3	0						8.8 partly decayed - 3% split
20.39		Heavn	Seasoned	300			1908	Minneapolis, S.D.			85			None			6	0.18						
20.40				7084			1907	Iron-Dakota																None removed previous to 1913
20.41		Sawed	Seasoned	25			1899	Portfolk, Va. No S.									10	100						6.10
20.42				86			1912	Brownwood, Tex. G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy		1911	9.5	28.0						Started to fail 1899
20.43				20		0.35					60						1909	7.5	100					Started to fail 1909
20.44				2														10	50					
20.45							0.513	1903	Wabasha, Minn.									5						
20.46				283,574																				5-6
20.47				10			1905	Tempe, Ariz. Mex. Cent.										9	90					Decay
ZINC CREOSOTE - CARD																								
21.1				595		0.52 zinc	1909	Lanes East C.B.T.P.	Oyster Shell Burnt Clay		75-85		Partly			1914	5	1.0						split
21.2				102			1908				90		Occasional											
21.3				220			1910				90		All											
21.4				110							75		Except											
21.5				292							85-90		Yes											
21.6				211			1910	Lanes West	Oyster Shell Burnt Clay		90													
21.7	7"x8"x8'	Sawed	Seasoned	1237	5.5 zinc	0.52 zinc	1911	Waukegan, Ill. B.T.	Gravel	Good	90	Cut	Shredded	Range	Very Heavy	1915	4	0						2% split
ZINC CREOSOTE - LOW PRESSURE																								
22.1	6"x8"x8'	Heavn	All Seasoned	198		zinc	1909	Waukegan, Ill. I.C.T.S.	Gravel	Fair	65	Cut	None	Light		1914	5							Started
22.2				50		0.15	1911	Hartford, Wis. C.M.T.S.P.		Good	90	Screw	Flat Plate	Heavy		1914	3							
22.3				50							90	Cut	None											4% decayed 12% split
22.4	7"x8"x8'			250			1906	Louisiana S.H.T.S.A.			80		Q.T.W.				8	1.6						Slight decay
ZINC TANNIN - WELLHOUSE																								
See	BLAC OAK	Index No. 15.1 7.15.9 1001																						
23.1				48			1902	Jopoka, Mo. A.T.S.F.										9	39.6					
23.2				20		0.33	1902	Brownwood, Tex. G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy		1909	7	100						Started to fail 1909
TABLE 21 OAK-SPANISH																								
SALTS, BARSCHALL HASSELMANN																								
4.1				20			1902	Brownwood, Tex. G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy		1908	6	100				5		Am. life, estimated by present service started to fail 1905
UNTREATED																								
2.1				20							60													
ZINC CREOSOTE - ALLARDICE																								
3.1				10		0.24 zinc					60													
ZINC TANNIN - WELLHOUSE																								
4.1				20		0.33					60													

© - Max. Pressure 200# per sq. in. at 160°F for 4.38 hours
 © - Preliminary Inters 2.2 inch before zinc treatment and 4.5 inch before Creosote treatment - Time 65 minutes - Max. Temperature 153°F - 160°F for 4 hours 20 minutes and 9 hours
 © - Max. Pressure 45# per sq. in. - Max. Temperature for Creosote 212°F for Zinc 125°F - Time Creosote 60 minutes
 © - " 175 " " 212 " " 180 " " 30 " " for zinc 4 hours.

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Table with 24 columns and multiple rows. Rows are grouped by wood type: OAK-SWEDISH, OAK-TURKEY, OAK-WATER, OAK-MISSISSIPPI WHITE, OAK-TENNESSEE WHITE, and TABLE 22 OAK-WHITE. Each row contains data such as treatment type, weight, year, location, and failure notes.

0 Avg. Lfe estimated by Forest Service

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Table with 24 columns and multiple rows. Rows contain data for various wood types including Cypress, Post Oak, Wood Tar Creosote, and Wood Tar Creosote-Dipped. Columns include treatment details, weight, year, location, and failure notes.

0 Avg. Lfe estimated by Forest Service

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
WOOD TAR CREOSOTE - DIPPED COLD																								
6.1				70			1895	NK & Phila	Pa System							1894		100	Decay		5.5		20.10	
WOOD TAR CREOSOTE - DIPPED HOT																								
7.1				308			1896-7	do	do							do		100	do		4.0		do	
7.2				600			do	Danvers Treat	do							do		100	do		5.5		do	
7.3				86			1897	do	do							do		100	Wear out				do	
WOOD TAR CREOSOTE - BRUSH																								
8.1				551			1894-5	do	do							do		100	Decay		5.8		do	
8.2				204			1897	Baltimore, Md.	do							do		100	Wear out		9.0		do	
8.3				386			do	do	do							do		100	Decay		8.0		do	
8.4				597			1897-8	do	do							do		100	do		9.0		do	
8.5				72			1898	do	do							do		100	do		9.0		do	
8.6				541			1897-8	do	do							do		100	do		9.5		do	
8.7				232			1898	do	do							do		100	do		10.0		do	
ZINC CHLORIDE - BURNETT																								
9.1				15		0.5	1902-10	Hannover Ill	C.O.P.F.	Sheridan Canal		90		All		1917-12	2	0					5.00	
9.2				10		do	185-10	Blanding Ill	do	do		90		do		do	2	0					do	
9.3				15		do	189-10	Barro Colo	do	Lyons Stone		90		do		1919-12	2	0					do	
9.4				181		0.25	1912	Beaumont Tex	G.C.P.S.F.	Sand	Poor	80	Cut	None	Heavy	1912	10	64				Started to fail 1911	11.00	
9.5				100		0.35	do	do	do	do	do	60	do	do	do	1919	7.3	100				18% failed 1908	do	
				100			1902-10	do	do	do	do	60	do	do	do	1912	10	71				Started to fail 1908	do	
10.1				100			1902-10	do	do	do	do	60	do	do	do	1912	10	71				Started to fail 1908	do	
10.11				107			1902-10	do	do	do	do	60	do	do	do	1905	3.5	100				do	1903	do
ZINC CREOSOTE - ALLARDICE																								
12.1				162			1909	Lines East	C.O.P.F.	Charters Royal		95-95		Partly		1914	5	3.1	Shaly split				5.00	
12.2				376			1908	do	do	do	do	90		All		do	6	0					do	
12.3				75			1910	do	do	do	do	90		do		do	4	0					do	
12.4				92			1909	do	West	do	do	85-90		do		do	5	0					do	
12.5				60			1910	do	do	do	do	90		do		do	4	0					do	
ZINC TANNIN - WELLHOUSE																								
13.1				100		0.35	1902	Beaumont Tex	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	5				Started to fail 1908	11.00	
13.2				180		0.33	do	do	do	do	do	60	do	do	do	do	10	92				do	do	
SALTS - BARSCHALL HASSELMANN																								
14.1				20			1901	Beaumont Tex	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1906	4.5	100				Started to fail 1905 85% removed 1905	11.00	
UNTREATED																								
15.1				20			do	do	do	do	do	do	do	do	do	do	4.5	100				do	75% do	do
ZINC CHLORIDE - BURNETT																								
16.1				20		0.35	do	do	do	do	do	do	do	do	do	1909	7.5	100				Started to fail 1909	do	
ZINC CREOSOTE - ALLARDICE																								
17.1				10			1911	do	do	do	do	do	do	do	do	1911	9	100					do	
17.2				11			1905	do	do	do	do	do	do	do	do	1905	3.5	100				Started to fail 1905	do	
ZINC TANNIN - WELLHOUSE																								
18.1				20		0.33	do	do	do	do	do	do	do	do	do	1911	8	100				Started to fail 1908 40% removed 1908	do	
18.2	7"4" x 8"			35			1910	Enoch, Ala.	T.C.P.T.C.							1914	4	20				89% Partially decayed	21.00	

© Average life estimated by Forest Service

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
TABLE 22a - OHIA																							
UNTREATED																							
1.1		Sawn	As received	108			1910	Hickman city	G.C.P.S.F.	Rock		90	Screen	1/2 x 1/8		1915	5	0					4500
1.2		Round	do	132			1910	do	G.C.P.S.F.	do		90	do	7/8 x 1/8		1915	5	0					4500

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
TABLE 23 PINE																									
1.1	CARBOLINEUM			10			1905	Tempco Branch	Max. Cent.						Bank Line	1914	9	90	Decay		Ally ¹		3.00		
2.1	CARBOLINEUM-AVENARIUS			84			1905	Document 726	S.C. + S.F.	Sand	Pool	60	Cut	None	Heavy	1909	4	91.7				started to fail 1906	11.00		
3.1	COPPER SULPHATE																								
3.1	COPPER SULPHATE-STEERING			284511																					
4.1	COPPER SULPHATE-STEERING			32348			1882-3	Germany	Aachen							1864	11	52				Decay-Wear	8-10	2.20	
5.1	CREOSOTE						12	1904		K.S. Ry							1908	4				8-10	No results yet - The removed marks were made before - Wood of Treatment - 1899	1.00	
5.2				16000				1907		Fl. E. Cent.							1	0						1.00	
5.3				17				1905	Tempco Branch	Max. Cent.						Bank Line	1914	9.5	0					3.00	
5.4				11													4	9.5	0					2	
5.5	7'-9"x8'			6000			10	1894	Pan-Hook, Ga.	W. N. H. H.						100	Cut	None	Hum. Line			16	Any life estimated by Forest Service	2	
5.6										FRANCE														10.10	
5.7	6 1/2 x 10 x 8-10									Germany	Swiss													Untreated life 7 to 8 years	15.00
5.8	do									do															2.00
5.9										do															1.00
5.10				150000			10	1880		German R.R.														2.00	
5.11	Bridge Ties			15000	12-18			1878		H. T. C.														1.00	
5.12	do			1893	20-22			1879		do														do	
5.13	do							1877		Te. A. S. F.														do	
6.1	CREOSOTE - FULL CELL																							2.00	
6.2	5 1/2 x 10 1/2 x 8 1/2				35-44					FRANCE	Oilseeds													Decay	2.20
6.3	6 1/2 x 10 x 8			868	4-42 gal		12	1907		W. N. H. H.	Gravel													2.00	
6.4	do			181				12	1907	W. N. H. H.														do	
6.5	do			285				12	1906	W. N. H. H.														do	
6.6	do			205				12	1906	W. N. H. H.														do	
6.7	6 1/2 x 10 x 8			1963			13	1911	W. N. H. H.	Gravel														3.00	
6.8	do			849				12	1906	W. N. H. H.														7.00	
6.9	do			285				12	1906	W. N. H. H.														do	
6.10	do			931				12	1906	W. N. H. H.														do	
7.1	CREOSOTE - GIUSSANI			29				1905	Tempco Branch	Max. Cent.						Bank Line	1914	9.5	0					2.20	
7A1	CREOSOTE - LOWRY			99	3.5 gal			1915	Patent, N.J.	D. L. W.	Stone	Good	101	Screw	Shank									44.00	
7A2	do			37	do			do	Dover, Md.	do	do	do	101	do	do									do	
8.1	CREOSOTE - LOW PRESSURE			183			7.0	1910	Alabama	T. C. I. R.														21.00	
9.1	CREOSOTE - RUEPING						5.0	1905		W. N. H. H.															
9.2				146						Tempco Branch	Max. Cent.													The recent	1.00
9.3	7 1/2 x 8 x 8			85				1907	Tempco Branch	Max. Cent.						Bank Line	1914	9.5	0					3.00	
9.4	do			10						W. N. H. H.	Gravel													2.50	
9.5	do			23						do														do	
9.6	do			77						W. N. H. H.														do	
9.7				276417			45450	1906		A. T. S. F.													No results	1.00	

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0 Max Pressure 40# per sq. in. at 190°F for 25 Minutes - Final Vacuum 12 inch - Air blow preservative back to measuring Tank.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
CREOSOTE - RUEPING																								
89.8		Sawn	Air Seasoned	179		4.56	1905	Chillicothe, W.	K. T. S. F.	Gravel		85	Cut	6 x 8	10 122 186	1915	10	5.8	Wear				1500 removal of amount -	45.00
89.91		do	do	304		4.56	do	Marcelline, Mo	do	do		85	do	6 x 8	10 268 875	do	10	36.8	Decay-Wear					do
89.82		do	do	44		4.56	do	Sutton, Mo	do	Slag		85	do	6 x 8	6 998 249	do	10	9.1	Wear					do
89.83		do	do	190		4.56	1904	Fisca City, Ga	do	Rock		90	do	7 1/2 x 8	2 650 296	do	11	4.2	do					do
89.84		Sawn	do	275		3.93	do	Bliss, Ohio	do	do		90	do	do	do	do	11	2.2	do					do
89.85		do	do	366		3.93	do	Ferry, Ohio	do	do		90	do	do	do	do	11	0						do
89.86		Sawn	do	27		4.56	do	do	do	do		90	do	do	do	do	11	0						do
89.87		Sawn	do	384		3.93	1905	Garnett, Mo	do	do		90	do	do	4 821 390	do	10	7.3	Decay					do
89.88		do	do	572		3.93	do	Argonia, Mo	do	do		90	do	do	5 121 566	do	10	9.8						do
89.89		Sawn	do	54621		5.00	1910	Holtzhausen, Ga	do	do		90	Screw	do	do	do	5	.7						do
89.90		Sawn	do	9436		5.00	1910	do	do	do		90	do	do	do	do	5	0						do
89.91		Sawn	do	24238		5.00	1910	Ottawa, Ga	do	do		90	Cut	7 1/2 x 8	4 337 691	do	9	0						do

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0 Preliminary air - 60° Pressure for 45 min. Creosote - at 104° pressure for 1 hr. 45 min at 120° F.
 1 Preliminary air - 65° Pressure for 30 min. Creosote - at 104° pressure for 2 hr. 15 min at 121° F.
 2 Preliminary air - 85° Pressure for 25 min. Creosote - at 175° pressure for 1 hr. 45 min at 197° F. Final vacuum - 23 inch - 1 hr. 30 min
 3 Preliminary air - 65° Pressure for 30 min. Creosote - at 195° pressure for 1 hr. 45 min at 197° F. Final vacuum - 23 inch - 1 hr. 30 min.
 4 Preliminary air - 75° Pressure for 30 min. Creosote - at 150° pressure for 1 hr. 45 min at 172° F. Final vacuum - 22 inch - 1 hr. 15 min.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
CRESOL CALCIUM - LOW PRESSURE																								
See ELM Index No. 6.1																								
10.1	7'9"x8'	Mill Seasoned	104	---	---	115 Dry	1910	Alabama	T.C.I.+RR	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DIAMOND BLUE PRESERVATIVE																								
11.1	---	---	19	---	---	---	1902	Beumont, Tex.	G.C.+S.F.	Sand	Per	60	Cut	None	Heavy	1908	6	100	---	---	---	---	---	---
MERCURIC CHLORIDE - (RYAN)																								
12.1	---	Green	---	---	---	---	1886	---	B.T.P.R.R.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SALTS - BARSCHALL HASSELMANN																								
13.1	---	---	37999	---	---	---	1902	---	G.B.+Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
13.2	---	---	74	---	---	---	---	---	G.C.+S.F.	Sand	Per	60	Cut	None	Heavy	1912	10	93.3	---	---	---	---	---	---
UNTREATED																								
14.1	7'9"x9'	Air Seasoned	25	---	---	---	1907	Lafayette + South La.	G.H.T.S.A	Gravel	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14.2	do	do	75	---	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14.3	---	---	---	---	---	---	---	---	FRANCE	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14.4	---	---	26720	---	---	---	---	---	Germany	Western RR	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14.5	---	---	233640	---	---	---	---	---	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
See Cedar Index Nos. 4.1 and 4.2																								
See Cypress Index Nos. 4.36 and 4.37																								
VARIOUS PROCESSES																								
15.1	---	---	831541	---	---	---	---	---	Germany	ISmitz	---	---	---	---	---	---	---	---	---	---	---	---	---	---
VULCANIZED																								
16.1	---	Sawed	25	---	---	---	1897	Northfork Div.	N. S.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16.2	---	Hewn	25	---	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16.3	---	do	100	---	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16.4	---	Sawed	100	---	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16.5	---	do	46	---	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ZINC CHLORIDE - BURNETT																								
See FIR Index Nos. 14.1 to 14.4 incl.																								
17.1	---	---	11827	---	---	---	---	1899	California	A.T.+S.F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.2	---	---	15046561	---	---	---	2576.50	1885	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.3	6'x8"x8'	Hewn	Air Seasoned	496	---	---	0.5	1906	Black Hills, Wis.	C.M.+S.R.	Gravel	Good	65	Cut	None	Light	1918	4	0	---	---	---	---	---
17.4	---	---	43	---	---	---	---	1905	Tampa Bay	Fla. Cent.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.5	---	Hewn	Seasoned	25	---	---	---	1897	Northfork Div.	N. S.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.6	---	Sawed	do	100	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.7	---	Hewn	do	100	---	---	---	do	do	do	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.8	---	---	242000	---	---	---	---	1886	Wyoming	U. P.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.9	8'x12"x8'	---	2562	---	---	---	0.5	1907	Hobson	G. N.	Gravel	Fair	85	5/8" x 1/2"	Standard	1914	7	0.9	Decay	---	---	---	---	---
17.10	---	Triangular	2601	---	---	---	0.5	1902	Conrad	do	do	do	68	do	do	do	12	68.5	---	---	---	---	---	
17.11	---	---	1030000	---	---	---	0.25	1888	---	T. & N. O.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.12	---	---	300	---	---	---	---	1901	Connecticut	N.H. & H.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.13	6'x10'x8"x8'	---	4836668	---	---	34 Sol.	---	---	Germany	German	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17.14	do	---	---	---	---	---	---	---	do	Strumper	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ZINC CHLORIDE STEEPING																								
18.1	6'x10'x8"x8'	---	3899	---	---	---	---	1852	Germany	Wagner	---	---	---	---	---	---	---	---	---	---	---	---	---	---

① Preliminary Vacuum 12 inch for 1.25 Hours - Boil Temp. 122° for 1.25 Hours - Max Pressure 16# per sq. in. at 120° F. for 10.1 Hours Drip 11 Hours
 ② Average life estimated by Forest Service
 ③ Mostly native Pine and Spruce - also some Oregon Fir, Elm, Ash, Maple + Oak. Nearly all Pine and Spruce removed in 1875 and 1876

ZINC CHLORIDE - BURNETT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
17.15	---	Hewn	Air Seasoned	7251	---	.58	1905	Newark N.J.	A.T.+S.F.	Block	---	85	Cut	72 x 4	15 23 x 25	1915	10	32.7	---	---	---	---	---
17.16	---	do	do	6337	---	.58	1904	do	do	do	---	85	do	do	15 23 x 25	1915	11	35.5	---	---	---	---	---
17.17	---	Sawn	do	2517	---	.52	1904	do	do	do	---	85	do	do	15 23 x 25	1915	11	31.9	---	---	---	---	---
17.18	---	do	do	90	---	.52	1905	do	do	do	---	85	do	do	15 23 x 25	1915	10	0	---	---	---	---	---

① Tons traffic per annum
 ② Zinc Chloride at 100# pressure for 2 hrs at 200° F. Initial vacuum 24 inch 45 min. Steam 20" for 3 hr. 30 min.
 ③ Zinc Chloride at 100# pressure for 2 hrs at 200° F. Initial vacuum 24 inch. 45 min. Steam 20" for 4 hrs

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ZINC CREOSOTE																							
19.1		Heard		200			1894	Ft. Hancock	G.H.S.A.	Gravel		Cut			1914	20	64	Dry Rot		12.6	Ang. life estimated by Forest Service	3.00	
19.2		"		410		6	1895	Nations Cliff	"	Rock		Yes			1914	19	100			14.0	"	2.00	
19.3		"		189		"	"	"	"	"		None			1914	19	100			14.0	"	"	
19.4		"		1098		"	"	"	"	Earth					1914	19	885			14.0	"	"	
19.5	7'9" x 9"	Heard		433	101 chbr 157 chbr	4.49 chbr	1907	Wilmross + Solin	"	Gravel		Cut	E.S.R. 37		1914	7		Good			6% shown decay	3.50	
19.6	"	"		71	"	"	1926	"	"	"		"	Q.P.W.		1914	5					"	2.00	
19.7	"	"		476	"	"	"	"	"	"		"	"		1914	5	1.1	Decay		12.18	"	"	
19.8	6'10" x 8'10"		Seasoned 3mo					Germany	General											10-15	"	"	
19.9	5'10" x 8'3"			161.213	6.6			France	State Ry											10-15	"	2.20	
ZINC CREOSOTE - GIUSSANI																							
20.1				19			1905	Tampa Dix	Max Cent						1914	9.5	0					3.00	
PINE-BALTIC																							
UNTREATED																							
21.1								Denmark	Ebeltoft								9	19					9.00
PINE-BLACKHILLS																							
ZINC CHLORIDE																							
22.1				6354		.35-40	1900-1	Sidney, Neb	C.B.V.	Partly Gravel	Very Dry	75		On Curves		1914	14	6	Rot	Good		3.00	
PINE-BULL																							
WOOD TAR CREOSOTE																							
23.1				18			1902	Phila. & Chester	P.B. System						1914		100	Decay		5		20.10	
PINE-COLORADO																							
ZINC TANNIN - WELLHOUSE																							
24.1				178			1885		A.T.S.F.						1901	15.1	38	Decay + Rot				29.20	
24.2				145			"	"	"						"	15.1	92	"				"	
24.3				156			"	"	"						"	15.1	38	"				"	
24.4				305			"	"	"						"	15.4	97	"				"	
24.5				50			1882	La. & N. O.	"						1897	15.0	100			11.8		2.00	
PINE-DANTZIC																							
UNTREATED																							
25.1	4.5' x 9"			2500			1898	Denmark	Fredrik						1909	11	19					9.00	
25.2	"			20000			"	"	Veilegia						"	16	67					"	
PINE-HEART																							
CREOSOTE - FULL CELL																							
26.1	7'9" x 8'5"	Heard		50		17.4	1910	Birmingham	Q.C.	Slop		75	Cut	None		1912	2	0				3.10	
UNTREATED																							
27.1				158			1895	Nations Cliff	G.H.S.A.	Rock			Yes		1914		100		9	Ang. life estimated by Forest Service		7.00	
27.2				717			"	"	"	Earth			"		"		100		9	"		"	
27.3				769			"	"	"	"			"		"		100		9	"		"	
27.4	7'9" x 8'	Sawed		4			1905	Birmingham	Q.C.	"			Screw		"		100		5.5	"	All out in 1911	"	
27.5	"	"		184			"	"	"	"			"		"		98.4		3.9	"	Open to Fall 1907	"	
27.6	"	"		332			"	"	"	"			"		"		100		4.07	"	"	"	
27.7	"	"		434			"	"	"	"			"		"		98.6		4.7	"	"	"	
TABLE 24 PINE LOBLOLLY																							
CREOSOTE - FULL CELL																							
1.1	7' x 8'	Heard	Seasoned 6mo	1000	35	10	1907	Barnett, Ga.	Georgia RR	Cinder		65	Cut	None		1913	6	0				3.10	
1.2	7'9" x 8.5"	"	"	50		17.4	1910	Birmingham	Q.C.	Slop		75	do	do		1912	2	0				do	

Ⓚ Records show an injection of 6% per Cu Ft of creosote but fail to give the amount of zinc chloride used
 Ⓛ Treatment similar to Allardice but not always followed - 1.3% solution of zinc chloride.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.3				88		22.19	1909	Lines East	C.B.V.	Cinders, Gravel		75.85		Partly		1914	5	0				2.5 decayed	5.00
1.4				50			1910	"	"	Gravel		90		All		"	4	0				"	do
1.5				40			1899	Lines West	"	Cinders, Gravel	Burnt Clay	85-90		Yes		"	5	0				"	do
1.6				31			1910	"	"	do	Lime Stone	90		do		"	4	0				"	do
1.7	CREOSOTE			2743		30-40	"	Weaver Ohio	P.B. System							1912	2					Various track fastenings	10.00
1.8		Green		299		8.0	"	Zoarcaro Tex	S.H.T.S.W.							1914	4					Seasoned 3 mo after treatment	30.10
1.9		Seasoned 3mo		300		8.0	"	"	"	"						"	4					"	do
CREOSOTE - RUBBING																							
2.1		Seasoned		274		5.0	1909	Fulton Ky	I.C.	Gravel		90		Standard Economy		1913	4	0		Good		Continuous angle bars	12.00
2.2		"		274		"	"	Lula Miss	"	New Gravel		75		Standard Economy		"	4					40" under bars - damaged by derailment	do
2.3		"		274		"	1910	Greenville Miss	"	Dirt		75		Standard Economy		"	3	0		Good		Weber joints 0.8% decayed	do
2.4		"		274		"	1909	Waukegan Ill.	"	Old Rock		90		"		"	4	0				Continuous angle bars	do
2.5		"		274		"	1910	Waukegan Ill.	"	Old Gravel		75		Standard Ballers		"	3					Weber angle bars	do
2.6				3200		"	1907	Carroll Miss	"	Gravel		85		None	Not Heavy	1914	7	1				Slightly rail cut	12.10
2.7				2880		6.0	"	"	"	"		85		"		"	4	1				do	do
LIQUID - U.M LONG'S																							
3.1		Seasoned		274		0.826	1910	Greenville, Fla.	"	Dirt		75		Standard Economy		1913	3			Good		Weber joints - show surface decay where dirt covers top of tie	12.00
OIL BAKERSFIELD																							
4.1				4			1902	Beaumont Tex	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	0		Good			11.00
OIL BEAUMONT																							
5.1				42	4.24		"	"	"	"	"	60	do	do	"	1911	9	100			3.77	Started to fail and removed 1905	do
OIL BEAUMONT AND ZINC CHLORIDE																							
6.1				81	3.0	0.25	"	"	"	"	"	60	do	do	"	1911	9	100					do
SALTS BARSCHALL HASSELMANN																							
7.1				99			"	"	"	"	"	60	do	do	"	1906	4	100			4.3	Started to fail 1905	do
SPIRITINE																							
8.1		Seasoned		100		3.3	"	"	"	"	"	60	do	do	"	1911	4	100			3.6	80% removed 1905-18% removed 1906	do
UNTREATED																							
9.1				110			1909	Lines East	C.B.V.	Cinders, Gravel	Burnt Clay	75.85		Partly		1914	5	73	Not				5.00
9.2				24			1908	"	"	Gravel		90		On Curves		"	6	95					do
9.3				48			1910	"	"	"		90		All		"	4	44					do
9.4				60			1907	Lines West	"	Cinders, Gravel	Burnt Clay	85-90		Yes		"	5	82.6					do
9.5				29			1910	"	"	do	Lime Stone	90		do		"	4	25					do
9.6				100			1902	Beaumont, Tex	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1904	2	100				Started to fail 1904	11.00
ZINC CHLORIDE																							
10.1		Seasoned		274		0.5	1909	Fulton Ky	I.C.	Gravel		90		Standard Economy		1913	4	0		Good		Continuous angle bars	12.00
10.2		"		24		"	"	Lula Miss	"	New Gravel		75		Standard Economy		"	4	3				Damaged by derailment - 40" under bars	do
10.3		"		274		"	1910	Greenville Miss	"	Dirt		75		Standard Economy		"	3	0.73	Broken	Good		Weber joints	do
10.4		"		274		"	1909	Waukegan Ill.	"	Old Rock		90		"		"	4					Continuous angle bars	do
10.5		"		274		"	1910	Waukegan Ill.	"	Old Gravel		75		Standard Ballers		"	3	0				Weber joints	do
ZINC CHLORIDE - BURNETT																							
11.1				70		0.5	1909	Lines East	C.B.V.	Cinders, Gravel	Burnt Clay	75.85		Partly		1914	5	2.8					5.00
11.2				50		"	1910	"	"	Gravel		90		All		"	4	0				10% decayed	5.00
11.3				43		"	1909	Lines West	"	Cinders, Gravel		85-90		Yes		"	5	4	Shaly Rot			2% split	do
11.4				30		"	1910	"	"	do	Lime Stone	90		do		"	4	0					do
11.5				100		0.35	1902	Beaumont, Tex	G.C.T.S.F.	Sand	Poor	60	Cut	None	Heavy	1911	9	100					11.00

Ⓚ - Preliminary Pressure 75 per Sq. In. for 5 Hours - Max. pressure 175 per Sq. In. for 2 Hours - Final Vacuum 24" for 3 Hours
 With Toplets cut & lub. - Without Toplets cut & lub.
 Ⓛ - Preliminary Vacuum 24" for 45 Minutes - Max. Pressure 100 per Sq. In. for 1.5 Hours
 Ⓛ - Preliminary Pressure 20 per Sq. In. for 3 Hours - Preliminary Vacuum 24" for 1 Hour - Max. Pressure 100 per Sq. In. for 1.5 Hours

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
12.1	ZINC CRESOSOTE-ALLARDYCE				50	—	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1911	9	100	—	—	—	2% out for test	11.00		
12.2	—	—	—	51	—	2332, no 233740	do	do	do	do	do	60	do	do	do	9	100	—	—	—	do	1 test	do		
13.1	ZINC CRESOSOTE-CARD				160	—	1908	Lines East	C.B.+Q.	Gravel	—	90	—	On Curves	—	1914	6	67	—	—	—	—	—		
13.2	—	—	—	426	—	1909	do	do	do	Under Gravel Burnt Clay	—	75-85	90	Partly	—	do	5	0.2	—	—	—	—	5.00		
13.3	—	—	—	472	—	1910	do	do	do	Gravel	—	90	—	All.	—	do	4	0	—	—	—	—	do		
13.4	—	—	—	267	—	1909	Lines West	do	do	Under Gravel Burnt Clay	—	85-90	—	Yes	—	do	5	0	—	—	—	—	do		
13.5	—	—	—	121	—	1910	do	do	do	Lyme Stone	—	90	—	do	—	do	4	0.3	—	—	—	—	do		
14.1	ZINC TANNIN-WELLHOUSE				100	—	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	95	—	—	—	Started to fail 1911	11.00		
TABLE 25 PINE LODGEPOLE																									
1.1	CRESOSOTE-FULL CELL				39	—	8.8.41	1905	Elberry, Mo.	C.B.+Q.	—	—	—	—	—	1914	8.5	0	—	—	—	Replaced 2 yrs after laying	5.10		
2.1	CRESOSOTE-FULL CELL-LOWRY				38	—	1907	Sheldon Mo.	do	Bulletine Board	—	85	—	do	—	1912	8.5	0	—	—	—	Good	5.00		
3.1	CRESOSOTE-RUEPING				25	—	1905	Elberry, Mo.	do	do	—	—	—	do	—	1914	8.5	0	—	—	—	Replaced 2 yrs after laying	5.10		
4.1	UNTREATED				15	—	1910	Denmark Wash	N.Y.N.Y.	—	—	—	—	Good	—	—	—	—	—	—	—	Replaced 2 yrs after laying	5.10		
4.2	UNTREATED				10	—	1905	Elberry, Mo.	C.B.+Q.	—	—	—	—	Good	Cut	Light	1914	4	0	—	—	—	15% partly decayed	41.00	
5.1	ZINC CHLORIDE-BOILED				61	—	1904	Sheldon, Mo.	do	Bulletine Board	Poor	85	—	do	—	do	8.5	40	—	—	—	—	Replaced 2 yrs after laying	5.10	
6.1	ZINC CHLORIDE-BURNETT				196	—	1906	do	do	do	—	—	—	do	Heavy	do	9	100	—	—	—	—	34% out in 1912	5.00	
6.2	ZINC CHLORIDE-BURNETT				63	—	1905	Elberry, Mo.	do	do	—	—	—	do	—	do	8	3	—	—	—	—	Good	5.00	
7.1	ZINC CRESOSOTE-ALLARDYCE				77	—	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	95	—	—	—	—	Replaced 2 yrs after laying	5.10	
PINE LONGLEAF																									
8.1	CRESOSOTE				250	—	1887	North Carolina	A.C.L.	Sandy loam	—	—	—	—	—	1910	23	40	—	—	—	—	—	33.00	
8.2	CRESOSOTE				300	—	1910	NY City	Elberry, Mo.	—	—	—	—	—	—	1908	21	0	—	—	—	Good	—	37.00	
8.3	CRESOSOTE				300	—	1910	Beaumont, Tex.	S.L.P.S.F.	—	—	—	—	—	—	1914	4	0	—	—	—	—	Removed 1908 to make room for M. Adoo Tunnel	30.10	
8.4	CRESOSOTE				300	—	1906	do	do	do	—	—	—	—	—	do	4	0	—	—	—	—	do	do	
8.5	CRESOSOTE				300	—	1906	do	do	do	—	—	—	—	—	do	4	0	—	—	—	—	do	do	
8.6	CRESOSOTE				—	—	1906	do	do	do	—	—	—	—	—	do	5-9	—	—	—	—	—	—	do	
9.1	OIL BEAUMONT				100	5.67	3	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1911	9	100	—	—	—	—	do	
10.1	OIL AND ZINC CHLORIDE				100	3.0	—	do	do	do	do	do	do	do	do	1912	10	8	—	—	—	—	Started to fail 1911	do	
11.1	SALTS-BARSCHALL HASSELMANN				100	—	—	do	do	do	do	do	do	do	do	1912	10	8	—	—	—	—	do	do	
12.1	SPIRITTINE				100	—	3.3	do	do	do	do	do	do	do	do	1910	10	95	—	—	—	—	do	do	
13.1	UNTREATED				95	—	—	do	do	do	do	do	do	do	do	1911	9	100	—	—	—	—	Started to fail 1906 25% removed 1908	do	
13.2	UNTREATED				2100	—	—	do	do	do	do	do	do	do	do	1915	14-15	87	—	—	—	—	—	81% removed 1905	do
13.3	UNTREATED				92	—	—	1910	Elberry, Mo.	do	do	—	—	—	do	1914	4	7	—	—	—	—	—	do	do

© Avg. life estimated by Forest Service

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
14.1	WOODLINE-DIPPED				75	133 Gal	—	1897	—	S.L.B.T.R.	—	—	—	—	Yes	—	1899	2	0	—	—	—	Good	2.00		
15.1	WOODLINE-PAINTED (HOT)				150	—	—	do	do	do	—	—	—	do	—	do	2	0	—	—	—	—	—	do		
16.1	ZINC CHLORIDE-BOILED				6	—	—	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	17	—	—	—	—	Started to fail 1911	11.00	
17.1	ZINC CHLORIDE-BURNETT				57	—	—	1901	Beaumont, Tex.	S.L.P.S.F.	Stone	On Curves	100	do	S.L.P.S.F.	—	1914	13	100	Decay	—	13	—	38.00		
17.2	ZINC CHLORIDE-BURNETT				68	—	—	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	Exam. removed 15% in 1915 Beams in 1916	do	
17.3	ZINC CHLORIDE-BURNETT				67	—	—	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	do	do	
17.4	ZINC CHLORIDE-BURNETT				14	—	—	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	do	do	
18.1	ZINC CRESOSOTE-ALLARDYCE				50	—	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	14	—	—	—	—	—	Started to fail 1908	11.00	
19.1	ZINC CRESOSOTE-BEAUMONT				50	—	—	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	38% removed 1908	do	
20.1	ZINC TANNIN-WELLHOUSE				100	—	0.33	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	55% removed 1908	do	
PINE MOUNTAIN																										
21.1	OIL BAKERSFIELD				2	—	—	1902	Beaumont, Tex.	G.C.P.S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	0	—	—	—	—	—	11.00	
21.2	OIL BAKERSFIELD				3	—	—	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	—	do	
22.1	OIL BAKERSFIELD AND ZINC CHLORIDE-BURNETT				8	—	—	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	—	do	
23.1	ZINC CHLORIDE-BURNETT				10	—	0.35	do	do	do	do	do	do	do	do	do	do	do	do	—	—	—	—	—	Started to fail 1906	do
23.2	ZINC CHLORIDE-BURNETT				—	—	0.28-0.47	do	New Mex. Div.	A.T.P.S.F.	Soil or Stone	—	do	do	do	do	do	do	do	—	—	—	—	do	do	
23.3	ZINC CHLORIDE-BURNETT				30.5	—	—	1885	Toledo, Ind.	do	—	—	—	—	—	Heavy	1896	11	0.7	—	—	—	—	do	do	
24.1	ZINC TANNIN-WELLHOUSE				78	—	—	1886	West	U.P.	—	—	—	—	—	—	1898	12	—	—	—	8	—	Practically all out 1894	do	
24.2	ZINC TANNIN-WELLHOUSE				do	—	—	do	do	do	—	—	—	—	—	—	do	12	—	—	—	8.5	—	do	do	
24.3	ZINC TANNIN-WELLHOUSE				do	—	—	do	do	do	—	—	—	—	—	—	do	12	—	—	—	9	—	do	do	
PINE PITCH																										
25.1	WOOD TAR CRESOSOTE				1	do	—	1889	Williamsport, Pa.	B System	—	—	—	—	—	—	1914	—	100	—	—	8	—	Worn out	20.10	
PINE RED NORWAY																										
26.1	ZINC TANNIN-WELLHOUSE				86	—	—	1890	—	D.I.M.	Gravel	Good	80	Cut	Light	1908	18	100	—	—	—	15	—	Reid on light side of doublets	33.00	
PINE RIGA																										
27.1	UNTREATED				—	—	—	—	—	Denmark	Hempel	—	—	—	—	—	—	7	27	—	—	—	—	—	9.00	
PINE SAP																										
28.1	COPPER AND IRON SULPHATE-BOUCHERIE				1000	—	—	1869	Tunnel N. Hamburg	Hamburg	—	Poor	—	—	—	Heavy	1882	13	—	—	—	—	—	Process too tedious	2.90	
29.1	DIAMOND WOOD PRESERVATIVE				500	0.46 Gal	0.11 Gal	1907	F. W. Morris	G.H.P.S.A.	Slag	—	—	Cut	Glendon	—	1914	7.5	0	—	—	—	Good	Decay test - not only ten years	7.00	
30.1	ZINC CHLORIDE-BURNETT				124 759	—	—	1903	—	Y.K.P.T.	—	—	—	—	—	—	1907	4	3.4	—	—	—	—	Changed to RUEPING	1.00	
30.2	ZINC CHLORIDE-BURNETT				334	1.443	0.4122	1905	—	G.H.P.S.A.	—	—	—	—	—	—	1914	9	10.0	—	—	—	—	—	Avg. life estimated by Forest Service started to fail 1909	7.00

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
30.3	7'9" x 8"	Hewn	Seasoned 1/2 yr after treat.	333	1.443	0.4122	1905	San Fran and Bayview, Tex.	G.H.Y.S.A.	---	---	---	---	Blender	---	1914	9	99.3	---	---	5.6	Artificially 1909. Avg. life estimated by Forest Service	7.00		
30.4	"	"	"	534	"	"	"	"	"	---	---	---	---	Blender	---	"	9	94.6	---	---	5.5	"	7.00		
ZINC CREOSOTE																									
31.1	7'8" x 8"	Hewn	---	750	1.12, 1.14, 1.17, 1.20	0.27, 0.28, 0.31, 0.34	1910	Selkirk, Tex.	"	---	---	---	Sawn	---	"	4	9	18.0	---	---	---	Cracked 8 mo. after treatment - main	"		
31.2	"	"	"	126	"	"	"	"	"	---	---	---	---	Blender	---	"	9	8.3	---	---	---	"	"		
31.3	"	"	"	127	"	"	"	"	"	---	---	---	---	Blender	---	"	9	51.2	---	---	---	8.3	Avg. life estimated by Forest Service	"	
ZINC TANNIN - WELLHOUSE																									
32.1	---	---	---	1,300	612	---	1901	---	M.H.P. System	---	---	---	---	---	---	1907	6	22	---	---	---	Changed to burn-treating	1.00		
PINE SHORTLEAF																									
33.1	---	---	---	2494	2.5 gal	---	1907	Sci. Ohio	P.S. System	---	---	---	---	---	---	1912	5	---	---	---	---	---	20.00		
33.2	---	---	---	300	---	---	1910	Dudridge, Ark.	S.L.T.S.W.	---	---	---	---	---	---	1914	4	0	---	---	Good	---	30.10		
33.3	---	---	---	263	---	---	"	"	"	---	---	---	---	---	---	"	4	0	---	---	"	---	30.10		
33.4	---	---	---	5000	---	12.0	1879	---	C.R.R. & M.I.	---	---	---	---	---	---	1908	---	---	---	---	15.5	Course grain. Plan. 1/16. Rail cut off removed 1918	1.00		
CREOSOTE - RUEPING																									
34.1	---	---	---	49000	---	---	1907	Jawa	G.H.Y.S.P.	---	---	---	---	105	---	"	7	---	---	---	---	Perfect	6.10		
CREOSOTE - STEAMING																									
35.1	7'9" x 9"	---	Seasoned 4 mo.	150 000	5.9 gal	117 gal	1880	Houston Tex.	H.P.T.C.	---	---	---	---	---	---	1882	2	0	---	---	---	Sound	Life untreated 2 yrs.	2.40	
CREOSOTE COAL TAR - FULL CELL																									
36.1	---	---	---	---	---	---	10	1890	Jameca, Ind.	Tunnel	---	---	---	---	---	---	---	---	---	---	---	Very sound after 23 yrs. service	37.00		
CREOSOTE CALCIUM																									
37.1	7'9" x 8"	---	Mill seasoned	104	---	1.15	1910	Alabama	T.C.T.R.G.	---	---	---	---	Goldia	---	1914	4	5	---	---	---	47% Good - 45% partly decayed	21.00		
37.2	"	---	"	102	---	0.85	"	"	"	---	---	---	---	"	---	"	4	7	---	---	---	"	"		
37.3	"	---	"	101	---	0.51	"	"	"	---	---	---	---	"	---	"	4	20	---	---	---	15% Good - 24% partly decayed - 63% decayed	"		
37.4	"	---	"	95	---	0.27	"	"	"	---	---	---	---	"	---	"	4	30	---	---	---	5% to 13% to 82% to	"		
OIL BAKERSFIELD																									
38.1	---	---	---	4	---	---	1902	Beaumont, Tex.	G.C.S.F.	Sand	Poor	60	Out	None	Heavy	1912	10	25	---	---	---	One out for inspection	11.00		
SALTS BARSCHALL HASSELMANN																									
39.1	---	---	---	98	---	---	"	"	"	"	"	60	"	"	"	"	10	99	---	---	---	75.5% put 1906 - 23% out 1908. Avg. life estimated by Forest Service	"		
UNTREATED																									
40.1	---	---	---	100	---	---	"	"	"	"	"	60	"	"	"	"	1906	4	100	---	---	---	3.4	35% out in 1904. 100 life estimated by Forest Service	"
ZINC CHLORIDE - BOILED																									
41.1	---	---	---	4	---	---	"	"	"	"	"	60	"	"	"	"	1912	10	25	---	---	---	25% removed 1908	"	
ZINC CHLORIDE - BURNETT																									
42.1	---	---	---	3	---	---	"	"	"	"	"	60	"	"	"	"	10	27	---	---	---	67% removed 1906	"		
42.2	---	---	---	100	---	0.95	"	"	"	"	"	60	"	"	"	"	19	62	---	---	---	61% do 1908	"		
42.3	---	---	Unseasoned	8083	0.25	1.5	185-91	Golden Dist.	S.P.	Gravel	Good	61.5	"	"	"	"	7-13	100	Ref. 92%	---	---	6.75	Life untreated. Sprayed 1907. Re-treated 6 yrs.	2.00	
42.4	---	---	"	41691	---	---	"	San Antonio Dist.	"	"	60	"	"	"	"	"	"	"	88%	---	---	8.16	"		
42.5	---	---	"	15564	---	---	"	Del Rio Dist.	"	"	60	"	"	"	"	"	"	"	92%	---	---	8.87	"		
42.6	---	---	"	2607	---	---	"	San Antonio Dist.	"	None	60	"	"	"	"	"	"	"	66%	---	---	8.67	"		
42.7	---	---	"	12899	---	---	"	Valentine Dist.	"	18% fine Gravel	60	"	"	"	"	"	"	"	85%	---	---	7.00	"		
42.8	---	---	"	13397	---	---	"	El Paso Dist.	"	None	60	"	"	"	"	"	"	"	51%	---	---	7.50	"		
42.9	6'8" x 8"	---	---	500	---	0.5	1906	Veranda S.D.	G.H.Y.S.P.	Gravel	Fair	85	Out	None	---	1914	8	14.6	---	---	---	None removed before 1914	6.10		
42.10	"	---	---	500	---	---	1903	Washington Zone	"	"	Good	85	"	"	"	1915	12	10.0	---	---	---	do do 1913	"		
ZINC CREOSOTE																									
43.1	---	---	---	50	---	---	1902	"	"	"	"	85	"	"	"	"	10	86	---	---	---	86% removed 1906	11.00		
43.2	---	---	---	---	---	---	---	"	"	"	"	---	---	"	"	"	1908	3	---	---	---	---	---	1.00	

① Preliminary Vacuum 12 inch for 2 Hours - Preliminary Temp. 106°F for 2 Hrs. - Max. Pressure 18" per sq. in. at 168°F for 2.5 Hours - Final Vacuum 11 inch for 0.5 Hours - Final Air for 6.5 Hours
 ② " " 10 inch for 1 Hour - " " 100°F for 1 Hour - " " 16" " " 100°F for 5.5 Hours - " " 12 inch " " 15 Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
ZINC CREOSOTE - ALLARDICE																									
44.1	---	---	---	50	---	---	1892	Beaumont, Tex.	G.C.S.F.	Sand	Poor	60	Out	None	Heavy	1912	10	44	---	---	---	82% removed in 1908	11.00		
ZINC TANNIN - WELLHOUSE																									
45.1	---	---	---	100	---	0.53	"	"	"	"	"	60	"	"	"	"	10	80	---	---	---	79% removed in 1908	"		
45.2	6'8" x 8"	---	---	500	---	---	1903	Washington Zone	G.H.Y.S.P.	---	---	---	---	85	---	1914	11	10	---	---	---	---	6.10		
PINE - SWEDISH																									
UNTREATED																									
46.1	6 1/2" x 8 1/2"	---	---	18000	---	---	---	Denmark	Longly, New York	---	---	---	---	---	---	---	9	72	---	---	---	7.5	Avg. life estimated by Forest Service	9.00	
46.2	"	---	---	60000	---	---	---	"	Springing, N.Y.	---	---	---	---	---	---	---	12	48	---	---	---	"	"		
46.3	"	---	---	47000	---	---	---	"	P.N.-Daly	---	---	---	---	---	---	---	9	49	---	---	---	"	"		
46.4	6" x 8"	---	---	20000	---	---	---	"	Yale Ave	---	---	---	---	---	---	---	16	80	---	---	---	10.6	Avg. life estimated by Forest Service	"	
46.5	6 1/2" x 8 1/2"	---	---	34300	---	---	1896	"	Willow	---	---	---	---	---	---	---	1909	13	74	---	---	10.0	"		
46.6	"	---	---	84000	---	---	---	"	Dalshere	---	---	---	---	---	---	---	11	75	---	---	---	8.0	"		
46.7	"	---	---	10000	---	---	---	"	Hallebar	---	---	---	---	---	---	---	11	94	---	---	---	7.0	"		
46.8	6" x 8"	---	---	40000	---	---	---	"	Lehigh, Washington	---	---	---	---	---	---	---	11	45	---	---	---	"	"		
46.9	6" x 8"	---	---	40000	---	---	---	"	Yale Jarrell	---	---	---	---	---	---	---	13	43	---	---	---	"	"		
PINE - VIRGINIA																									
CREOSOTE - HAYFORD																									
47.1	---	---	Seasoned several mo.	10000	---	---	185-6	Bound Brook	P.R. of N.J.	---	---	---	---	---	---	---	1883	8	0	---	---	---	Sound	Slight rail cutting	2.40
47.2	---	---	"	10000	---	---	1878	"	P.R.	---	---	---	---	---	---	---	1882	4	0	---	---	---	O.K.	Favorable abroad	"
PINE - WHITE																									
SULPHATE OF COPPER OR ZINC AND BARIUM CHLORIDE - THILMANN																									
48.1	---	---	---	1006	---	---	1881	Washington Zone	W.N.H. & H.	Stone	---	---	---	---	---	---	1896	15	100	---	---	---	11-15	---	38.00
UNTREATED																									
49.1	---	---	---	---	---	---	---	---	S.O.P. & Q.	---	---	---	---	---	---	---	---	---	---	---	---	---	5	90% failures due to decay	35.00
ZINC TANNIN - WELLHOUSE																									
50.1	---	---	Seasoned 6 mo.	85	---	---	1890	D.P. Ry.	Gravel	Good	80	Out	---	---	---	---	1908	18	100	---	---	---	Ref. 100	7000	52.10
PINE - YELLOW																									
CREOSOTE																									
51.1	---	---	---	---	---	---	1884	New York City	East York	---	---	---	---	---	---	---	1900	16	---	---	---	---	Ref. 1900	29.50	
51.2	---	---	---	8000	---	---	1907	"	S.L.T.W.	---	---	---	---	---	---	---	1914	7	100	---	---	---	Crushed	100	
51.3	---	---	Bridge Tim.	12000	---	---	1905	Bohale, Or.	"	---	---	---	---	---	---	---	"	9	100	---	---	---	100	1.80	
TEREDO PROOF PAINT																									
52.1	---	---	---	---	---	---	1899	---	P.S. Ry.	---	---	---	---	---	---	---	1907	8	---	---	---	---	Good	36.00	
UNTREATED																									
53.1	---	---	---	7500	---	---	1900	Jawa	G.H.Y.S.P.	---	---	---	---	---	---	---	1910	10	41.8	---	---	---	---	1.10	
53.2	---	---	---	14688	---	---	1903	N.Y.	S.L.T.W.	---	---	---	---	---	---	---	"	7	12.3	---	---	---	---	"	
53.3	---	---	---	21805	---	---	1901	PEHN	P.R.	---	---	---	---	---	---	---	1914	13	43	---	---	---	---	1.05	
PINE - GEORGIA YELLOW																									
WOOD TAR CREOSOTE																									
54.1	---	---	---	96	---	---	1897	Baltimore, Md.	P.S. System	---	---	---	---	---	---	---	1914	---	100	---	---</				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
56.2	7"x9"x8"	Heavy	—	500	—	—	1905	Fair Haven, Conn.	K.M.N.H	Stone	Damp	100	—	—	—	1914	—	—	—	—	—	Replaced 1924	38.00		
CREOSOTE COAL TAR - CREO RESINATE																									
57.1	—	—	—	500	—	—	1901	Alhona Pa.	No System	—	—	—	—	—	—	—	100	—	—	—	9.0	Record not complete	20.10		
57.2	—	—	—	250	—	—	—	Pittsburg Pa.	do	—	—	—	—	—	—	—	100	100	100	100	7.5	do	do		
57.3	—	—	—	125	—	—	—	—	do	—	—	—	—	—	—	—	—	100	100	100	9.0	do	do		
57.4	—	—	—	125	—	—	—	—	do	—	—	—	—	—	—	—	—	100	100	100	10.0	Good condition 1911	do		
57.5	—	—	—	125	—	—	—	—	do	—	—	—	—	—	—	—	—	100	100	100	10.0	Record not complete	do		
57.6	—	—	—	125	—	—	—	—	do	—	—	—	—	—	—	—	—	100	100	100	10.0	Good condition 1911	do		
PINE - WESTERN YELLOW																									
58.1	6"x6"x8-10"	Heavy	Unseasoned + Saturated 1yr	15	—	—	1910	Oshtemo Wash.	M.K.N	—	Good	—	Cut	None	Light	1914	4	0	—	—	Good	3 partially decayed	41.00		
TABLE 26 - POPLAR																									
CREOSOTE - FULL CELL																									
11	—	—	—	30	—	—	1910	Hennepin Ill.	C.B.T.P.	Sharden Gravel	—	90	—	All	—	1912	2	0	—	—	—	—	5.00		
12	—	—	—	20	—	—	—	do	Blanding Ill.	do	—	90	—	Yes	—	do	2	0	—	—	—	—	do		
13	—	—	—	30	—	—	—	do	Barr Colo.	do	Lyons Stone	Very Dry	90	—	do	—	do	2	0	—	—	—	do		
COPPER SULPHATE - BOUCHERIE																									
21	—	—	—	—	—	—	1857	Chili S.A.	Southway	—	—	—	—	—	—	1860	3	—	—	—	—	Favorable	2.40		
UNTREATED																									
3.1	—	—	—	55	—	—	1909	Lines East	C.B.T.P.	Coopers Gravel Burr Clay	—	75-85	—	Partly	—	1914	5	70.0	Rot	—	—	—	5.00		
3.2	—	—	—	25	—	—	1910	do	do	Gravel	—	90	—	All	—	do	4	31.6	do	—	—	—	do		
3.3	—	—	—	34	—	—	1909	Lines West	do	Coopers Gravel Burr Clay	—	85-90	—	Yes	—	do	5	65.4	do	—	—	—	do		
3.4	—	—	—	15	—	—	1910	do	do	Lyons Stone	—	90	—	do	—	do	4	15.0	do	—	—	—	do		
WOOD TAR CREOSOTE																									
4.1	—	—	—	17	—	—	1912	Philo S.W.Vir.	No System	—	—	—	—	—	—	1914	—	100	Decay	—	5	Record not complete	20.10		
ZINC CHLORIDE - BURNETT																									
5.1	—	—	—	30	—	0.5	1910	Hennepin Ill.	C.B.T.P.	Sharden Gravel	—	90	—	All	—	1914	4	10	Rot	—	—	16% split	5.00		
5.2	—	—	—	20	—	—	—	do	Blanding Ill.	do	—	90	—	do	—	do	4	5	Split	—	—	—	do		
5.3	—	—	—	30	—	—	—	do	Barr Colo.	do	Lyons Stone	Very Dry	90	—	Yes	—	1912	2	0	—	—	—	do		
ZINC CREOSOTE - CARD																									
6.1	—	—	—	166	—	0.52 inc. 2.0 C/100	1909	Lines East	do	Coopers Gravel Burr Clay	—	75-85	—	Partly	—	1914	5	9.5	Split	—	—	—	do		
6.2	—	—	—	24	—	—	1910	do	do	Gravel	—	90	—	All	—	do	4	0	—	—	—	4% split	do		
6.3	—	—	—	208	—	—	1909	Lines West	do	Coopers Gravel Burr Clay	—	85-90	—	Yes	—	do	5	3.4	Split	—	—	—	do		
6.4	—	—	—	46	—	—	1910	do	do	Lyons Stone	—	90	—	do	—	do	4	0	—	—	—	—	do		
TABLE 27 - REDWOOD BAL TIC																									
1.1	5"x8"x11"	Sawn	Well seasoned Seasoned 2 yrs	—	—	1 gal	—	England	Bellevue Southway	—	—	—	—	—	—	—	—	—	—	—	Split	15	2.20		
1.2	do	do	do	—	—	8	—	do	do	—	—	—	—	—	—	—	—	—	—	—	—	—	40000 Annual renewals	do	
1.3	do	do	do	—	—	2.5 gal	—	do	do	—	—	—	—	—	—	—	—	—	—	—	—	—	40000 to 24000 do	do	
1.4	do	do	do	—	—	do	—	do	do	—	—	—	—	—	—	—	—	—	—	—	Wear	12-15	90000 to 100000 do	do	
1.5	do	do	do	—	—	2.7 gal	—	do	do	—	—	—	—	—	—	—	—	—	—	—	—	—	do	do	
1.6	do	do	do	—	—	30	—	do	do	—	—	—	—	—	—	—	—	—	—	—	Wear	16-20	300000 Annual renewals	do	
1.7	do	do	do	—	—	2.5 gal	—	do	do	—	—	—	—	—	—	—	—	—	—	—	Wear-split	12	170 000 do	do	
1.8	do	do	do	—	—	7.0/10	—	do	do	—	—	—	—	—	—	—	—	—	—	—	Decay	25-30	do	do	
1.9	do	do	do	—	—	10	—	do	do	—	—	—	—	—	—	—	—	—	—	—	—	—	do	do	
1.10	do	do	do	—	—	28	—	do	do	—	—	—	—	—	—	—	—	—	—	—	40	do	16	20 per mile 40% decay	do
1.11	do	do	do	—	—	28	—	do	do	—	—	—	—	—	—	—	—	—	—	—	—	—	15	do	do
1.12	do	do	do	—	—	13.7 gal	—	do	do	—	—	—	—	—	—	—	—	—	—	—	Wear	8-9	97000 Annual renewals	do	
																						15	17000 do	do	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
ZINC CHLORIDE																								
2.1	—	—	—	—	—	—	—	Russia	Harbin	—	—	—	—	—	—	—	—	—	—	—	8	Life untreated 4 yrs	29.20	
REDWOOD - CALIFORNIA																								
CARBOLINEUM - AYENARIUS																								
3.1	—	—	—	120 of 100 lbs	—	—	1903	Hawaii	Hanalei Paper Mills	—	—	—	Screw	Staples	—	1913	10	0	—	—	—	—	Am. Cal. Redwood - excellent condition	39.00
OIL CALIFORNIA AND ZINC CHLORIDE																								
4.1	—	—	—	2	—	—	1902	Beaumont Tex.	GC+SP	Sand	Poor	60	Cut	None	Heavy	1905	3	100	—	—	—	—	Started to fail 1905	11.00
ZINC CHLORIDE - BURNETT																								
5.1	—	—	—	8	—	0.35	—	—	—	—	—	60	do	do	do	—	—	—	—	—	—	—	do	do
SPRUCE																								
CREOSOTE - FULL CELL																								
6.1	10"x10"	Sawn	Green	—	—	—	1860	Mass.	B.T.A	—	—	—	—	—	—	Heavy	1869	9	100	Split	—	—	—	2.40
MERCURIC CHLORIDE - KYAN																								
7.1	6"x8"	—	Seasoned 6 to 8 mo.	25	—	—	1911	Hartford Wis.	C.M.S.R.	Gravel	Good	90	Scot Stones	300 solid No. 100	Heavy	1914	3	0	—	—	—	—	—	27.00
UNTREATED																								
9.1	—	—	—	—	—	—	1855	Mass.	Union	—	—	—	—	—	—	Light	1883	28	—	—	Good	—	House car tracks	2.40
TABLE 28 - SYCAMORE																								
CREOSOTE - FULL CELL																								
1.1	—	—	—	45	—	—	1910	Hennepin Ill.	C.B.T.P.	Sharden Gravel	—	90	—	All	—	1912	2	0	—	—	—	—	5.00	
1.2	—	—	—	30	—	—	—	do	Blanding Ill.	do	—	90	—	do	—	do	2	0	—	—	—	—	do	
1.3	—	—	—	15	—	—	—	do	Barr Colo.	do	Lyons Stone	Very Dry	90	—	Yes	—	do	2	0	—	—	—	do	
UNTREATED																								
2.1	—	—	—	65	—	—	1909	Lines East	do	Coopers Gravel Burr Clay	—	75-85	—	Partly	—	1914	5	85.4	—	—	—	—	do	
2.2	—	—	—	25	—	—	1910	do	do	Gravel	—	90	—	All	—	do	4	82.0	—	—	—	—	do	
2.3	—	—	—	35	—	—	1909	Lines West	do	Coopers Gravel Burr Clay	—	85-90	—	Yes	—	do	5	94.4	—	—	—	—	do	
2.4	—	—	—	15	—	—	1910	do	do	Lyons Stone	—	90	—	do	—	do	4	55.0	—	—	—	—	do	
ZINC CHLORIDE - BURNETT																								
3.1	—	—	—	45	—	0.5	1910	Hennepin Ill.	do	Sharden Gravel	—	90	—	All	—	1912	2	0	—	—	—	—	do	
3.2	—	—	—	30	—	—	—	do	Blanding Ill.	do	—	90	—	do	—	do	2	0	—	—	—	—	do	
3.3	—	—	—	15	—	—	—	do	Barr Colo.	do	Lyons Stone	Very Dry	90	—	do	—	do	2	0	—	—	—	do	
ZINC CREOSOTE - CARD																								
4.1	—	—	—	175	—	0.52 inc. 2.0 C/100	1909	Lines East	do	Coopers Gravel Burr Clay	—	75-85	—	Partly	—	1914	5	1.7	Split	—	—	—	do	
4.2	—	—	—	22.4	—	—	1910	do	do	Gravel	—	90	—	All	—	do	4	0	—	—	—	—	do	
4.3	—	—	—	91	—	—	1909	Lines West	do	Coopers Gravel Burr Clay	—	75-85	—	do	—	do	5	3.3	Split	—	—	—	do	
4.4	—	—	—	30	—	—	1910	do	do	Lyons Stone	Very Dry	90	—	do	—	do	4	0	—	—	—	—	do	
TABLE 29 - TAMARACK																								
CREOSOTE - FULL CELL																								
1.1	—	—	—	85	—	0.05	1909	Lines East	C.B.T.P.	Coopers Gravel Burr Clay	—	75-85	—	Partly	—	1914	5	0.	—	—	—	—	5.00	
1.2	—	—	—	20	—	—	1910	do	do	Gravel	—	90	—	All	—	do	4	0	—	—	—	—	do	
1.3	—	—	—	14	—	—	1911	do	do	do	—	75	—	do	—	do	3	0	—	—	—	—	do	
1.4	—	—	—	46	—	—	1909	Lines West	do	Coopers Gravel Burr Clay	—	85-90	—	Yes	—	do	5	0	—	—	—	—	do	
1.5	—	—	—	60	—	—	1910	do	do	Lyons Stone	Very Dry	90	—	do	—	do	4	0	—	—	—	—	do	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CREOSOTE - OPEN TANK																							
2.1				19			1907	Monrovia, Wis	C+N+W	Gravel	Good	90	Cut	Wallaigite	Light	1915	7.5	0		Good		All sound	26.00
SALTS - BARGSCHALL HASSELMANN																							
3.1				98			1902	Brownville, Tex	B.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1911	6	100		4		80% removed 1905	11.00
UNTREATED																							
4.1							1902	Brownville, Tex	B.C.+S.F.	Sand	Poor	80	Cut	None	Heavy	1905	3.5	100				All removed 1905	11.00
4.2		Water Cut	Piled Seasoned 23%	25			1907	Monrovia, Wis	C+N+W	Gravel	Good	90	do	do	Light	1915	7.5	72	Decay	6.9		Remainder partly decayed & rotcut	26.00
4.3			Seasoned 23%	25			do	do	do	do	do	do	do	do	do	do	7.5	100	do	do		do	do
4.4			Piled & Seasoned 35%	20			do	do	do	do	do	do	do	do	do	do	7.5	95	do	do		do	do
4.5			Seasoned 17%	62			do	do	do	do	do	do	do	do	do	do	7.5	98.4	do	do		do	do
4.6				7500			1902	Monrovia	D+I.R.							1912	10	100			7-8	Track lots used 1905 All out 1912	11.00 11.25
4.7				85			1909	Lines East	C.B.+Q.	Coarse Gravel Quint Clay		75-85 90		Partly		do	5	78.7	Rot				5.00
4.8				10			1910	do	do	Gravel		90		All		do	4	10	do				do
4.9				49			1909	Lines West	do	Coarse Gravel Quint Clay		85-90		do		do	5	82.6	do				do
4.10				30			1910	do	do	Lign. Stone		90		do		do	4	15	do				do
4.11				2894			1908	Newport	G.H.	Gravel	Good	90	8 1/2"	N.P.N.21		do	6	57.9	do			53% of material split & broken Includes Pine Spruce & Fir	40.00
4.12	7x8x8'			2966			1904	Stokell	do	Coarse Gravel	do	68	1/2"	N.P.N.58		do	10	39.5	do				do
4.13				2168			1905	Fortine	do	Gravel	do	77.5	do	do		do	10	100	do	7.9		Includes Pine, Spruce & Fir	do
4.14	7x8x8'			2989			1908	Cladith Gap	do	do	do	85	do	2 1/2" N.P.N.58		do	6	15.3	do			do	do
4.15	do			2916			do	Kimrock	do	do	do	90	8 1/2"	N.P.N.58		do	6	18.4	do			do	do
ZINC CHLORIDE - BURNETT																							
5.1				85		0.5	1909	Lines East	C.B.+Q.	Coarse Gravel Quint Clay		85-85 90		Partly		1914	5	13	Split				5.00
5.2				21		do	1910	do	do	Gravel		90		All		do	4	0					do
5.3				45		do	1909	Lines West	do	Coarse Gravel Quint Clay		85-90		Yes		do	5	0					do
5.4				61		do	1910	do	do	Lign. Stone		90		do		do	4	0					do
5.5		Triangular		1320		0.5-0.5	1904	do	do	Harder Rock		85		do		do	10.3	61.0		10.1			5.00
5.6				49		0.41	1902	Brownville Tex	B.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1912	9.5	0				15% decayed	11.00
5.7	7x8x8'			2848		0.5	1903	Orangeville	G.H.	Coarse Gravel	Good	60	1/2"	do		1914	11	9.7	Rot			Includes Pine, Spruce & Fir	40.00
5.8				2530		do	do	Glennport	do	do	do	do	do	do		do	11	2.2	do				do
5.9				2708		do	1904	White Fish	do	Gravel	do	77.5 90	do	do		do	10	65.3	Rot-split		10.2	Includes Pine, Spruce & Fir	do
5.10				125		0.510	1907	Monrovia Wis	C+N+W	do	do	90	Screw	Sellers	Light	1915	7.5	0		Good		8.0% Partly decayed	26.00
5.11				125		do	do	do	do	do	do	do	do	do		do	do	7.5	0			do	do
5.12				125		do	do	do	do	do	do	do	do	do		do	do	7.5	0			do	do
5.13				13		0.308	do	do	do	do	do	do	do	do		do	do	6.5	0			do	do

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
ZINC CREOSOTE - ALLARDYCE																								
6.1				50		0.5 ZINC 20 DRY	1902	Brownville Tex	B.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1911	9	100				All removed 1911	11.00	
ZINC CREOSOTE - CARD																								
7.1				573		0.5 ZINC 20 DRY	1909	Lines East	C.B.+Q.	Coarse Gravel Quint Clay		75-85 90		Partly		1914	5	0					5.00	
7.2				298		do	1910	do	do	Gravel		90		All		do	4	0					do	
7.3				39		do	1908	do	do	do		75		do		do	3	0					do	
7.4				284		do	1909	Lines West	do	Coarse Gravel Quint Clay		85-90		Yes		do	5	0					do	
7.5				211		do	1910	do	do	Lign. Stone		90		do		do	4	0					do	
7.6				8		0.5 ZINC 20 DRY 0.2 ZINC 20 DRY	1911	Orangeville Wis	C.M.+P.	Gravel		75		A.S. Hall		1912	1	0					6.00	
7.7				57		do	1902	Brownville, Tex	B.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1914	10	90				3% curve - 90% removed 1909	11.00	
ZINC AND CRUDE OIL																								
8.1				3			1914	Bakers 2 1/2'	C.B.+Q.	Gravel		75		do		1912	1	0					5.00	
ZINC TANNIN - WELLHOUSE																								
9.1				200			1891	Albany Pa	F.H.+C							1898	7	1	Decay	Good			2.00	
9.2				100		0.58	1902	Brownville Tex	B.C.+S.F.	Sand	Poor	60	Cut	None	Heavy	1912	10	100				in 1911 - 84% good (16% partially decayed) Shipped to Fall 1912	11.00	
9.3		Water Home	Piled Seasoned 11%	125		0.428	1907	Monrovia Wis	C+N+W	Gravel	Good	90	Screw	Sellers	Light	1915	7.5	0		Good		194% Partly decayed	26.00	
9.4		do	Piled Seasoned 11%	50		0.440	do	do	do	do	do	90	do	do		do	do	0				2.0%	do	
9.5		do	Piled Seasoned 11%	38		0.408	do	do	do	do	do	90	do	do		do	do	0					do	
9.6		do	Piled Seasoned 11%	125		0.418	do	do	do	do	do	90	Cut	Sellers	do	do	do	0				15.2% Partly decayed	do	
9.7		do	Piled Seasoned 11%	50		0.426	do	do	do	do	do	90	do	do		do	do	0				6.0%	do	
9.8		do	Piled Seasoned 11%	128		0.408	do	do	do	do	do	90	do	Wallaigite		do	do	1.8				6.2%	do	
9.9		do	Piled Seasoned 11%	50		0.426	do	do	do	do	do	90	do	do		do	do	0				20.0%	do	
9.10		do	Piled Seasoned 11%	59		0.424	do	do	do	do	do	90	do	do		do	do	0				44.1%	do	
9.11		do	Piled Seasoned 11%	55		0.424	do	do	do	do	do	90	do	do		do	do	0				4.5%	do	
9.12		do	Piled Seasoned 11%	58		0.376	do	do	do	do	do	90	do	do		do	do	1.7				20.7%	do	
9.13				200			1892	Associate Ind	Prigitem	do						1905	13	100			8.84		29.00	
9.14				85			1890	Monrovia	D+I.R.	Coarse Gravel	Good	80	Cut	do		1908	15	100			15	Track relaid	33.10 38.00	
TABLE 30 - VARIOUS SPECIES																								
COPPER SULPHATE - THILMANN																								
11							1870	Glennport Mo								1875	5					Favorable to 1875	2.90	
12							1877	do	Wabash							1882	5					Unfavorable	do	
13							1878	do	do							do	4					do	do	
14							1879	do	H.P.+S							do	3					do	do	
15							do	do	L.S.+P.S							do	3					do	do	
CREOSOTE																								
2.1				6501			1892	White Sulphur	H.O.C							1912	6	100	Rot			Most removed 1907 balance 1909	15.00	
2.2				76100			1896	Prof. D.V	do							1909	13	32	Rot/cut				do	
2.3				94694			1907	do Prof. and Quincy	H.P.							1914	7	0					Perfect preservation - no results	1.00
MERCURIC CHLORIDE - (PRESSURE)																								
3.1							1846	East Mass.															Too costly	2.40
MERCURIC CHLORIDE - KYAN																								
4.1							1842	do	B.T.O														Failure	do
4.2							1845	do	old Galena														Did not Pay	do
4.3							1847	do	R.T.W														do	do
4.4							1851	do	R.T.R.														Unsuccessful Wood Preserved - Strength reduced	1.05 1.00
OIL, CRUDE																								
5.1				198			1907	Zappes Branch	Max. Cont.							1911	4	0						3.00

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
	<u>TAR</u>																							
6.1							1852		RFR							1908							Not preserved - dry rot	1.00
	<u>TREATED - PROCESS NOT GIVEN</u>																							
7.1				111816			1899		CPEE							1909	10	9.5	Decay					33.00
7.2				1647805			1890		4							4	8-10	1.1	do					do
	<u>VULCANIZED - HEAT AND PRESSURE</u>																							
8.1							1883	New York	Magnolia							1885	12				Bad		Untreated life 5 yrs	29.60
	<u>ZINC CHLORIDE - BURNETT</u>																							
9.1				430000			1900		CFA							1908	8						Some decayed in 3-4 yrs	1.00
9.2				300000		0.5	1905		T.S.L.T.W.							do	3						No results	do
9.3		Triangle		2823		0.5	1904	Columbus Falls	G.N.	Gravel	Good	75% 92	75% 92	85% 92		1914	10	66.9				est 94	Includes 875,500 - 643,500 185,000 - 18,000	40.00
9.4				2916			1903	Metalia	4	do	do	90	85% 92	Grade		do	11	88.4				est 84		do
9.5				305107			1867		RFR														out on fire 1870 - partial success	1.00
	<u>ZINC CRFOSOTE</u>																							
10.1							1908		C.N.W.							1908							No results	1.00
	<u>ZINC TANNIN - WELLHOUSE</u>																							
11.1				126973		0.5	1897		As System													est 72	Rail cut + decay	do
11.2							1899		S.L.I.N.T.S							1883	4						Favorable	2.40
11.3							1880		I+SH L							do	3						do	do
11.4							1881		A.T.O.E							do	2						do	do

DISCUSSION.

MR. M. K. TRUMBULL: Mr. Chairman, I think we will all agree that this is a masterly contribution, especially inasmuch as it is the first convention at which we have had service tests presented. I refer to this report and the others pertaining to paving blocks, timber, piling, etc. In my opinion the resolution passed one year ago to have committees prepare service tests has been amply justified. I would like to ask, in view of the recommendations and the necessity for the accumulation from year to year of records with service tests as to what plan or policy has been mapped out by the Executive Committee for the perpetuation of this work.

MR. L. B. MOSES: Mr. President, Mr. Card asks me to suggest that the most satisfactory way to continue those records, which are, of course, invaluable to us, would be to request the Forest Service to keep them for us. They would then be available for the information and guidance of the members of this Association. We would be assured, in the first place, that there would be no selfish interest attempting to serve its own ends, besides which the records would certainly carry much more weight with all who have occasion to use them. If that is feasible and the Forest Service people are willing to undertake the work I should certainly like to see it handled in that way.

THE PRESIDENT: Mr. Trumbull, my personal opinion is that this should be a standing committee and it should be continued from year to year. Of course, the present Executive Committee cannot outline the policies of the next Executive Committee, but that has been my thought in the matter.

MR. M. K. TRUMBULL: The question in my mind is as to whether it is desirable for the Association to act on this or to leave it in the hands of the incoming officers and Executive Committee.

THE PRESIDENT: Has anyone anything to say on that point? What is your pleasure? Do you want to leave it to the Executive Committee or does this Association want to instruct the Executive Committee to continue the Service Tests Committees as standing committees, not necessarily the same men?

MR. M. K. TRUMBULL: Mr. President, before we get down to the actual determination of our policy in this respect although appreciating Mr. Moses' suggestion, I would like to ask Mr. Winslow a question as to whether he finds that the railroads are liberal in their response to the requests for information as coming from the Forest Products Laboratory, or whether it places the Committee in a better position to secure that information if there are a few railroad men on the Committee.

MR. C. P. WINSLOW: First, in response to the question whether the railroads are liberal in responding to the requests for information

of this sort, I will say yes. The assistance and co-operation they have given us in writing for information of that sort has been very gratifying. My personal feeling is that it would be an advantage to any committee of this sort to have railroad men as members. Of course, in correspondence from the Laboratory requesting most of this information that I have had to handle it has come as Laboratory correspondence rather than as individual correspondence, and I cannot say what the results might be on another basis. I only know that so far handling it as I have done in corresponding with these railroads we have met with very gratifying assistance from them and their co-operation in that is very highly appreciated and should have been acknowledged in the presentation of the report.

THE PRESIDENT: When the report of the Committee on Service Tests of Wood Block Paving was submitted they recommended that the Committee be continued and there was a motion to that effect. Now, I am ready to receive a motion to continue this Committee, and to make it a permanent standing committee if you so elect.

MR. M. K. TRUMBULL: Mr. President, I hardly think we are quite ready for that motion to be put. We should consider the fact that the American Railway Engineering Association has done a considerable amount of work in this line. We should have an expression from some of the railroad men present. It is unfortunate that Mr. Stimson and some of the others have already left. We should secure expressions from as many as possible as to the desirability of merging the work of this Committee with that of the American Railway Engineering Association, or to adopt some policy, as between the two associations, which will give the best results to all that are interested in the requirements.

THE PRESIDENT: Gentlemen, what is your pleasure?

MR. E. T. HOWSON: Mr. President, I would like to support the ideas just advanced.

There is so much to be done by all the technical associations that any overlapping means that some other work will not be done. This Association can gather certain statistics on service ties better than the other association. The other association can gather statistics from certain other sources perhaps better than this Association, because of its more direct affiliation with the railroads. For that reason it seems to me that a joint committee of the two associations could combine the information secured by each into a more comprehensive report than will be available otherwise. Each association would have the benefit of it, there would be no duplication and corresponding disagreement in minor details and we would get all the benefit of the individual reports.

I would, therefore, suggest that the Executive Committee consider the advisability of suggesting to the American Railway Engineering Association's Board of Directors the appointment of a joint committee to study the service tests of ties as this matter applies to both associations.

THE PRESIDENT: Mr. Howson, if you will allow me to suggest, we certainly ought to accept the report of the Committee. Can you not make a motion to that effect? Then recommend that the incoming Executive Committee confer with the American Railway Engineering Association and so forth?

MR. GEO. E. REX: Mr. President, I would like to move that the report of the Committee be accepted, and if it is in order, I would also like to move that the incoming Executive Committee be instructed to continue Mr. Winslow as Chairman of this Committee as a standing committee.

THE PRESIDENT: You are in order.

MR. GEO. E. REX: I think this has been a magnificent work, one that needs the study of those who have the time and technical knowledge to put into it. I think that Mr. Winslow deserves great credit and I would like to see him continue as Chairman.

MR. M. K. TRUMBULL: I second that motion, Mr. President.

THE PRESIDENT: The motion is that we accept the report and continue Mr. Winslow as Chairman of that Committee and that the Executive Committee confer with a like committee of the American Railway Engineering Association, take it up with the Board of Directors, with the view of having a joint committee appointed. Are you ready for the question? Those in favor say Aye, those opposed No. The Ayes have it.

