

Northern Pacific Railway Company. Engineering Department Records.

Copyright Notice:

This material may be protected by copyright law (U.S. Code, Title 17). Researchers are liable for any infringement. For more information, visit www.mnhs.org/copyright.

Version 3
August 20, 2018

REGIONAL OFFICES
LOS ANGELES 21
NEW ORLEANS 12
NEW YORK 17
PORTLAND 5
HOUSTON 2
MEMPHIS 9
ATLANTA 3
CHICAGO 1

A. D. CHAPMAN & COMPANY, INC.
WOOD PRESERVATIVES & INDUSTRIAL CHEMICALS
333 NORTH MICHIGAN AVENUE
CHICAGO 1

DISTRIBUTORS OF
DOWICIDE FOR
THE DOW CHEMICAL COMPANY
EXCLUSIVE SALES AGENTS
FOR
CHAPMAN CHEMICAL COMPANY
MEMPHIS, TENNESSEE

March 5, 1946

Mr. A. J. Loom
Gen'l Superintendent Timber Preservation
Northern Pacific Railway Company
Brainerd, Minnesota

Dear Mr. Loom:

Supplementing our Mr. Anderson's letter of February 20th to you with regard to treatment with pentachlorphenol, I have just returned from installing pentachlorphenol in five Western plants and in every case no additional equipment was necessary with the exception of the installation of a suitable cylinder basket for dissolving the crystals of penta in the oil or in the oil and creosote.

As described in Nonpressure Treatment of Wood III copy of which was sent to you, this basket is a cylinder of about 2 ft. in diameter and 6 or 8 ft.long through which a 3 or 4 inch pipe perforated with many holes is installed. Oil at about 200°F. is forced through the perforations in the pipe and the streams of hot oil are forced through the mass of penta crystals in the wire basket dissolving them very quickly. The basket is simply installed in either an underground tank or in a typical cedar butt treating tank.

Usually the heavy petroleums as specified by the A.W.P.A. and R.E.A. for blending with creosote are suitable for penta solutions for tie and timber treatment. Many companies, however, treating poles choose a somewhat lighter oil and we have made a rather extensive survey of oils throughout the country and will be glad to make specific recommendations if you are interested in the lighter type of oil. We might suggest that if you are interested in determining whether your current petroleum oil is suitable for use in penta alone or in mixture of creosote, please send a sample to Chapman Chemical Company, Memphis, Tennessee and we will check it and report the results to you.

The Santa Fe Railroad is contemplating the use of a mixture of 2½% penta in petroleum considering this the equivalent of a 50-50 mixture of a creosote in petroleum. Such a solution would cost only about 8¢ per gallon based on a 4¢ per gallon oil. They are also considering the use of a mixture containing 10% creosote and 90% of a 2% penta solution in petroleum.

I tried to phone you yesterday, but understood that you were away on a Western trip, and in this event would like to suggest that you visit the plants of the Forest Products Treating Company at Laramie, Wyoming and The Dalles, Oregon and, if possible, the three J. H. Baxter plants, all of whom are starting with our pentachlorphenol.

(4 copies)

Thanking you for your interest and looking forward to serving you, we remain

Cordially yours,
A. D. CHAPMAN & COMPANY, INC.

Dale Chapman

DC:m

Nonpressure Treatment of Wood

III.—Solvents, Equipment, and Methods for the Treatment of Wood with Low Viscosity Oil Solutions of Pentachlorphenol

By Stanley J. Buckman, Robert Y. Browne, and Walter H. Gay

Central Laboratories, Inc.
Memphis, Tennessee

There is a large potential market for treated wood for use in the construction of homes, farm buildings, and small industrial buildings, but it is a market which has not been adequately developed and served. Many millions of dollars are spent each year for the repair of damage of buildings of this type by decay and termites. The experience of large users of treated wood, such as railroads and utilities, has shown that the loss by decay and termite attack can be reduced to a small fraction of the present amount by the use of wood properly treated with preservatives. However, the small consumers usually are not sufficiently aware of the risks involved until it is too late and, if so, cannot obtain treated wood within a reasonable period of time at a satisfactory cost.

Development and service of the small consumer market is a challenge to the existing pressure and nonpressure treating industry since nonpressure treatment of wood by lumber mills and yards offers some advantages from the standpoint of low cost distribution of treated lumber. Low viscosity oil solutions of the chlorinated phenols, such as pentachlorphenol, are particularly adaptable to nonpressure treatment. Such solutions can be used to obtain treated lumber which is nonbleeding, odorless, paintable, and generally suitable for use in building construction.

The information presented in this paper was assembled in cooperation with The Dow Chemical Company and A. D. Chapman and Company, Inc., who made a substantial contribution to the cost of the work.

Pentachlorphenol and Petroleum Solvents

Pentachlorphenol is a crystalline organic chemical with a low vapor pressure, low solubility in water, and a high toxicity to wood destroying fungi and insects. Hatfield (4) has summarized the published, and some of the unpublished, information on recrystallized pentachlorphenol and the technical grade which is used in the field of wood preservation. The latter grade is available in the form of dry flakes and in solutions. A five percent solution by weight is most generally used in the treatment of wood and is available from several suppliers in this form and in the form of concentrates which are diluted with petroleum oils to obtain five percent solutions.

In general, large users will find it economical to prepare ready-to-use solutions from the dry chemical and suitable petroleum solvents. This can be readily done, following the precautions given by the manufacturers for handling the dry chemicals and solutions. Different solvents are employed for different use requirements. However, excluding the short immersion treatment of millwork and other products which are finished within a short period of time after treatment, the most commonly used solvents are light fuel oils. This is the only type considered in the present paper, which is primarily concerned with the general lumber treatment field.

Based on a study of a large number of different petroleum oils, information assembled from refineries, American Society for Testing Materials Tentative Specifications for Fuel Oils D 396-39 T, and general information which has been accumulated about various phases of the problem during the past several years, the following specification is recommended as a "tentative standard" for petroleum oils used as solvents in the preparation of pentachlorphenol solutions employed for the clean treatment of wood by nonpressure and pressure methods:

1. *Flash point.* Flash point not less than 190° F. as determined by the Pensky-Martens closed tester.
   A.S.T.M. Standard D 93.
2. *Pour point.* Pour point not more than 20° F.
   A.S.T.M. Standard D 97.
3. *Water and Sediment.* Water and sediment (B. S. and W.) not more than 0.1 percent.
   A.S.T.M. Standard D 96.
4. *Distillation.* Not less than 90 percent distilling below 650° F.
   A.S.T.M. Standard D 158.
5. *Viscosity.* Viscosity not more than 45 Saybolt Universal seconds at 100° F.
   A.S.T.M. Standard D 88.
6. *Pentachlorphenol Solvency.* Pentachlorphenol solvency not less than 10 percent by weight at 75° F.
7. *Color.* Surfaced Southern pine sapwood shall not be appreciably discolored when it is immersed for three minutes in a five percent solution of pentachlorphenol in the petroleum oil.
8. *Sludge Formation.* Sludge not more than 0.4 percent as determined by the method given in Appendix A.

The specification outlined is not intended to cover a petroleum solvent for use in special applications, such as the short immersion treatment of sash, doors, and other wood products which may be painted and finished in other ways within a few days after treatment. It also is not intended to cover a petroleum oil for use in the preparation of a pentachlorphenol solution for the treatment of products that will be finished with light shades of paints, unless some special precautions are taken to prevent yellowing of the paint film. Some yellowing of white paint has been noted during service when it was applied to wood three to five months after treatment with an absorption of 4.4 pounds per cubic feet of a five percent solution of pentachlorphenol in a No. 2 fuel oil having a normal color range between A.S.T.M. No. 2 and 4. As might be expected, the results indicated that the amount of yellowing increased with increased absorption of the solution by the treated wood. Yellowing of the type observed very likely can be reduced by the use of a sealing coat of exterior aluminun paint for exterior surfaces and a sealing coat of shellac for interior surfaces. Some of the plastic resin coatings also may offer possibilities. The color requirement given in the tentative specification is a start in this direction and should be the subject of further consideration and possible revision in the future. Pentachlorphenol solutions will darken during use in treatment and will pick up some colored sediment from treating vats, pipe lines, etc. It seems best to select oils for the time being based on a color requirement of the type described, with particular attention to the selection of oils with a maximum resistance to sludge formation when the solutions are heated. A minimum drying period of 30 days between treatment and painting under good drying conditions is recommended, and the use of a suitable "sealing primer" is suggested when the

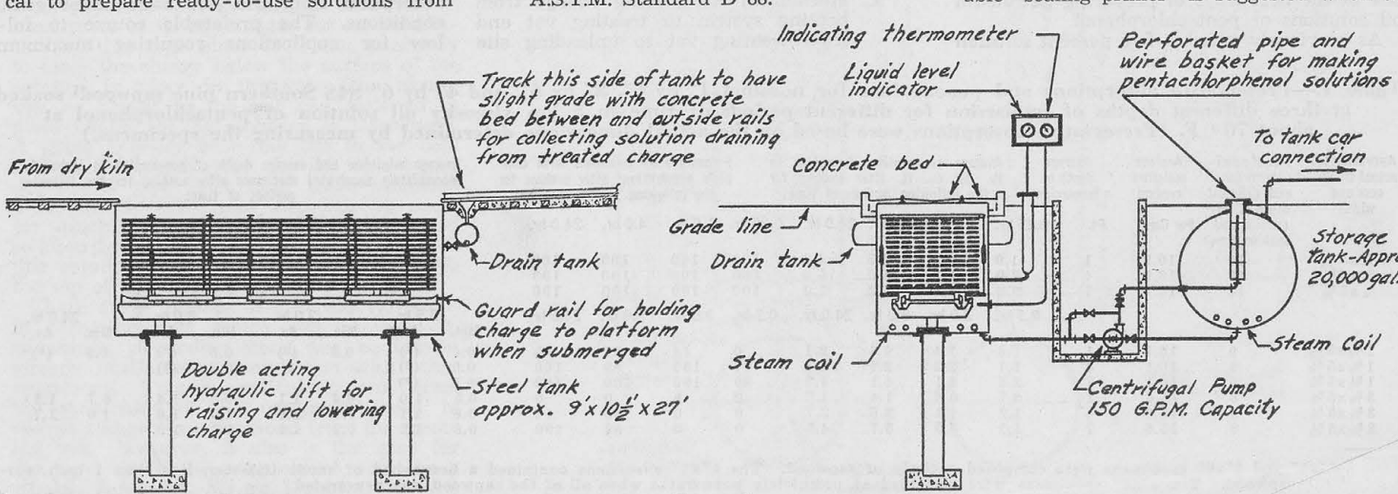


FIGURE 1.
Main features of one type of nonpressure treating plant.

treated wood is finished with light shades of paint.

The requirement on resistance to sludge formation included in the specification is applicable primarily to petroleum oils used in solutions employed as the hot bath for the hot-and-cold-bath treatment of wood products and for pressure treatment. A sludge will form and precipitate from petroleum oil solutions of pentachlorphenol when they are heated for an extended period of time under commercial treating plant conditions. The rate of sludge formation has been found to be different for different petroleum oils subjected to the same conditions. The evidence supports the conclusion that large amounts of pentachlorphenol are not precipitated as such in the sludge. Determinations made on sludge formed in petroleum solutions of pentachlorphenol by heating have shown 6.5 to 8.0 percent pentachlorphenol based on total chlorides when the solution as a whole contained 5.1 percent pentachlorphenol. Apparently, the pentachlorphenol acts primarily as a catalyst from the standpoint of sludge formation and the sludge is largely from the petroleum oil, at least in the cases when comparatively large amounts of sludge are formed.

The tentative method described in Appendix A was developed for use in determining the relative sludge forming characteristics of different petroleum oil solutions of pentachlorphenol. This method has been used for determinations on pentachlorphenol solutions prepared with a large number of different petroleum oils. The results of these determinations, combined with experience in the use of the same oils for the treatment of wood, indicate that the method provides a basis for distinguishing between satisfactory and unsatisfactory petroleum oils for use in pentachlorphenol solutions which are heated at 190° F. and above. Continued determinations are being made to obtain further information on the degree of correlation between the results obtained by the test method and the performance of a petroleum oil in commercial use. In the meantime, a preference should be shown for oils which give the smallest relative amounts of sludge, as determined by the tentative method.

Equipment for Preparation of Solutions and Treatment

Figures 1 and 2 show the main features of one type of arrangement for use in preparing oil solutions of pentachlorphenol. The petroleum oil is heated to a temperature of 170 to 190° F. and pumped from the bottom of the tank up through the wire basket where small streams of hot oil flow from the holes in the perforated pipe through the surrounding column of pentachlorphenol retained in the wire basket. Experience with various types of equipment has shown that the arrangement described is efficient and one of the best ways of preparing petroleum oil solutions of pentachlorphenol.

As previously noted, a five percent solution of pentachlorphenol by weight is the concentration most generally used in the treatment of wood. The weight of the oil used in a batch is normally calculated from determinations of the specific gravity, temperature, and volume of oil in the tank. The amount of pentachlorphenol required for a five percent solution by weight is equal to the weight of the oil used divided by 0.95 minus the weight of the oil. The Lime Ignition Method described in Appendix B is a satisfactory plant control method for use in the determination of pentachlorphenol in oil solutions (8).

Aside from brush and spray applications and short dipping treatments employed for specialized uses, such as sash and doors and emergency war applications for which longer treatments are not necessary or feasible, the simplest form of nonpressure treatment consists of soaking the wood in the treating solution at atmospheric temperature until the desired treatment has been obtained. Different variations of the hot-and-cold-bath process constitute the other major type of nonpressure treatment method of interest in the present consideration (3). In all of these variations, the wood is preheated prior to soaking in an oil solution at lower temperatures, varying from about 70 to 100° F. Although there are differences in the rates of heat transfer obtained with different heating mediums and heating conditions, the general principle is the same whether the wood is preheated in an oil bath, in a dry kiln with air and steam, or in a retort with steam, etc. The gases in the wood expand during the heating period and some are forced out. When the wood is transferred to the preservative solution, it cools and the gases in the interior contract thereby creating a partial vacuum or, in other words, a differential between atmospheric pressure and the pressure of the air and vapor in the wood. This pressure differential forces the surrounding preservative solution into the wood. The main components of nonpressure treating plants using the hot-and-cold-bath type of treatment method are as follows:

1. *Heating system*—Conventional dry kiln or special heating chamber with provision for heating by hot air and steam, or hot oil bath.
2. *Treating system*—
   - A. Vat with liquid level indicating gage and indicating thermometer
   - B. Mechanism or mechanisms for lowering charge into vat, submerging the charge (if the liquid is kept in the vat), holding the charge submerged during treatment, and removing the charge from the vat. One of the primary elements involved in the treatment is the time between removal from the heating system and complete immersion. This time period should be kept at a minimum.
   - C. Mechanism for moving charge from heating system to treating vat and from treating vat to unloading site when winches, tractors, etc., used with dry kilns are not available.
   - D. Provision for draining excess solution from charge and recovery in either the treating vat or storage tank.
   - E. Storage tank or tanks and transfer pump.

There are a number of different plant layouts which can be used. One type is based on the use of both hot and cold vats of solution and transferring the charge of wood from the hot to the cold bath with a crane, monorail hoist, etc. Another type of nonpressure plant is based on the use of one vat for both the hot and cold baths. The better procedure followed for an arrangement of this type consists of transferring hot solution into the vat to heat the wood, removing the hot solution at the end of the heating period, and refilling with the cold bath of solution from another storage tank. In other words, this variation involves the use of two tanks in preference to two vats and the transfer of hot and cold supplies of solution in and out of the vat in preference to the transfer of the wood from one vat to another.

Consideration also has been given to the use of a slowly moving conveyor arrangement and feeding individual posts, pieces of lumber, etc., to the conveyor at one end and having the conveyor carry the pieces in turn through a hot and cold bath. A final hot expansion bath may be employed to give a series of three vats through which the conveyor moves. A final hot bath also can be used with any one of the other types of nonpressure treating plants mentioned by an additional transfer of either the wood or solution. The final hot bath functions in a similar way to the final vacuum employed for pressure treatment and is used to "dry-up" the treated wood products and reduce the amount of solution retained by the wood without reducing penetration.

Figure 1 shows the main features of one type of nonpressure treating plant based on heating the wood in a conventional dry kiln or in a special heating chamber with provision for heating by hot air and steam. This general method of approach has some advantages for treating installations designed to produce as "clean" a treated wood product as feasible. As previously discussed, some sludge will form from most petroleums and precipatate when solutions of pentachlorphenol in petroleum oils are heated for a long period of time. Petroleum oils differ in this respect and the amount of sludge encountered can be materially reduced by the selection of oils. Thought also has been given to the elimination of pentachlorphenol from the hot bath as one means of eliminating any sludge problem. However, there is a significant interchange of liquid between the hot and cold bath oil systems in practical plant installations and a significant absorption from the hot bath under some conditions. The preferable course to follow for applications requiring maximum cleanliness of the treated wood thus seems to be one of heating in hot air, supplemented with steam as necessary to avoid excessive checking but conducted so as to reduce the moisture content of the wood as much as feasible during the heating period.

The type of nonpressure treating plant shown in Figure 1 is based on using a double-acting hydraulic lift and keeping the solution in the vat between treatments except for a long shut-down period. The charge is pulled from the kiln with conventional winches or other suitable equipment. The rails attached to the top of the lift are equipped with a guard rail attachment which will keep the charge from leaving the rails when it is submerged in the liquid. By the use of a double-acting lift, the same mechanism can be used to lower the charge evenly and quickly into the solution, submerge it by overcoming the buoyant force, hold the charge submerged during treatment, and evenly raise the charge from the solution after treatment.

A double-acting lift of the type shown in Figure 1 merits first consideration in handling large charges of lumber when the wood is heated with hot air and steam in a dry kiln or heating chamber and must be quickly submerged in the cold bath. When a hot oil bath is used to heat the wood, a crane or traveling overhead hoist has advantages in transferring the charge from one vat to another. Installations of this type require supplementary equipment to submerge the charge and hold it below the surface of the solutions in the hot bath and in the cold bath.

A double-acting lift of the type shown in Figure 1 also is a feasible installation when one vat is used for both the hot and cold baths by transferring hot and cold solutions from separate storage tanks. However, it loses some of its advantages for an installation of this type since it is not necessary to force the charge below the surface of the solution in place in the vat. The charge can be placed in the vat and fastened in place before the hot solution is introduced. A quick transfer from the hot to the cold bath is accomplished by the use of a larger pump and pipe lines than those indicated in Figure 1. Provision also can be made for quickly filling the vat with the cold solution by gravity from the storage tank of this solution located at an elevation above the top of the treating vat.

There are a number of different variations in plant lay-outs which can be used to advantage, depending upon the equipment already available in conjunction with other operations. This is particularly true from the standpoint of the equipment used to charge and remove the wood from the treating vat. However, it also is the case for the lay-outs of the nonpressure plant as a whole. As noted, Figure 1 shows only the main features for one type of nonpressure treating plant based on heating the wood with hot air and steam in a conventional dry kiln or a special heating chamber.

Table 1.—Preservative absorptions and penetrations for nominal 1″ by 6″, 2″ by 6″, and 4″ by 6″ S4S Southern pine sapwood[1] soaked at three different depths of immersion for different periods of time in a low viscosity oil solution of pentachlorphenol at about 70° F. (Preservative absorptions were based on the actual dimensions determined by measuring the specimens.)

Approximate actual thickness and width	No. of specimens for each different depth of immersion and soaking time	Average moisture content	Average depth of immersion	Average preservative absorption in lb. per cu. ft. after soaking for the following periods of time:				Percentage of specimens with complete penetration[2] after soaking for the following periods of time:				Average minimum and average depth of penetration in inches for incompletely penetrated specimens after soaking for the following periods of time:							
												0.5 hr.		2.0 hr.		8.0 hr.		24.0 hr.	
		Per Cent	Ft.	0.25 hr.	1.0 hr.	4.0 hr.	24.0 hr.	0.25 hr.	1.0 hr.	4.0 hr.	24.0 hr.	Min.	Av.	Min.	Av.	Min.	Av.	Min.	Av.
¾ x5 5/8	10	10.9	1	1.9	2.4	2.8	4.2	100[3]	100	100	100								
¾ x5 5/8	10	10.9	4	2.9	3.8	4.0	5.6	100	100	100	100								
¾ x5 5/8	10	10.9	7	3.8	4.6	5.2	7.0	100	100	100	100								
				0.5 hr.	2.0 hr.	8.0 hr.	24.0 hr.	0.5 hr.	2.0 hr.	8.0 hr.	24.0 hr.								
1 5/8 x5 5/8	9	16.1	1	1.0	1.4	1.4	2.1	0	44	67	89	0.4	(3)	0.5	(3)	0.5	(3)	0.5	(3)
1 5/8 x5 5/8	9	16.1	4	1.7	2.2	2.7	3.4	67	100	89	100	0.5	(3)			0.6	(3)		
1 5/8 x5 5/8	9	16.1	7	2.5	3.1	4.1	4.7	89	100	100	100	0.5	(3)						
3 5/8 x5 5/8	8	15.6	1	0.7	0.8	1.4	1.2	0	0	0	0	0.5	1.0	0.4	1.1	0.8	1.4	0.7	**1.2**
3 5/8 x5 5/8	8	15.6	4	1.2	1.4	2.6	2.7	0	0	25	12	0.6	1.1	0.7	1.2	1.0	1.6	1.0	1.7
3 5/8 x5 5/8	8	15.6	7	1.5	2.0	3.7	4.5	0	0	62	100	0.8	1.2	0.9	1.4	1.2	1.9		

[1]The 1″x6″ and 2″x6″ specimens were composed entirely of sapwood. The 4″x6″ specimens contained a heartwood of small diameter, less than 1 inch, surrounded by sapwood. The 4″x6″ specimens were classified as completely penetrated when all of the sapwood was penetrated.

[2]Two specimens or 20 per cent had a small amount of lightly penetrated or unpenetrated wood in the central portion of the cross section.

[3]The major portion of the cross section of all of the 2″x6″ specimens was penetrated and no determinations were made of the average penetration of the incompletely penetrated specimens of this size.

Table 2.—Preservative absorptions and penetrations for Southern pine posts soaked for different periods of time in a vertical position with the top 6 inches below the surface of a low viscosity oil solution of pentachlorphenol at about 70° F.

Duration of soaking period—Hr.	8		24		48	
Number of posts	18		18		18	
Average butt diameter—In.	3.6		3.5		3.4	
Average top diameter—In.	3.1		3.0		3.0	
Average moisture content—Per cent	18.1		22.0		18.6	
Average preservative absorption in lb. per cu. ft. for the portions of the posts the following distances in ft. from the butt:						
0 — 1.5	3.3		5.2		5.7	
1.5 — 2.5	2.7		4.9		5.4	
2.5 — 3.5	2.4		4.4		5.1	
3.5 — 4.5	2.2		3.9		4.7	
4.5 — 5.5	1.9		3.7		4.6	
5.5 — 6.5	1.7		3.7		4.4	
Average preservative absorption in lb. per cu. ft. for entire posts—	2.5		4.4		5.1	
Average preservative penetration in inches and percentage of sapwood depth penetrated at the following distances in ft. from the butt:	**In.**	**Per Cent**	**In.**	**Per Cent**	**In.**	**Per Cent**
2.0	1.2	77	1.5	98	1.5	97
3.0	1.2	78	1.4	97	1.4	94
4.0	1.0	72	1.4	96	1.4	94
5.0	0.9	63	1.3	94	1.4	93
5.8	0.7	51	1.3	93	1.3	93
Percentage of posts with 100 per cent of sapwood depth penetrated at 2 ft. from butt—	17		78		72	
Percentage of posts with 85 per cent or more of sapwood depth penetrated at 2 ft. from butt—	39		100		100	

Preparation for Treatment and Selection of Treatment Methods

In general, it is preferable to dry wood to an average moisture content of 25 percent or below prior to treatment by nonpressure methods, and this is particularly important for wood to be treated by cold soaking. Practical experience also has indicated that Douglas fir, and possibly other woods, may develop an additional resistance to treatment if dried too rapidly or for too long a period of time. Woods, such as Douglas fir, which are difficult to treat under optimum conditions should be incised before treatment.

The cold soaking process consists of soaking wood in a preservative solution at temperatures from 70 to 100° F. until the desired absorptions and penetrations have been obtained. Hubert (5) has reported results obtained by cold soaking ponderosa pine, white fir, and western larch pieces of different sizes in a low viscosity oil solution of pentachlorphenol. Table 1 and Figures 3, 4, and 5 give the preservative absorptions and penetrations obtained for nominal 1″ by 6″, 2″ by 6″, and 4″ by 6″ S4S Southern pine sapwood soaked at three different depths of immersion, and Table 2 gives the same results for round Southern pine posts soaked in a vertical position in the same general type of preservative (1). All the results mentioned and additional published and unpublished information for fence posts and other products show that the cold soaking method has a field of usefulness, particularly in the treatment of permeable woods such as Southern and ponderosa pine. The method has its greatest application in the treatment of thin lumber and round pieces having a small cross section or a thin sapwood which are in an optimum condition for treatment.

The information given in Tables 1 and 2 and shown in Figure 6 illustrates the effect of depth of immersion on the preservative absorptions and penetrations (1, 2). This is of interest in the treatment of products, such as fence posts. The most effective treatment of a post is desired at the ground line since the conditions at this location are the most favorable to the development of decay. By immersing posts full length in a vertical position with the butts down, it is possible to obtain a progressivly heavier absorption from the top to the butts.

The hot-and-cold-bath process is the most effective of the nonpressure treatment methods. Table 3 and Figures 7 and 8 give the preservative absorptions and penetrations obtained for nominal 2″ by 6″ S4S Southern pine sapwood preheated at different temperatures for two hours and soaked for various

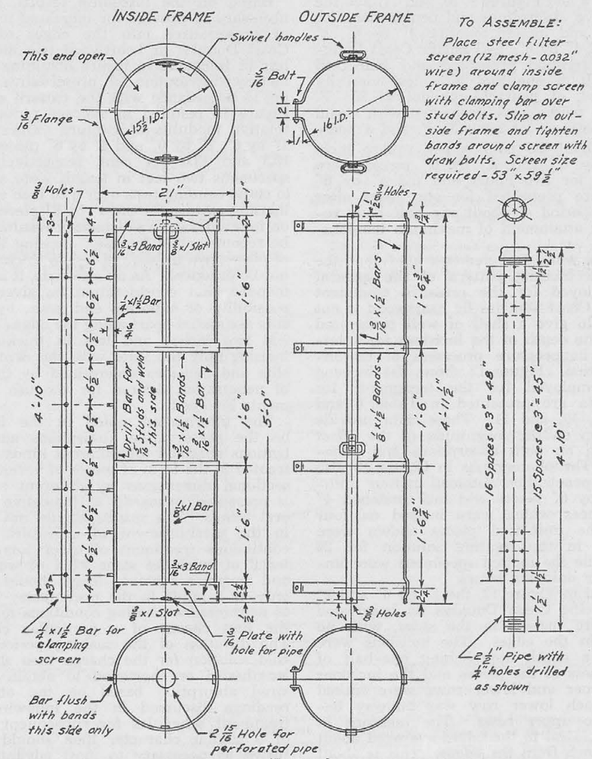


FIGURE 2.
Wire basket for use in the preparation of solutions of pentachlorphenol.

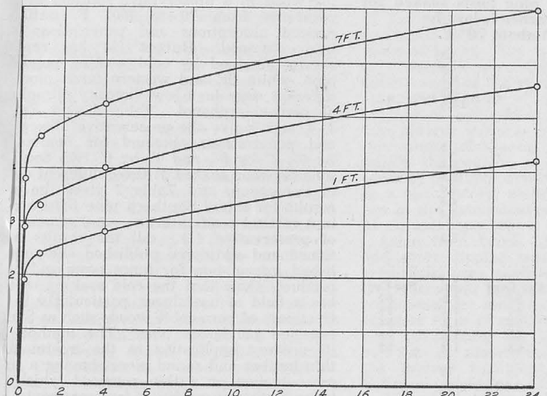


FIGURE 3.

Increase in absorption with time for 1" by 6" S4S Southern pine sapwood immersed at three different depths in a low viscosity oil solution of pentachlorphenol at about 70° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately ¾" by 5⅝".)

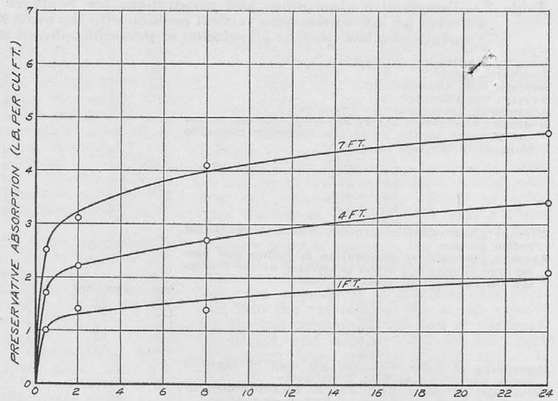


FIGURE 4.

Increase in absorption with time for 2" by 6" S4S Southern pine sapwood immersed at three different depths in a low viscosity oil solution of pentachlorphenol at about 70° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 1⅝" by 5⅝".)

periods of time at different depths of immersion (2). These data support the conclusion that satisfactory penetrations and any desired absorptions up to about 20 pounds per cubic feet can be obtained in 2" by 6" S4S Southern pine sapwood with a moisture content of about 20 percent by varying the treatment conditions within a range which can be readily employed in commercial practice. As shown in Figure 7, an absorption of about eight pounds per cubic foot was obtained by preheating for two hours at 180° F., followed by immersion at a depth of four feet for one hour.

Table 4 and Figures 9, 10, and 11 give the preservative absorptions and penetrations for unincised and incised nominal 1" by 6", 2" by 6", and 4" by 6" S4S Pacific Coast Douglas fir heartwood preheated and immersed at a depth of one foot in a low viscosity oil solution of pentachlorphenol at 80° F. All of the pieces were preheated with steam at a temperature of 230 ± 3° F. and a pressure of about 6.5 pounds per square inch. The 1" by 6" and 2" by 6" pieces were preheated for two hours and the 4" by 6" pieces were preheated for six hours after an initial period of about one-half hour required for attainment of maximum temperatures.

Previous work had demonstrated that the use of an incising pattern of the general type employed for the pressure treatment of Pacific Coast Douglas fir heartwood is not adequate to give a shell of well penetrated wood to the depth of the incisions for treatment by nonpressure processes of reasonable duration. Figure 12 shows the incising pattern employed for the treatments for which data are presented in Table 4 and Figures 9, 10, and 11. These data provide information on the magnitude of the effect of incising on both absorptions and penetrations. The photographs in Figure 13 also show the penetration obtained in four unincised 4" by 6" pieces and four matched 4" by 6" pieces which were incised on four sides. The unincised pieces shown were immersed in the treating solution for 24 hours, while the incised specimens were immersed for only six hours.

As noted in Figure 12, the 1" by 6" and 2" by 6" Pacific Coast Douglas fir heartwood pieces were incised in the sides, with no incisions in the edges. The incisions were made to a depth approaching one-half of the thickness of the pieces and the incisions in the upper and lower rows were spaced so that each lower row was midway between two upper rows. The incisions in the sides closest to the edges averaged about one-half inch from the edges. This is about as close to the edges as incisions of the depth used could be made without splitting the pieces with the hand incising method employed. However, as was thought might be the case, the incisions were not close enough to the edges to give complete penetration, even though the specimens had been incised to approximately one-half of their thickness. The photograph in Figure 14 shows the unpenetrated strips of wood which remained close to the edges of some of the pieces from the group of 2" by 6" pieces preheated and soaked for two hours in a low viscosity oil solution of pentachlorphenol at 80° F. with a resultant absorption of 8.3 pounds of solution per cubic foot of wood.

Based on the foregoing results, it seems necessary to provide for increased movement of preservative into the edges of Pacific Coast Douglas fir heartwood two inches and less in thickness to insure obtaining a satisfactory distribution of preservative. Incising in accordance with the pattern shown in Figure 12 resulted in average reductions in relative modulus of rupture values for the 1" by 6", 2" by 6" and 4" by 6" pieces of 19.3, 10.3 and 13.0 per cent, respectively, when specimens two feet in length were subjected to static bending tests over a 20 inch span. The incising pattern for the 4" by 6" pieces incised on four sides gave satisfactory results and can be recommended for use. Incising the edges of pieces two inches and less in thickness may not be practical. As an alternate, it is recommended that consideration be given to the possibility of exposing end grain by sawing slits six inches apart along the edges of material two inches and less in thickness and incising only the sides with the depth of the slits and incisions determined by the depth of penetration desired for the use requirements involved.

The information noted in the foregoing on the preservative absorptions and penetrations obtained for different kinds of wood treated in the form of pieces of various cross-sectional dimensions by different schedules is presented primarily as indicative of general trends. The results should not be used in the establishment of schedules for the continuous treatment of other lots of material of even the same kind of wood, size, and moisture content. They should be used only as a guide in the preliminary selection of nonpressure treating conditions for use on the first charge of a particular character. The duration of the soaking period in the cold solution for the charge then should be lengthened or shortened to obtain the desired absorption based on the absorption readings discussed in the following. The treatment schedules for subsequent charges of a similar character then should be adjusted as necessary to most advantageously obtain the desired results. No attempt was made in the studies mentioned to define the most efficient duration of preheating period to use. It is possible that slightly shorter preheating periods can be employed in commercial practice depending upon the heating medium used, provision for adequate circulation of the heating medium throughout the charge, etc. Information is available for use in determining the heating periods required under various conditions to attain the desired temperatures in pieces of wood with different cross sectional dimensions (6, 7).

Determination of Preservative Absorptions

The liquid level indicating gage shown in Figure 1 is used to follow the absorption of solution by the charge and determine the length of time which the particular charge is allowed to remain in the cold bath. There is only a small difference between the gross absorption (the total amount of solution absorbed by the charge) and the net absorption (the amount of solution remaining in the wood after drainage). The difference is represented by the amount of solution which flows out of the wood during the drainage period and will vary with the kind of wood, amount of solution absorbed, etc. The gross absorption necessary to attain the desired minimum net absorption is estimated, based on the results obtained for prior charges of a similar character. The total gross absorption is composed of two parts: the initial absorption which takes place during the time the charge is being submerged and the absorption after the charge is submerged. The initial absorption is estimated from experience and will vary with the kind of wood, preheating conditions, time between immersion of the first part of the charge and complete immersion, viscosity of the treating solution, etc. The amount of gross absorption after the charge is submerged is determined from the difference between a reading taken on the liquid level gage as soon as the charge is submerged and subsequent readings. Temperature corrections are usually not made in gross absorption readings since these readings are used only as a guide in attaining the desired minimum net absorption and are limited in accuracy by the estimates mentioned.

Figure 1 shows a separate small tank for use in collecting the amount of drainage from the charges. The amount of drainage can either be measured in this tank or drained back into the treating vat and measured later between charges. The net absorption for a nonpressure treating plant of the type shown in Figure 1 is determined by the difference in volume of solution in the vat before and after treatment, corrected for any temperature change of the solution and the amount of drainage from the charge.

Table 3.—Preservative absorptions and penetrations for nominal 2" by 6" S4S Southern pine sapwood preheated at different temperatures for two hours and soaked for various periods of time at different depths of immersion in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on the actual dimensions determined by measuring the specimens.)

Temperature to which wood was preheated	Number of specimens	Average moisture content Per cent	Average depth of immersion Ft.	Average preservative absorption in lb. per cu. ft. after soaking for the following periods of time: 0.5 hr.	2.0 hr.	6.0 hr.	24.0 hr.	Percentage of specimens with complete penetration after soaking for the following periods of time: 0.5 hr.	24.0 hr.
80	20	17.1	1		1.4	1.8	2.5		100
80	20	17.4	4	1.9				65[2]	
80	20	16.8	7		3.4	4.4	5.0		100
130	20[1]	17.7	4	2.6	4.5	6.0	7.3	90[3]	100
180	20	19.6	1		9.7	12.7	14.5		100
180	20[1]	19.8	4	5.1	11.7	14.0	15.5	100	100
180	20	19.3	7		13.8	15.8	17.3		100
230	20	22.8	1		16.5	20.8	22.6		100
230	20[1]	22.2	4	11.8	18.4	21.6	23.0	100	100
230	20	21.0	7		19.8	22.0	23.0		100

[1]One group of 20 specimens was used for the 0.5 hr. soaking period and a separate group of 20 specimens was used for the 2, 6, and 24 hour soaking periods, the same specimens being removed, weighed and put back in the treating tank after 2 and 6 hours soaking.

[2]The 7 incompletely penetrated specimens in this group had an average minimum penetration of 0.3 in. and an average penetration of 0.8 in.

[3]The 2 incompletely penetrated specimens in this group had an average minimum penetration of 0.4 in. and an average penetration of 0.6 in.

The temperature correction factors given in American Wood Preservers' Association Standard 40c are satisfactory for five percent pentachlorphenol solutions A standard temperature of 60 or 100° F. may be used and correction factors are provided for both. The net absorption in gallons for the charge is usually converted to pounds of solution per cubic feet of wood, based on the specific gravity of the solution at the standard temperature and the volume of wood in the charge based on the actual dimensions of the pieces.

Similar general principles can be used in determining preservative absorptions with various types of nonpressure treating plants. The type shown in Figure 1 represents the simplest case, and additional equipment is necessary when both hot and cold supplies of solution are involved in the treatment. Scales can be used to determine the net preservative absorption by weighing the charge of wood or a representative portion of the charge before and after treatment. For the treatment of certain types of products, such as cedar poles, the net preservative absorption in the thin layer of sapwood may be determined by analyses of borings from a representative number of poles.

Determination of Preservative Penetration

Two reasonably satisfactory methods are available which can be used to obtain indications of the penetration of petroleum oil solutions of pentachlorphenol which will not appreciably color wood. Following is a brief description of the use of these methods on increment borings:

Silver Nitrate Method[1]—This method is based on the formation of yellow silver pentachlorphenate on the treated wood. The reagents consist of a 10 percent solution of sodium acetate, hydrous, in water and a 0. 1 N solution of silver nitrate. (Same silver nitrate solution used in pentachlorphenol determinations by the Lime Ignition Method.) The boring is dipped in the sodium acetate solution followed by a dip in the silver nitrate solution. It then is set aside to dry about 15 minutes. The development of a yellow color indicates the presence of silver pentachlorphenate and the yellow color frequently can be intensified by heating the boring in an oven for 15 to 30 minutes after the initial drying period at room conditions. This test has been found to give reasonably visible indications of pentachlorphenol at concentrations of about two pounds of a five percent solution per cubic foot of wood. The untreated portion of borings of different kinds of wood show different results. For example, Southern pine sapwood and heartwood and cedar sapwood normally remain a natural color and cedar heartwood becomes darkened. Douglas fir darkens over both the untreated sapwood and heartwood, particularly the heartwood. This interferes with penetration determinations on Douglas fir and can be prevented by dipping the boring in a three percent solution of hydrogen peroxide before it is dipped in the sodium acetate and silver nitrate solutions.

Beilstein Method—This method is used to determine whether pentachlorphenol is present in portions of borings and can be employed readily on pieces about 0.2 inch in length. The portion of the boring to be tested is held in copper tongs[2] or wrapped in copper wire and suspended in a reduced flame of a Bunsen burner, preferably equipped with a wing tip. If pentachlorphenol is present, a green flame is observed in close association with the boring when it starts to burn. The copper tongs or wire should be heated in the flame of the Bunsen burner before each determination. This test is useful primarily in making check determinations on the indicated depth of penetration obtained with the Silver Nitrate Method and will give positive indications at somewhat lower concentrations of pentachlorphenol. The Beilstein Method can be used on portions of the same borings which have been tested by the Silver Nitrate Method although the green color of the pentachlorphenol may be slightly harder to detect. The Beilstein Method also is useful in readily determining whether the penetration of pentachlorphenol exceeds some minimum depth. In addition, borings can be cut into pieces 0.2 inch in length and a sufficient number of pieces tested to determine the depth of penetration within 0.2 inch. This usually can be accomplished by testing several pieces from each boring.

[1]Slight modification of method described by E. D. Serdynsky in Procedure dated August 10, 1944

Treatment Records

Records of the treatment of all charges should be permanently preserved on suitable forms provided for this purpose. Proper treatment records provide a valuable source of information about material in service and are very useful as a guide in selecting the most efficient treating methods to use on future charges. The treatment record form should provide for the following: charge number, date treated, kind of wood, number and size of pieces, moisture content, total cubic feet in charge, nonpressure treating process used, percentage of pentachlorphenol in treating solution and identification of petroleum oil, time preheating was started, preheating temperature, time preheating temperature was attained, time preheating ended, time charge was completely submerged, liquid level readings (gross absorptions) and temperature readings for the solution during the cold bath period, time charge was removed from cold bath, liquid level and temperature readings before and after treatment and the amount of drainage used in the calculations of net absorption, preservative penetrations shown by borings, and disposition of charge.

[2]Suitable copper tongs can be readily made from a piece of heavy copper wire flattened at the ends, a piece of spring wire, and some insulating tape.

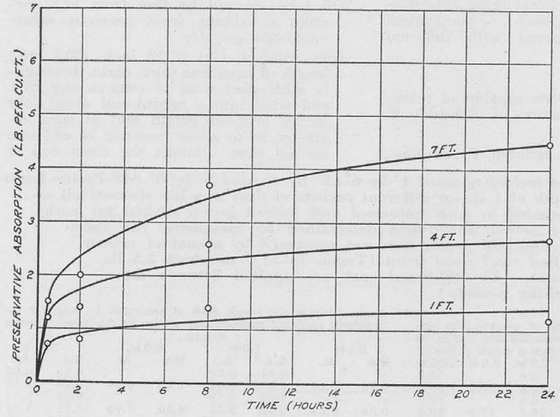


FIGURE 5.

Increase in absorption with time for 4" by 6" S4S Southern pine sapwood immersed at three different depths in a low viscosity oil solution of pentachlorphenol at about 70° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 3⅝" by 5⅝".)

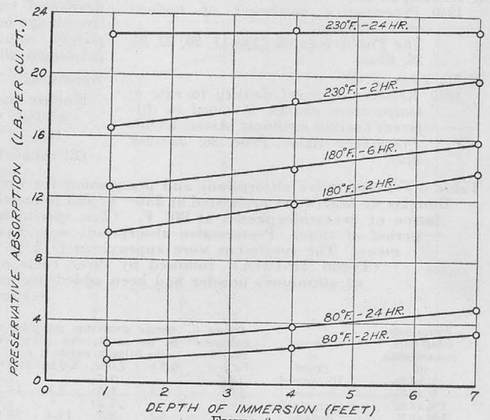


FIGURE 6.

Relation between absorption and depth of immersion for 2" by 6" S4S Southern pine sapwood preheated at different temperatures and immersed for various periods of time in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 1⅝" by 5⅝".)

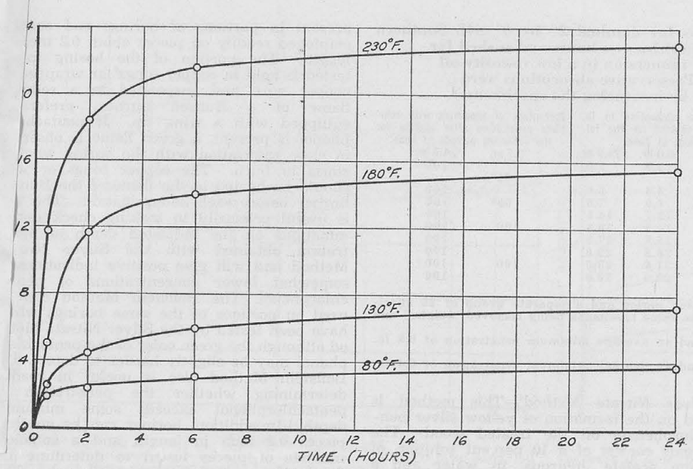


FIGURE 7.
Increase in absorption with time for 2" by 6" S4S Southern pine sapwood preheated two hours at different temperatures and immersed a depth of four feet in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 1⅝" by 5⅝".)

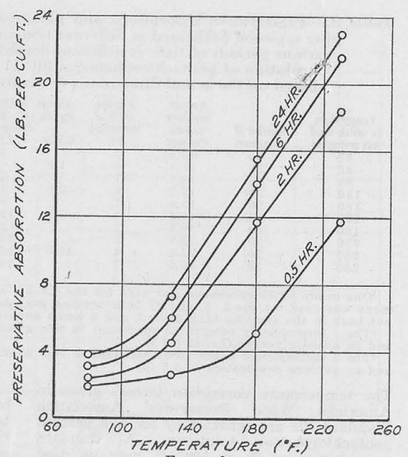


FIGURE 8.
Increase in absorption with temperature of wood for 2" by 6" S4S Southern pine sapwood preheated two hours and immersed at a depth of four feet for different periods of time in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 1⅝" by 5⅝".)

Literature Cited

1. *Buckman, S. J. and Pera, J. D.*
   1942. *Nonpressure treatment of wood. I. Cold soaking treatment of southern pine sapwood with a low viscosity oil solution of pentachlorphenol. Southern Lumberman* 165: 223-226, *illus.*
2. *Buckman, S. J., Pera, J. D., and Browne, R. Y.*
   1943. *Nonpressure treatment of wood. II. Soaking treatment of preheated southern pine sapwood with a low viscosity oil solution of pentachlorphenol. Southern Lumberman* 167: 156-158, *illus.*
3. *Forest Products Laboratory*
   1944. *Methods of applying wood preservatives.* *U. S. Dept. of Agr. Forest Products Lab. R* 154, 21 *pp. [Mimeographed]*
4. *Hatfield, I.*
   1944 *Information on pentachlorphenol as a wood preserving chemical.* *Amer. Wood-Preservers' Assoc. Proc.* 40: 47-65.
5. *Hubert, E. E.*
   1940. *Preservative treatment of timbers with Permatol.* *The Timberman* 42 (1): 17, 20, 22, 24, 26, *illus.*
6. *MacLean, J. D.*
   1940. *Relation of wood density to rate of temperature change in wood in different heating mediums. Amer. Wood-Preservers' Assoc. Proc.* 36: 220-248, *illus.*
7. ———
   1943. *Rate of temperature change in laminated timbers heated in air under controlled relative humidity conditions. U. S. Dept. Agr. Forest Products Lab. R* 1434, 17 *pp., illus. [Mimeographed]*
8. *Method developed in cooperation with J. D. Burnes, Page and Hill Company; R. H. Colley, Bell Telephone Laboratories, Inc.; Ira Hatfield, Monsanto Chemical Company; and F. B. Smith, The Dow Chemical Company.*

APPENDIX A

Tentative Method for Determination of Relative Sludging Characteristics of Petroleum Oil Solutions of Pentachlorphenol

A sludge forms and precipitates from petroleum oil solutions of pentachlorphenol when they are heated for an extended period of time under commercial treating plant conditions. The rate of sludge formation has been found to be different for different petroleum oils subjected to the same conditions. The method described in the following was developed for use in determining the relative sludge forming tendencies of pentachlorphenol solutions prepared with different petroleum oils.

Apparatus

Electric oven—An oven capable of maintaining a temperature of 270 ± 2° F. (133 ± 1° C.).

Oil tube—Test tubes, ignition, Pyrex glass, heavy wall 25 mm. outside diameter, 200 mm. overall length, calibrated by the operator and marked to indicate 50 ml. capacity.

Gooch crucible—Coors porcelain, size No. 4, 35 ml. capacity.

Asbestos—For Gooch crucibles, medium fiber, acid washed.

Iron catalyst—Commercial bare iron wire 0.040 in. (No. 18 gauge) in diameter.

Glassware and miscellaneous—Filter flasks, crucible adapter, beakers, stirring rods, cork stoppers, metal test tube rack.

Analytical balance—Sensitive to at least 1 mg. (0.001 gm.) and with a capacity of 200 grams in each pan.

Solvents and Chemicals

Petroleum ether—30°-60° C. boiling range.
Pentachlorphenol—Technical product.
Ferric chloride—C. P. crystal.

Preparation of Apparatus

Oven—Should be preheated at sufficiently high temperature to give a final temperature of 270° F. with full load of samples.

Oil tube—Should be free from any particles of sludge from previous determinations and dry.

Iron catalyst—Cut a 12 inch (30.5 cm.) length of bare iron wire, clean thoroughly with steel wool to remove any rust, and wind into a helical coil about four inches over-all length and of such diameter as to allow insertion of coil into the oil tube. Handle the clean coil as little as possible. Use a freshly prepared coil for each determination.

Gooch crucible—Add sufficient asbestos suspended in water to give a mat about 1/8 inch thick. Dry by suction and pack with a glass rod. Then add additional asbestos suspension to increase the mat thickness to about 3/16 inch and dry by suction. Prepared crucibles should be dried at least three hours at 110° C. (Note 1), cooled in a desiccator, and weighed to the nearest 0.001 gm. before using in the sludge determination.

Preparation of Oil Solution

Prepare 105 grams of a solution containing five percent by weight of pentachlorphenol in the oil to be tested. This should provide two 50 ml. portions for test, with the exception of very heavy oils for which it will be necessary to prepare more than the stated amount.

Procedure

Weigh the calibrated oil tube and coil to the nearest 0.001 gm. and introduce 0.05 gm. ferric chloride (Note 2) into the tube below the oil level. Weigh the beaker containing the pentachlorphenol solution to the nearest 0.01 gm. and fill the calibrated oil tube to the 50 ml. mark. Reweigh the beaker and obtain the weight of oil solution added to the tube by difference. Stopper the tube loosely and place upright in the metal rack. Prepare a duplicate determination and place both samples and rack in the preheated oven, recording the time and adjusting the oven if necessary to give a temperature of 270 ± 2° F. and allow the samples to remain 48 hours.

After the heating period, remove the rack containing the samples from the oven and filter the samples through the tared Gooch crucibles (Note 3). If several samples are to be run, it is advisable to return the oil to the oven long enough to thoroughly heat the sample before filtration. Wash the tube and coil with three 10 ml. portions of petroleum ether, transferring as much of the sludge to the crucible as possible with these washings. Finally wash the tube and crucible with 70 ml. of petroleum ether or until the filtrate appears free of oil (Note 4).

Dry the crucible containing sludge and the tube containing the coil and any adhering sludge for at least three hours, preferably over-night at 110° C. (Note 1). Cool the crucible in a desiccator and weigh to the nearest 0.001 gm., recording the increase in weight as sludge. The tubes need not be cooled in a desiccator but must be cooled and reweighed to the nearest 0.001 gm. to determine the amount of sludge adhering to the tube and coil. Add the weight of sludge in the crucible to that found in the tube to obtain the total sludge formed.

Calculation—Calculate the percentage of total sludge, which includes the undissolved ferric chloride, in the pentachlorphenol solution as follows:

$$\text{Relative sludge} = \frac{\text{wt. of total sludge}}{\text{wt. of solution}} \times 100$$

Notes

1. Since the method calls for an oven at 270° F., it is both convenient and satisfactory to use that temperature for preparing dry crucibles and the same temperature for drying both tubes and crucibles after filtering the sludge.

2. Ferric chloride is furnished in lumps which may be crushed with a spatula to obtain the amount needed. Because the salt takes up water from the air rapidly, it should be crushed just prior to use and only in the amount needed. The crushed salt should be kept in a separate closed container and, if it becomes moist while a series of determinations are being prepared, discard and prepare a fresh portion.

3. Some oils form a very heavy mixture during the heating period. If filtration is too difficult, such oils may be diluted with small amounts of the washing solvent to facilitate filtration. It is advisable to filter without such dilution if possible because some oils give a precipitate upon dilution with the washing solvent.

4. Since the precipitated sludge may be soluble to some extent in petroleum ether, it is advisable to standardize the amount of washing solvent used. The 100 ml. amount given in the method will be enough to wash both tube and crucible free of oil in most cases. Should extra solvent be needed, use as little as possible and record the amount used as a qualifying condition for that determination.

APPENDIX B

Plant Control Method for Determination of Pentachlorphenol in Oil Solutions

The lime ignition method described in the following is satisfactory for determinations of pentachlorphenol content of oil solutions (Note 1). Such solutions can be completely combusted and this method is based on the fact that the chlorine in pentachlorphenol is liberated by combustion and combines with the surrounding calcium hydroxide forming calcium chloride. The chloride then may be determined volumetrically (Note 2).

Apparatus

Crucible—No. 2 porcelain crucible, high form 55 ml. capacity.

Burner—No. 4 Meker burner.

Chemical glassware—200 and 1000 ml. volumetric flasks, 10 and 25 ml. burettes, weighing bottles equipped with dropper, or weighing pipette, graduates, pipettes, beakers, stirring rods, funnels, watch glasses, etc.

Filter paper—No. 40 Whatman filter paper.

Balance—Analytical balance sensitive to at least 1 mg. (0.001 gm.)

Reagents

Calcium hydroxide
Concentrated nitric acid
Standard 0.1 N (N/10) silver nitrate solution purchased from a reliable chemical supply house or a standard 0.1 N silver nitrate soution prepared by dissolving 17.00 grams of reagent primary standard grade of silver nitrate in distilled water and making the volume of solution to 1000 ml. in a volumetric flask.
Approximately 0.1 N (N/10) ammonium thiocyanate solution prepared or purchased from a reliable chemical supply house and standardized against the 0.1 N silver nitrate solution (Note 3). An approximately 0.1 N solution of ammonium thiocyanate can be prepared by dissolving 8.0 grams of reagent grade ammonium thiocyanate in distilled water and making the volume of solution to 1000 ml. in a volumetric flask.
Volhard indicator: Dissolve 10 grams of ferric alum in 10 ml. of concentrated nitric acid in distilled water and dilute to 100 ml.
All of the chemicals are analytical reagent grade.

Procedure

Place eight grams of calcium hydroxide in the crucible and tap gently to level the calcium hydroxide in the bottom. Make a well in the calcium hydroxide to a depth of 10 to 15 mm. (1/2 inch) with a test tube or litmus vial, leaving a minimum of five mm. (1/4 inch) of calcium hydroxide surrounding the sides and bottom of the well. Add approximately the amount of oil solution containing 0.05 gm. of pentachlorphenol (1.0 gm. of a 5 percent solution) to the bottom of the well drop by drop from a stoppered weighing bottle equipped with a dropper or a weighing pipette. Obtain the exact sample weight by difference from the weights of the weighing bottle before and after adding the sample to the well. Place an additional 10 grams of calcium hydroxide in the crucible and pack well by tapping the crucible on the table. Hand packing for three minutes usually is adequate. The properly packed fusion mixture should have the surface appearance of white tooled leather and will

Table 4.—Preservative absorptions and penetration for unincised and incised nominal 1" by 6", 2" by 6", and 4" by 6" S4S Pacific Coast Douglas fir heartwood preheated at 230° F. and immersed at a depth of 1 ft. for different periods of time in a low viscosity oil solution of pentachlorphenol at 80° F. (Ten specimens were included in each unincised and incised group soaked for each period of time. Preservative absorptions were based on the actual dimensions determined by measuring the specimens. The specimens were approximately 2 ft. in length and end penetration was prevented by a coat of primer (Tygon TP-107A)[1] followed by three coats of a modified vinyl resin paint (Tygon TP-21)[1] to which 2.5 lb. of aluminum powder had been added per gallon of paint. An additional coat was applied between the heating and soaking periods.)

Approximate actual thickness and width In.	Unincised or incised	Average moisture content Per cent	Average preservative absorption in lb. per cu. ft. after soaking for the following periods of time: 0.5 hr.	2.0 hr.	6.0 hr.	24.0 hr.	Percentage of specimens with complete penetration after soaking for the following periods of time: 0.5 hr.	2.0 hr.	6.0 hr.	24.0 hr.	Average minimum and average depth of penetration in inches for incompletely penetrated specimens after soaking for the following periods of time: 0.5 hr. Min.	0.5 hr. Av.	2.0 hr. Min.	2.0 hr. Av.	6.0 hr. Min.	6.0 hr. Av.	24.0 hr. Min.	24.0 hr. Av.
¾ x 5 ⅝	Unincised	13.7		1.7		5.4		0.0		30.0			0.07	0.28			0.10	0.36
¾ x 5 ⅝	Incised	13.0	4.8	5.6	8.1	11.8	20.0	20.0	20.0	50.0	0.10	0.49	0.09	0.34	0.10	0.38	0.10	0.52
1 ⅝ x 5 ⅝	Unincised	19.2		1.2		4.6		0.0		10.0			0.08	0.13			0.09	0.34
1 ⅝ x 5 ⅝	Incised	19.7	6.4	8.3	11.4	13.8	0.0	10.0	10.0	50.0	0.08	0.57	0.08	0.69	0.10	0.76	0.15	1.24
3 ⅝ x 5 ⅝	Unincised	18.0		0.5		2.9		0.0		0.0			0.05	0.14			0.11	0.33
3 ⅝ x 5 ⅝	Incised	17.8	4.6	6.2	7.7	11.1	0.0	0.0	0.0	0.0	0.08	0.80	0.20	0.90	0.52	0.94	0.84	1.12

[1]Tygon primer and paint were obtained from the United States Stoneware Company.
[2]The average penetrations were determined from a section about ½ in. thick cut from each specimen about midway between the ends. Four measurements were made on each section along two perpendicular lines, one of which was parallel to and midway between the wider faces of the specimen and the other parallel to and midway between the narrower faces.

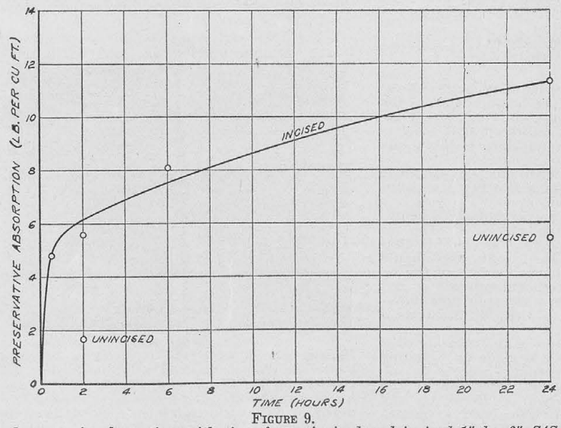


FIGURE 9.
Increase in absorption with time for unincised and incised 1" by 6" S4S Pacific Coast Douglas fir heartwood preheated two hours at 230° F. and immersed at a depth of one foot in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately ¾" by 5⅝".)

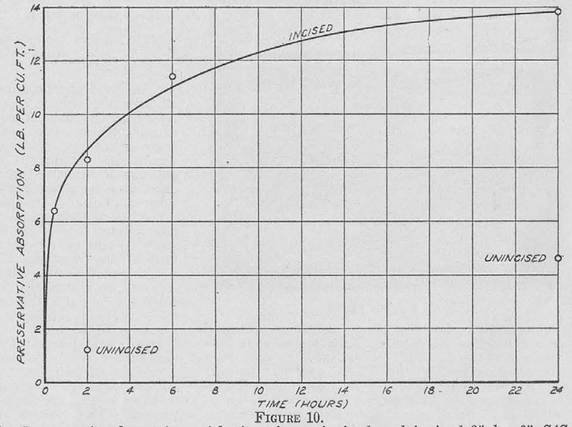


FIGURE 10.
Increase in absorption with time for unincised and incised 2" by 6" S4S Pacific Coast Douglas fir heartwood preheated two hours at 230° F. and immersed at a depth of one foot in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 1⅝" by 5⅝".)

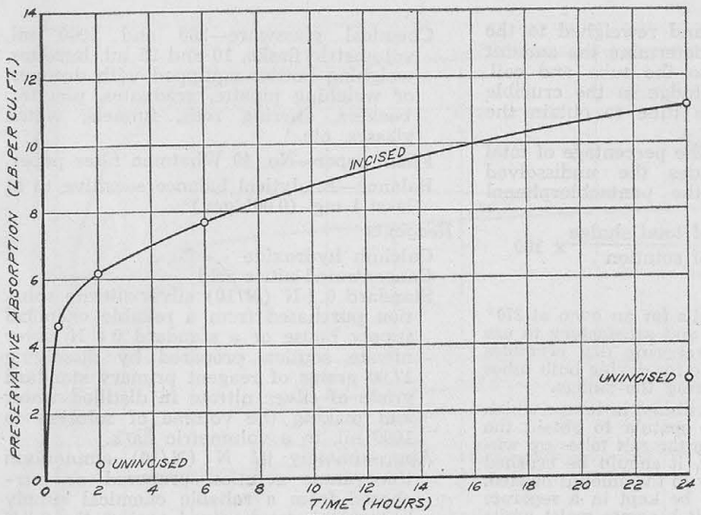


FIGURE 11.

Increase in absorption with time for unincised and incised 4" by 6" S4S Pacific Coast Douglas fir heartwood preheated six hours at 230° F. and immersed at a depth of one foot in a low viscosity oil solution of pentachlorphenol at 80° F. (Preservative absorptions were based on actual cross sectional dimensions of approximately 3⅝" by 5⅝".)

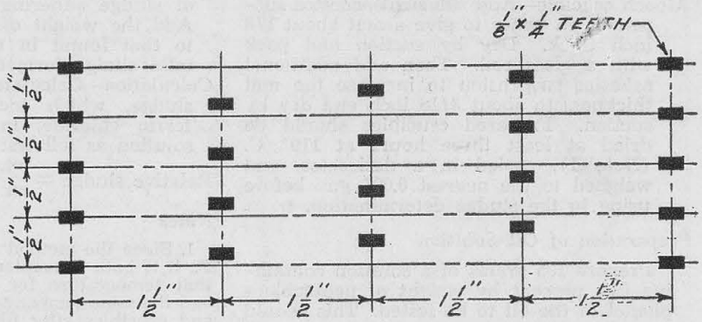


FIGURE 12.

Incising pattern used for the incised Pacific Coast Douglas fir heartwood included in the study. The 1" by 6" and 2" by 6" S4S pieces were incised in the sides to a depth of ⅜" and ¾", respectively, with no incisions in the edges. The 4" by 6" S4S pieces were incised to a depth of ¾" in both sides and edges.

remain in place when the crucible is placed on its side.

Place the crucible about two cm. (3/4 inch) above the top of a Meker burner and heat slowly for 15 to 25 minutes with the gas and air supply of the burner reduced to give a single blue cone which envelops only the bottom of the crucible. Care should be taken not to heat the fusion mixture too rapidly as evidenced by any appreciable smoking. After the preliminary heating period, gradually increase the heat over a period of five minutes by admitting more gas and air to the burner. Should there be any appreciable smoking, return to low heat of the burner for 15 minutes, cool, empty the fusion mixture into a dry 400 ml. beaker and cover with a watch glass.

Break up any lumps with a stirring rod and slowly add 50 ml. of distilled water to the covered beaker, stirring when the reaction ceases to break any remaining lumps and completely wet the material. Place the covered beaker in a cold water bath and very slowly add 45 ml. of concentrated nitric acid. During the neutralization with nitric acid, heat is developed and there is considerable foaming. The beaker should be kept covered with the watch glass as much as possible to avoid loss by spattering. Rinse the inside of the crucible with about 10 ml. of a five percent solution of nitric acid, adding the acid wash to the solution in the beaker. After reaction has ceased, add 15 ml. 0.1 N silver nitrate from a 25 ml. burette, cover the beaker and boil gently for three minutes to coagulate the silver chloride. Cool to room temperature and add the contents of the beaker to a 200 ml. volumetric flask. Rinse the beaker with distilled water and add the washings from the beaker to the flask with sufficient additional distilled water to make a volume of 200 ml. Stopper the flask, mix the solution thoroughly by inverting the flask several times, and filter the solution in the flask through a dry filter paper and funnel. Discard the first 15 to 25 ml. of filtered solution, retain the remainder and transfer 100 ml. of the solution with a pipette into a 400 ml. beaker. Add five ml. of the Volhard indicator to the 100 ml. of filtered solution in the beaker and titrate to the first permanent pink end point with 0.1 N ammonium thiocyanate from a 10 ml. burette (Note 4)

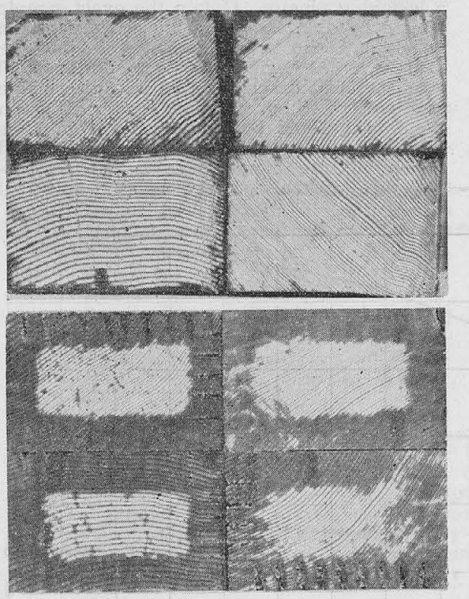


FIGURE 13.

Photographs showing the penetration of dyed pentachlorphenol treating solution in four unincised 4" by 7" S4S pieces (above) and four matched incised 4" by 6" S4S pieces (below) of Pacific Coast Douglas fir heartwood which were incised on four sides. The group of unincised and incised pieces were both preheated for two hours at 230° F. and the unincised pieces were immersed in the treating solution at 80° F. for twenty-four hours while the incised pieces were only immersed for six hours.

Calculation

$$\text{Pentachlorphenol, percent (Notes 1 and 2)} = \frac{[\text{ml. 0.1 N } AgNO_3 - (\text{ml. 0.1 N } NH_4CNS \times 2)] \times 0.5327}{\text{Weight of sample (gm.)}}$$

Notes

1. In general, the lime ignition method gives slightly low results for pentachlorphenol as the result of the loss of some chlorine during ignition. Experience has indicated that a tolerance of 0.2 per cent pentachlorphenol usually would be adequate to compensate for the amount of chlorine lost when analyses are made on a one gram sample of a five per cent solution of pentachlorphenol.

2. This method gives the percentage of pentachlorphenol based on total chlorides. The results should be corrected for the chloride content of the reagents. The results also should be corrected for the chloride content of the oil solvent in which the pentachlorphenol is dissolved unless it is known from prior determinations that the chloride content of the solvent alone is negligible.

The blank determination of the chloride content of the reagents alone is made by weighing 18 grams of calcium hydroxide into a 400 ml. beaker and proceeding as described in the method beginning with words "Break up any lumps." The results are calculated as pentachlorphenol based on the weight of the sample of the unknown oil solution to which the reagent correction will be applied (1.0 gram of a five per cent oil solution of pentachlorphenol). The equivalent percentage of pentachlorphenol calculated in this way then is subtracted from the percentage of pentachlorphenol found for the unknown sample.

When a combined reagent and oil blank is run, the sample must be carried through the entire procedure. The amount of solvent included in the determination should be approximately the same as that in the oil solution of pentachlorphenol to which the correction will be applied (0.95 gram for a five per cent pentachlorphenol solution). The results then should be calculated as pentachlorphenol based on the weight of the pentachlorphenol solution which has been analyzed (1.0 gram of a 5 per cent pentachlorphenol solution).

3. The ammonium thiocyanate solution is standardized against the 0.1 N silver nitrate as follows:

Add 15 ml. of 0.1 N silver nitrate from a 25 ml. burette to a 400 ml. beaker. Dilute with 100 ml. of distilled water. Add 10 ml. of concentrated nitric acid and five ml. of the Volhard indicator. Titrate with the ammonium thiocyanate to the same permanent pink end point used in the method of analysis for total chlorides. Use the following formula to obtain a factor for converting the ml. of ammonium thiocyanate found in the pentachlorphenol determination to equivalent ml. of O.1 N ammonium thiocyanate:

$$\text{Factor} = \frac{15}{\text{ml. } NH_4CNS \text{ equivalent to 15 ml. 0.1 N } AgNO_3}$$

Multiply this factor times the ml. of ammonium thiocyanate found in the pentachlorphenol determination to obtain the ml. of O.1 N ammonium thiocyanate used in the formula for calculation of the percentage of pentachlorphenol.

4. The pink end point should be permanent for at least five minutes.

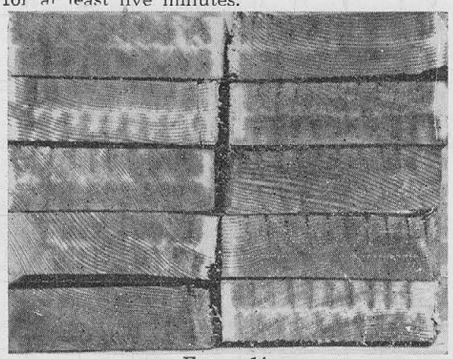


FIGURE 14.

Photograph showing the penetration of dyed pentachlorphenol treating solution in ten incised 2" by 6" S4S pieces of Pacific Coast Douglas fir heartwood. The pieces were incised to a depth of ¾" in the sides with no incisions in the edges. The closest incisions averaged about ½" from the edges. Note the unpenetrated strips of wood close to the edges of a number of the pieces.

Reprinted from *Southern Lumberman*, issue of September 1, 1954

Brainerd, Minn., February 25, 1946

Mr. H. N. Anderson
A. D. Chapman Company, Inc.
333 North Michigan Ave.,
Chicago 1, Ill.

Dear Mr. Anderson:

I wish to thank you for the additional articles on "Nonpressure Treatment of Wood with Low Viscosity Oil Solutions of Pentachlorphenol", which I received with your letter of February 20th.

These articles seem to confirm previous literature at hand and my personal observation of quick dipping in clear pentachlorphenol solutions more than 20 years ago to prevent or retard blue stain, molds or other natural discolorations that are otherwise inevitable, particularly in finished pine lumber.

Evidently the quick dipping was effective and if so the long soaking in solutions of higher temperatures as explained in the late bulletins should prove much more effective expecially with reference to resistance to decay.

Assuming all this to be true, I am interested only in the possibility for use of Pentachlorphenol in solution or mixture with heavy petroleums such as are specified by the A.W.P.A. and A.R.E.A. for solutions with creosote and the mechanics of mixing and maintaining a satisfactory supply of the proper concentration for satisfactory treatment by the established pressure processes.

Any information or recommendations you may offer in reply to my letter of February 9th about possibilities for use of pentachlorphenol in solution with heavy petroleum will be greatly appreciated.

Yours truly,

A. J. Loom
Gen'l. Supt. Timber Preservation.

AJL/b
cc- E.M.W.
B.B.
L.Y.


CHIEF ENGR
FEB 26 1946
LIBRARY

COPY

A. D. CHAPMAN & COMPANY, INC.
Wood Preservatives & Industrail Chemicals

333 North Michigan Avenue
Chicago 1

February 20, 1946

Mr. A. J. Loom
Gen'l. Supt. Timber Preservation
Northern Pacific Railway Company
Brainerd, Minnesota

Dear Mr. Loom:

This will further acknowledge your letter of February 9 with reference to treatment with Pentachlorphenol.

We are pleased to attach articles on Nonpressure Treatment of Wood II and III wich give information about mixing of pentachlorphenol and its use. While these pertain to nonpressure treatment of wood nevertheless the same method is used for pressure treatment.

After you have had an opportunity to read these over we will be looking forward to hearing from you again.

Cordially yours,
A. D. CHAPMAN & COMPANY, INC.

/s/ H. N. Anderson

Cy- E. [illegible] W.
B.B.
L.L.

Brainerd, Minn., January 31, 1946

Mr. J. Oscar Blew
Associate Technologist
U.S.Forest Products Laboratory
Madison, Wis.

Dear Mr. Blew:

Will you kindly let me know if the Laboratory has conducted any experimental treatment with pentachlorphenol in solution with heavy petroleums such as are being used under A.W.P.A. and A.R.E.A. specifications for blending with creosote.

I will greatly appreciate any information you may give me particularly with reference to the kind of petroleum and facilities you think would be required for maintaining proper concentration of the chemical in a suitable solution for treatment of ties.

Yours truly,

A. J. Loom
Gen'l.Supt.Timber Preservation.

AJL/b

COPY

A. D. CHAPMAN & COMPANY, INC.
Wood Preservatives & Industrail Chemicals

333 North Michigan Avenue
Chicago 1

February 11, 1946

Mr. A. J. Loom
Gen'l. Supt. Timber Preservation
Northern Pacific Railway Company
Brainerd, Minnesota

Dear Mr. Loom:

Your letter of February 9 has been received in Mr. Chapman's absence from the office. We are referring your letter to him in the field however, and you no doubt will hear from him within a short time.

Cordially yours,
A. D. CHAPMAN & COMPANY , INC.

/s/ M. Harding
Secretary to Mr. Chapman

Cy- E.M.W.
B.B.
L.M.

Brainerd, Minn., February 9, 1946

Mr. Bernard Blum:

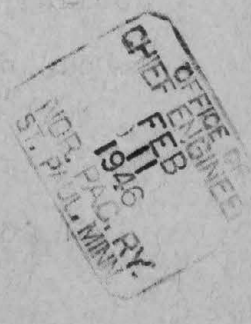
Referring to yours of February 4th and Mr. Willis's lettter of February 8th suggesting further investigation of the possibilities for use of pentachlorophenol solution as a substitute for creosote.

I am attaching copies of my letter of January 31st and reply from the Forest Products Laboratory from which you will note they have not expermented with this chemical in solution with heavy petroleums such as we are using but they believe heavy oils would prove most desireable.

I am also attaching copy of my letter today to the A. D. Chapman Company in response to Mr. Willis' letter of February 8th and will let you know what they say in reply.

AJL/b
CC-Mr.E.M.Willis
Mr.L.Yager

Papers in mail Pkg "18 - 2/9/46
With letter EMW.


OFFICE OF
CHIEF ENGINEER
FEB 11 1946
GR. NO. RY.
ST. PAUL, MINN.

Brainerd, Minn., February 9, 1946

Mr. Dale Chapman
A. D. Chapman & Co. Inc.
333 North Michigan Ave.,
Chicago 1, Ill.

Dear Sir:

Referring to your letter of February 1st to Mr. E. M. Willis, Purchasing Agent, Northern Pacific Railway Company, quoting your prices on pentachlorphenol.

I have considerable literature on properties and uses of pentachlorphenol for wood preservation but fail to find any reference to its use for this purpose in solution with heavy petroleums such as are specified by the A.W.P.A. and A.R.E.A. for blending with creosote. It seems to me that solutions with the heavier petroleums would furnish greater protection and be more satisfactory as a substitute for creosote than the lighter solvents that I note have been used in experimental treatment by the Forest Products Laboratory and others.

As you may know it is our practice to use 50-50 creosote-petroleum solution for treatment of cross ties, switch ties, lumber etc. for ordinary purposes and straight creosote for marine piling and other purposes. At each of our pressure treating plants we have two 160,000 gallons storage tanks, one for creosote and one for the specified heavy petroleum. Most of our air-seasoned materials are treated by the Lowry Process but we also treat by Boiling under Vacuum.

I would like to know what extra facilities would be required to permit our substitution of pentachlorphenol for creosote.and to assure maintenance of a proper concentration of the chemical in a suitable solution under these conditions.

I shall be glad to have your recommendations.

AJL/b

Yours truly,

Cy. Mr. Blum.

A. J. Loom
Gen'l. Supt. Timber Preservation.

C O P Y

UNITED STATES DEPARTMENT OF AGRICULTURE
Forest Service
Forest Products Laboratory

Madison 5, Wisconsin

February 5, 1946

Mr. A. J. Loom
Northern Pacific Railway Co.
Brainerd, Minnesota

Dear Mr. Loom:

Your letter of January 31 to Mr. Blew is received.

We have not used pentachlorophenol in solution with oils of the type specified by the A.W.P.A. and A.R.E.A. for blending with creosote. The encloded print ZM66800F show results on our post test using pentachlorophenol with crank case oil which is the only solvent of the heavy oil type that we have used. In International Termite Exposure Test stakes and our other treatments we have employed #2 fuel oil or lighter solvents (see enclosed preprint). Our own service tests and the results of others seem to indicate that pentachlorophenol solutions containing the heavier petroleums furnish greater protection than those with the lighter solvents.

From the best information that is available we feel that the solvent to be used with pentachlorophenol for the pressure treatment of ties should have a pentachlorophenol solvency of not less than 10 percent at 75°F. (Pensky-Marten closed ltester) and should not cause operating difficulties due to excessive sludging or gumming when the treating solutions are repeatedly heated and used.

Until more experience is gained in the use of these solutions for pressure impregnation it is desirable that the treating solutions and operations be under close control.

Very Truly Yours,

/s/ T. R. Truax, Chief
Division of Wood Preservation

St. Paul, Minn., February 8, 1946

File 166-11

Mr. A.J.Loom
Gen. Supt. Timber Presv.

Referring to correspondence about the suggested use of pentachlorphenol solution for timber treating purposes, and to our telephone conversation today:

Under date of February 1st, A.D.Chapman and Company have written me as follows:

"This will acknowledge your letter of January 31st, your File 166-11.

"We are pleased to quote on pentachlorphenol as follows:

LCL quantities	20¢ per lb.
Carload quantities	18¢ per lb.

"Prices are F.O.B. cars, Midland, Michigan, freight equalized with St. Louis.

"Pentachlorphenol comes packaged in either 100 lb. fibre cartons or 275 lb. barrels.

"We will be more than pleased to correspond with you further regarding to the above."

I understand you will write to them regarding some of the technical features of the subject, and if agreeable, will be glad to have a copy of your letter.

(Signed) E. M. WILLIS

cc: Mr. Bernard Blum

Mr. Louis Yager

OFFICE OF
CHIEF ENGINEER
FEB
9
1946
NOR. PAC. RY.
ST. PAUL, MINN.

Brainerd, Minn., February 5, 1946

Mr. Bernard Blum:

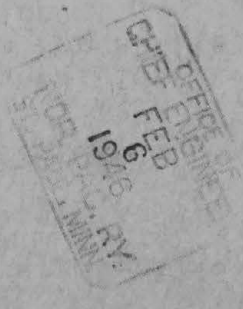
Referring to our recent conversations about the creosote situation and prospects for sufficient supply to keep the plants in operation.

As of February 1st we have on hand the following gallons creosote and Fuel oil at each plant:

	Creosote	Fuel Oil
Brainerd (Storage Tanks)	19113	40280
Paradise (" ")	23794	66048
Hillyard (Total)	22328	27048
Seattle (Total)	(30017)	22382
Total on Hand	35218	155758

At an average of 1-1/2 gallons creosote per tie the present creosote supply will permit about one week's operation at Brainerd and Paradise. In discussion with Mr. Harms today he stated that some creosote is again being offered by producers which he is hopeful of obtaining providing that tank cars are made available for shipping.

AJL/b
cc-Mr.E.M.Willis
Mr.L.Yager


OFFICE OF
CHIEF ENGINEER
FEB
6
1946
RY.

3659A

At Seattle, February 4, 1946

MR. A. J. LOOM:

Your letter of January 30 about possible use of pentachlorophenol for use in tie treatment; also Mr. Willis' letter same date to you, about the suggestion of the A D Chapman Co. Inc.

It is my understanding from our discussion at Brainerd that you are pursuing this matter as quickly as possible in view of the serious situation in the acquisition of creosote oil.

Apparently the pentachlorophenol has definite toxicity values and therefore they are suggesting to us a 50-50 creosote penta-mixture as an alternate to straight creosote, which is of considerable interest.

cc-Mr. L. Yager
Mr. E. M. Willis

bb/s

Brainerd, Minn., January 30, 1946

Mr. Bernard Blum:

I will continue to obtain all of the additional information I can about possibilities for our use of pentachlorphenol solution in the event of a creosote shortage, as requested in your letter of January 28th and Mr. Yager's letter of the same date.

We already have at hand considerable data on physical and chemical properties as well as toxicity of pentachlorphenol to wood destroying fungi which has been verified by the Forest Products Laboratory and recent experiments indicate that its use as a wood preservative should prove satisfactory if solutions of proper concentration can be maintained and required penetration obtained.

99 Pine fence postswere treated by the Forest Products Laboratory with 6.7 Lbs. per cubic foot of 5% pentachlorphenol in light petroleum oil. After 7 years service 97 showed no decay or attack by termites. Nearly all of the untreated posts installed at the same time have been destroyed by decay and termites.

In 1942 the West Coast Wood Preserving Company did some experimental treatment using 5% Pentachlorphenol and 95% Diesel Oil. Also using 25% creosote, 1.25% pentachlorphenol and 73.75% fuel oil. 15 ties treated with these solutions were placed in our Seattle Tie Record Test Track but like similar service tests with this chemical they are not yet old enough to warrant any definite conclusions.

In his letter of January 22nd Mr. Dale Chapman states that his company can advise us definitely with regard to suitable petroleum oils. As I doubt if any reliable information is available elsewhere, I thought it would be interesting to know what he recommends, not only as to the kind of petroleum but also with reference to facilities required for maintaining proper concentration of the chemical in a suitable solution for treatment of ties.

I am attaching herewith a paper entitled "Information on Pentachlorphenol as a Wood Preserving Chemical" by Mr. Ira Hatfield of the Monsanto Chemical Company of St. Louis. Mr. Hatfield was for several years with the U.S. Department of Agriculture, Bureau of Plant Industry, in cooperation with the Forest Products Laboratory.

AJL/b
cc-Mr.E.M.Willis.
Mr.L.Yager.

OFFICE OF CHIEF ENGINEER
JAN 31 1945
NOR. PAC. RY.
ST. PAUL, MINN.

OFFICE OF
General Supt. Timber Preservation
BRAINERD, MINN.

AMERICAN WOOD-PRESERVERS' ASSOCIATION

This is an advance copy of a report to be presented at the Fortieth annual meeting of the American Wood-Preservers' Association to be held at the Palmer House, Chicago, Ill., on April 26, 1944, and is not for publication until after this meeting.

This Association, as a body, is not responsible for any statement made or opinion expressed in its publications.

INFORMATION ON PENTACHLOROPHENOL AS A WOOD PRESERVING CHEMICAL

By Ira Hatfield
Development Department, Organic Chemicals Division, Monsanto Chemical Company, Saint Louis, Missouri

Introduction

Pentachlorophenol is not a new chemical creation. It was first described by Erdman in 1841. That was only three years after John Bethell was issued a British patent on the use of "dead oil of tar" for wood preservation, and this Bethell patent is looked upon as the beginning of modern wood preservation. Although pentachlorophenol is an old chemical, its distinct preservative value remained unexplored for almost a century. In 1936, Monsanto Chemical Company began manufacturing the product on a commercial scale, and since that time, pentachlorophenol has graduated from a curiosity into the realm of a valuable industrial preservative.

Although the literature on pentachlorophenol as a preservative material has grown considerably in the last five years, there are still much unpublished data dealing with the characteristics, qualities and field application of pentachlorophenol as a wood preservative. The purpose of this article is to bring the subject more nearly up to date.

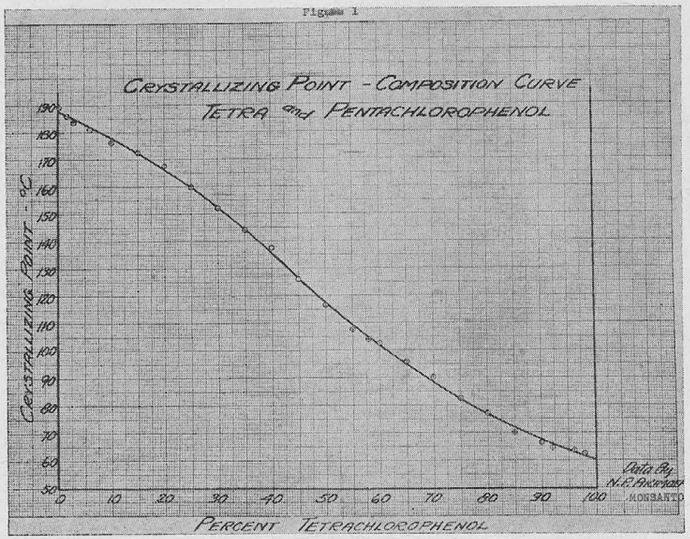
Identification of Pentachlorophenol

Chemically-pure pentachlorophenol is a white needle-shaped crystalline solid, having a crystallizing point of 190.2 deg., C. (8). For wood preservation, the technical grade of pentachlorophenol is satisfactory and is the grade commonly used. The crystallizing point of technical pentachlorophenol varies with the amount of tetrachlorophenol contained therein. The product as sold commercially seldom contains more than 12 per cent tetrachlorophenol, which would give a crystallizing point of 175 deg., C., and it contains not more than 2 per cent maximum of alkali insolubles. A composition curve showing the crystallizing point, according to the

percentages of tetrachlorophenol and pentachlorophenol present, is given in Fig. 1.

The identity of a sample of technical pentachlorophenol can be determined as follows: Dissolve approximately 10 mg. of the sample in 25 ml. of benzene, and add 20 ml. of a solution consisting of two parts concentrated nitric acid and one part water. Add one drop of hydrochloric acid, agitate gently and heat on a steam bath approximately 10 min. Wash the benzene layer with 75 ml. water and separate. A yellow-red color in the benzene layer indicates

Figure 1



the presence of a chlorophenol. Having identified the product as a chlorophenol, its further identification as pentachlorophenol can be obtained by determining the crystallizing point[1] and the alkali insoluble content.[2]

[1] 1. Fill an enameled cup (4 in. top diameter by 2⅜ in. high) with sample.
2. Place the cup directly on a tripod (use no wire gauze) and melt completely with a burner, preferably in a hood. Stir constantly with a standarized 160–195 deg., C. thermometer to avoid overheating.
3. Allow the sample to cool and continue to stir with the thermometer in such a manner that it lightly scrapes the sides of the cup, thereby preventing an appreciable amount of solid to form.
4. When the temperature reaches 178 deg., C., stir in the center of the cup in a circle of about ½ in. diameter at a rate of about 1 revolution per second.
5. Read the crystallizing point at the highest point at which the temperature remains constant for at least 15 seconds.
The method is precise to ±0.2 deg., C.
Report the result to the nearest 0.1 deg., C.

[2] Place 5 grams of sample in a 250 ml. beaker. Add 50 ml. of a 5 per cent solution of sodium hydroxide. Boil for five minutes or until as much as possible is dissolved. Make up to 200 ml., heat to boiling and filter while hot through a weighed Gooch crucible. Dry at 120 deg., C., for one hour, cool and weigh.

$$\text{Per cent of alkali insoluble material} = \frac{\text{Wt. of residue} \times 100}{\text{Wt. of sample}}$$

The alkali insoluble is reported to the nearest 0.01 per cent. The accuracy is on the order of ±0.2 per cent.

[1] J. D. Burnes, Page & Hill Company, Minneapolis, Minnesota, unpublished manuscript.

It is not only necessary to be able to check the identity of the chemical in its crystalline state, but accurate methods of assay and methods of analysis for it after it has been dissolved in treating solutions are also essential. Several methods have been devised. In 1939, Baechler (1) described a modified—Stepanoff method for determining chlorinated phenols. Deichmann and Schafer (13) published a spectrophotometric method in 1942. Morrill and Benignus (23) have recently brought together several methods giving not only the details for analysis, but suggesting the types of materials that can be analyzed suitably by the several methods. Burnes[1] and other investigators are collaborating in an attempt to formulate a suitable method of analysis for routine treating plant laboratories and for inspectors' use in determining quantitatively the amount of pentachlorophenol in treating solutions and in treated wood.

Toxicity of Pentachlorophenol to Wood-Destroying Fungi, Insects and Other Micro-Organisms

Naturally, toxicity to fungi and other micro-organisms is a primary requisite of any good preservative. In 1937, Bateman and Baechler (2) reported that "of all the compounds that were found to kill our test organism, tetrachlorophenol and pentachlorophenol are the cheapest sources of toxic action." In 1939, Carswell and Hatfield (7) published toxicity data on several preservative chemicals, including pentachlorophenol.

To determine the preservative value of pentachlorophenol without possible effects from impurities, recrystallized pentachlorophenol was tested against a number of fungi, including wood stainers and wood rotters, and other organisms of general interest. The results of these laboratory studies are given in Table I.

The question might be raised as to the relative fungicidal value of recrystallized material compared to the technical grade. Because pentachlorophenol is not easily dissolved in nutrient media, possibly more accurate comparative tests can be made by using the sodium salts of technical pentachlorophenol and recrystallized pentachlorophenol. Such studies show that for all practical purposes, there is no difference in the toxicity range of the two materials. This would indicate that technical pentachlorophenol is suitable for wood preservative purposes and the extra expense

which would be involved in recrystallizing the product is not warranted on the basis of fungicidal efficiency. As tests on agar do not necessarily show the effectiveness of a preservative on wood, wood block tests made by the Standard National Door Manufacturers Association method (as published by Hubert (18)) have shown technical pentachlorophenol dissolved in engine oil distillates to be effective in preventing attack by *Lenzites trabea* and *F.P.L. 517* at concentrations well below 0.5 lb. of pentachlorophenol per cu. ft. of wood. Laboratory data on such tests are given in Table II. Likewise, all field tests have made use of the technical grade of pentachlorophenol.

TABLE I.—TOXICITY OF PENTACHLOROPHENOL TO FUNGI AS DETERMINED AT MONSANTO CHEMICAL COMPANY BY STANDARD PETRI PLATE TEST METHOD

Organism	Type	Recrystallized pentachlorophenol inhibiting concentration	Recrystallized pentachlorophenol killing concentration
Ceratostomella pilifera	Wood stainer	0.006	0.006
Hormonema dematioides	Wood stainer	0.006	0.006
Hormodendrum cladosporioides	Wood stainer	0.006	0.05
Hormiscium gelatinosum	Wood stainer	0.02	0.02
Alternaria tenius	Wood stainer	0.02	0.02
Polystictus versicolor	Wood rotter	0.008	0.01
Polystictus hirsutus	Wood rotter	0.008	0.02
Coniophora cerebella	Wood rotter	0.002	0.002
Fomes roseus	Wood rotter	0.006	0.006
Fomes annosus (F.P.L. 517)	Wood rotter	0.002	0.006
Lentinus lepideus	Wood rotter	0.002	0.004
Poria incrassata	Wood rotter	0.002	0.002
Trametes serialis	Wood rotter	0.001	0.002
Lenzites saepiaria	Wood rotter	0.002	0.006
Lenzites trabea	Wood rotter	0.002	0.004
Merulius domesticus	Wood rotter	0.001	0.001
U-10 (From Bell Telephone Lab.)	Wood rotter	0.002	0.002
Chaetomium globosum	Textile rotter	0.008	0.01
Tricophyton rosaceum	Animal pathogen	0.004	0.006
Tricophyton interdigitale	Animal pathogen	0.006	0.008
Epidermophyton inguinale	Animal pathogen	0.004	0.004
Fusarium vasinfectum	Plant pathogen	0.01	0.02
Aspergillus niger	General	0.006	More than 0.1
Penicillium digitatum	General	0.006	0.008
Alternaria radicina	General	0.006	0.006
Rhizopus nigricans	General	0.004	0.006

Physical and Chemical Properties Which Govern the Permanence of Pentachlorophenol Under Conditions of Use

Because of the interesting physical and chemical properties of pentachlorophenol, as well as its toxicity to micro-organisms, pentachlorophenol offers great promise in the field of wood preservation. The solubility of pentachlorophenol in water is very low, ranging from five parts per million at 0 deg., C., to 35 at 50 deg., C. Solubility at other points is shown in Table III. This extraordinarily low solubility of pentachlorophenol in water minimizes loss by leaching, thus affording greater permanence than is obtained by more soluble materials.

TABLE II.—TOXICITY DATA BY MONSANTO APPLICATION RESEARCH DEPARTMENT ON PENTACHLOROPHENOL DISSOLVED IN COLORLESS PETROLEUM OIL

(N.D.M.A. Wood Block Test Method as Described by Hubert (18))

Absorption treating solution lb. per cu. ft.	Solution strength per cent	Absorption dry toxic lb. per cu. ft.	*Fomes annosus* (F. P. L. 517) Visual appearance	*Fomes annosus* (F. P. L. 517) Per cent loss from decay	*Lenzites trabea* (617) Visual appearance	*Lenzites trabea* (617) Per cent loss from decay
33.55	5	1.68	No attack	—0.21	No attack	—0.9
33.10	2.5	0.83	No attack	—0.39	No attack	—0.75
32.27	1.25	0.40	No attack	—0.08	No attack	—0.76
32.03	0.62	0.20	5 specimens showed no attack; 5 appeared to have isolated areas of attack	0.0	No attack	—0.7

(The foregoing tests were run using ponderosa pine blocks treated according to the N. D. M. A. test method, and placed on fungus mats for a period of 63 days. The negative values under Percent loss from decay, mean that there was actually an increase in the weight of the wood after exposure to attack. This undoubtedly resulted from solid material absorbed from the nutrient agar during the exposure period.)

TABLE III.—SOLUBILITY OF RECRYSTALLIZED PENTACHLOROPHENOL IN DISTILLED WATER (8)

Temperature deg., C.	Solubility gram/100 grams soln.
0	0.0005
27	0.0018
50	0.0035
62	0.0058
70	0.0085

The solubility of re-crystallized pentachlorophenol in a number of common organic substances is given in Table IV. These data are of importance in the preparation of solutions of pentachlorophenol, as the penetration, distribution and retention of the preservative depend upon the choice of a suitable solvent.

Pentachlorophenol is also of interest because of its low vapor pressure, as shown in Table V. Because pentachlorophenol has such low water solubility and low vapor pressure, and since wood-block tests show that under laboratory-test conditions, as little as 0.2 lb. of pentachlorophenol per cu. ft. has shown effective wood preservation, the question is sometimes raised: Why should a 0.5 lb. per cu. ft. retention be recommended for commercial use? The information from Monsanto application research records as given in tables VI, VII, VIII and IX will help answer this question. These tables give data on absorption of 5 per cent pentachlorophenol in petroleum solution by commercially treated pine and gum railroad ties. The data show that as a petroleum solution containing pentachlorophenol passes through the wood, the total quantity of preservative solution absorbed diminishes as the center of the tie is approached. Furthermore, although the analysis of the treating solution under continued use does not show that oak, pine or sap gum absorb pentachlorophenol selectively from the oil solution, our results indicate that there may be a diminishing concentration gradient for pentachlorophenol from the outside to the inside of treated specimens of certain species of wood. Until thousands of analyses and years of service records make a conclusive verdict possible, it is prudent to maintain a suitable safety factor to assure a continuance of the performance already demonstrated by the treated materials now under observation.

Another point that has been investigated is the stability of pentachlorophenol to ultra-violet light. It is known that many organic substances are subject to change through the action of ultra-violet. The action of ultra-violet light on both re-crystallized and technical pentachlorophenol have been studied in the laboratory and they show some decomposition. That this decomposition of pentachlorophenol is inconsequential so far as wood preservation is concerned is borne out by field service records of pentachlorophenol pressure-treated wood.

TABLE IV.—SOLUBILITY OF RE-CRYSTALLIZED PENTACHLOROPHENOL IN VARIOUS CHEMICALS OR MIXTURES[1]

Solubilities expressed as per cent PCP on weight of solution, arranged in descending order at 30°C.

	0°C.	10°C.	20°C.	30°C.	40°C.	50°C.	60°C.	70°C.
Methyl alcohol (methanol)	40.5	48.0	57.0	65.5	72.0	75.5	77.5	----
Diacetone alcohol	39.5	49.5	56.5	62.5	67.5	71.2	73.5	----
Diethyl ether U. S. P.	----	45.8	52.9	60.3	----	----	----	----
Butyl carbitol	34.5	39.5	48.0	57.0	62.5	64.5	65.5	----
100% ethyl alcohol (ethanol)	46.0	49.5	53.0	56.5	60.0	63.5	67.0	----
Diethylene glycol	----	----	27.5	52.5	62.0	64.5	----	----
95% ethyl alcohol (ethanol)	39.0	43.0	47.5	52.0	56.5	61.0	65.5	----
Carbitol	----	----	30.0	40.0	51.0	62.0	----	----
Cellosolve	8.0	17.5	27.0	37.5	50.0	65.0	----	----
Steam-distilled pine oil	24.5	28.0	32.0	35.5	39.0	43.0	46.5	----
Acetone U. S. P.	----	13.5	21.5	33.4	----	----	----	----
Xylene	8.5	11.0	14.0	17.5	22.0	27.5	34.0	----
Corn oil	3.5	11.4	14.8	17.3	19.2	----	----	----
Cottonseed oil	4.2	10.8	14.8	17.0	19.4	----	----	----
Dioxan	----	5.5	11.5	16.0	22.0	30.0	37.5	----
Linseed oil (raw)	----	10.2	13.9	15.4	----	----	----	----
Toluene	6.0	8.5	11.5	15.0	19.5	24.0	31.0	----
Soya Bean oil	----	3.8	12.4	14.9	18.5	23.0	----	----
Benzol	----	----	11.0	14.0	19.5	24.5	31.5	----
Tung oil	----	3.5	11.2	13.5	----	----	----	----
Ethylene glycol	----	----	6.0	11.5	21.0	31.5	38.5	----
Orthodichlorobenzene	5.5	6.5	8.5	11.5	15.5	20.5	26.0	----
Ethyl benzene	----	6.5	8.5	11.5	15.0	19.5	25.0	31.0
Dipentene	----	7.1	8.4	10.3	----	----	----	----
Turpentine	----	1.6	3.0	4.4	----	----	----	----
Carbon disulfide	----	1.7	3.0	4.3	----	----	----	----
Carbon tetrachloride	----	0.8	2.0	3.1	----	----	----	----
Stoddard solvent	----	0.5	1.5	2.5	3.5	5.5	7.5	----
No. 9 refined oil	0.4	0.7	1.1	1.6	2.5	3.8	5.6	----
Water (distilled)	0.00049	0.0010	0.0014	0.0019	0.0025	0.0035	0.0053	0.0085

[1] Data by Application Research Department, Monsanto Chemical Company, St. Louis, Mo.

TABLE V.—VAPOR PRESSURE OF RE-CRYSTALLIZED PENTACHLOROPHENOL

Temperature, deg., C.	Millimeters of mercury vapor pressure	Temperature, deg., C.	Millimeters of mercury vapor pressure
0	0.000010	190	17.69
20	0.00011	200	27.37
50	0.0023	210	41.60
75	0.019	220	62.15
100	0.12	230	91.40
110	0.24	240	132.4
120	0.45	250	189.1
130	0.82	260	266.4
140	1.45	270	370.7
150	2.51	280	509.7
160	4.23	290	692.1
170	6.96	293.08	760.0
180	11.21	300	932.1

Data on Pentachlorophenol Treatments of Wood

Non-Pressure Treatments

As might be expected, service records on pentachlorophenol-treated material are not extensive because of the relatively short time this preservative has been in commercial use. The initial commercial application of pentachlorophenol in petroleum oils was in the field of non-pressure treatments. Sash, doors, flooring and many other items requiring a colorless treatment were treated in commercial dipping vats to a standard set initially by the National Door Manufacturers' Association. For early work, see papers by Western Pine Association (23), Hubert (16), (17), (18), Carswell and Nason (8), and Carswell and Hatfield (7). The information developed was extended experimentally by Buckman and Pera (5), (6) to the non-pressure treatment of lumber, timbers, cross arms and other wood items.

In 1941, the Consolidated Treating Company, St. Paul, Minn. (10), following extensive research and development of the process, began commercial full-length treatment of western red cedar poles with a pentachlorophenol-petroleum oil solution followed by a butt treatment with creosote. Their treating standard called for a minimum retention of 0.25 lb. of pentachlorophenol per cu. ft. of sapwood. Later they produced full-length pentachlorophenol-in-petroleum treated northern white cedar poles without a creosote butt treatment.

In 1942, Doolittle (14) published on the full-length treatment of western red cedar poles with 5 per cent pentachlorophenol dissolved in Edeleanu extract of transformer oil. Thousands of poles treated with this solution are now in line.

In 1942–43, the Valentine–Clark Corporation[1] treated Norway pine cross arms with a hot creosote bath followed by a cold bath

[1] Unpublished data.

TABLE VI.—ANALYTICAL DATA[1] ON PINE TIE NO. 103 FROM RUN 37—TIE TREATED WITH "A" PETROLEUM OIL CONTAINING PENTACHLOROPHENOL

Location of section analyzed—center of rail bearing area
Volume data on section analyzed—6.825" x 8.75" x 1.25" or 74.625 cu. in.
Original weight of total section—1,028 grams
Original pentachlorophenol content of treating solution as determined by the oxygen bomb method of analysis—4.90 per cent

Location of sample used for analysis	Weight data on section analyzed: Total weight before rasping	Weight saved after rasping	Analytical data based on 25 gram sample; all figures represent percentages: Oil	Penta-chloro-phenol	Wood	Water	Total	Penta-chloro-phenol recovered from oil extracted from wood with benzene (oxygen bomb analysis)	Penta-chloro-phenol recovered from wood after benzene extraction (oxygen bomb analysis)	Penta-chloro-phenol per gram of oil in unextracted wood (oxygen bomb analysis)
	grams	grams						per cent	per cent	per cent
Outer 1 inch	518	485	31.17	1.69	60.40	6.74	100.00	4.69	0.40	5.65
Next 1 inch	328	309	24.56	1.15	66.00	8.29	100.00	4.07	0.14	4.62
Inner Portion	182	180	15.64	0.66	72.20	11.50	100.00	3.48	0.20	4.50

[1] Data based on work done by the application research department, Monsanto Chemical Co.

TABLE VII.—ANALYTICAL DATA[1] ON PINE TIE NO. 103 FROM RUN 37—TIE TREATED WITH "A" PETROLEUM OIL CONTAINING PENTACHLOROPHENOL

Location of section analyzed—center of tie
Volume data on section analyzed—6.875" x 8.625" x 1.25"—74.125 cu. in.
Original weight of total section—943 grams
Original pentachlorophenol content of treating solution as determined by the oxygen bomb method of analysis—4.90 per cent

Location of sample used for analysis	Weight data on section analyzed		Analytical data based on 25 gram sample, all figures represent percentages					Pentachlorophenol recovered from oil extracted from wood with benzene (oxygen bomb analysis)	Pentachlorophenol recovered from wood after benzene extraction (oxygen bomb analysis)	Pentachlorophenol per gram of oil in unextracted wood (oxygen bomb analysis)
	Total weight before rasping	Weight saved after rasping	Oil	Pentachlorophenol	Wood	Water	Total			
	grams	grams						per cent	per cent	per cent
Outer 1 inch	469	454	32.12	1.75	60.80	5.33	100.00	4.21	0.46	5.26
Next 1 inch	294	276	25.43	1.31	67.20	6.06	100.00	3.68	0.36	4.77
Inner Portion	180	174	10.53	0.38	81.40	7.69	100.00	2.16	0.13	3.21

[1] Data based on work done by the application research department, Monsanto Chemical Co.

TABLE VIII.—ANALYTICAL DATA[1] ON SAP GUM TIE NO. 109 FROM RUN 38—TIE TREATED WITH "A" PETROLUEM OIL CONTAINING PENTACHLOROPHENOL

Location of section analyzed—center of rail bearing area
Volume data on section analyzed—6.5" x 8" x 1.31" or 68.12 cu. in.
Original weight of total section—785 grams
Original pentachlorophenol content of treating solution as determined by the oxygen bomb method of analysis—4.90 per cent

Location of sample used for analysis	Weight data on section analyzed		Analytical data based on 25 gram sample, all figures represent percentages					Pentachlorophenol recovered from oil extracted from wood with benzene (oxygen bomb analysis)	Pentachlorophenol recovered from wood after benzene extraction (oxygen bomb analysis)	Pentachlorophenol per gram of oil in unextracted wood (oxygen bomb analysis)
	Total weight before rasping	Weight saved after rasping	Oil	Pentachlorophenol	Wood	Water	Total			
	grams	grams						per cent	per cent	per cent
Outer 1 inch	409	403	21.78	1.27	70.40	6.55	100.00	4.55	0.14	5.22
Next 1 inch	248	237	15.48	0.87	75.20	8.45	100.00	4.20	0.14	5.06
Inner Portion	128	130	17.32	0.85	74.00	7.83	100.00	4.31	0.17	5.23

[1] Data based on work done by the application research department, Monsanto Chemical Co.

TABLE IX.—ANALYTICAL DATA[1] ON SAP GUM TIE NO. 109 FROM RUN 38—TIE TREATED WITH "A" PETROLEUM OIL CONTAINING PENTACHLOROPHENOL

Location of section analyzed—center of tie
Volume data on section analyzed—8.375" x 6.75" x 1"—56.53 cu. in.
Original weight of total section—652
Original pentachlorophenol content of treating solution as determined by the oxygen bomb method of analysis—4.90 per cent

Location of sample used for analysis	Weight data on section analyzed		Analytical data based on 25 gram sample all figures represent percentages					Pentachlorophenol recovered from oil extracted from wood with benzene (oxygen bomb method)	Pentachlorophenol recovered from wood after benzene extraction (oxygen bomb method)	Pentachlorophenol per gram of oil in unextracted wood (oxygen bomb method)
	Total weight before rasping	Weight saved after rasping	Oil	Pentachlorophenol	Wood	Water	Total			
	grams	grams						per cent	per cent	per cent
Outer 1 inch	337	331	20.65	1.14	73.20	5.01	100.00	4.45	0.18	5.29
Next 1 inch	197	193	11.54	0.89	81.60	5.97	100.00	3.72	0.14	4.85
Inner Portion	118	111	4.67	0.29	91.60	3.44	100.00	3.17	0.08	4.84

[1] Data based on work done by the application research department, Monsanto Chemical Co.

of pentachlorophenol in petroleum oil. Similar experimental cross-arm treatments were carried out for Bell of Canada[1] in 1943, with excellent results.

Pressure Treatments

As far as the writer is aware, the first pressure-treating work with pentachlorophenol in petroleum oils was done in an experimental cylinder at Monsanto Chemical Company, St. Louis, Mo., late in 1935. A number of pine saplings were pressure treated and installed in a test plot near New Orleans in April, 1936. Early in 1936, the Forest Products Laboratory, Madison, Wis., treated a large number of fence posts with various preservative chemicals. Included in these tests were two batches of posts treated with pentachlorophenol dissolved in spent crankcase oil. Installation of the treated pine posts was begun late in 1936, and completed in February, 1937. Included in this series were 99 posts having an average retention of 6.7 lb. per cu. ft. of treating solution containing 4.82 per cent of pentachlorophenol by weight, and 99 posts having an average absorption of 6.4 lb. per cu. ft. of treating solution containing 3.02 per cent of pentachlorophenol by weight. These posts have been examined periodically by the Forest Products Laboratory and the latest published report on them will be found in the 1943 Proceedings of the American Wood-Preservers' Association (22). After seven years all of the 198 posts are still in service, with none showing termite damage and only five showing some decay.[1] Out of the 65 untreated posts set at the same time, 64 are unserviceable and all have been attacked by termites or decay.

Both of the aforementioned treatments, i.e., the saplings treated at Monsanto and the fence posts treated at the Forest Products Laboratory, were treated in what might be considered semi-commercial equipment. Between October 30 and September 9, 1937, two carloads of lumber and dimension material were pressure-treated at the plant of the Santa Fe Tie and Lumber Preserving Company, Somerville, Tex. The treated material was distributed to various parts of the United States where it was used for test-plot installations and also under actual service conditions. From the material treated at Somerville, there is published data on only one batch of 4 in. by 4 in. timbers. These were installed by the Mississippi highway commission in February, 1938. After five years exposure, all specimens were in perfect condition (22).[2]

A number of ties have been treated experimentally, some with pentachlorophenol dissolved in a practically colorless petroleum

[1] Unpublished data.
[2] The Mississippi State highway department, Jackson, Miss., issues a mimeographed inspection report annually. The information herein stated was taken from one of these latest reports.

oil, the rest treated in dark, heavy petroleum oils. Specific information is available at this time on only one batch consisting of 200 No. 1 hewn southern yellow pine ties that were treated by the Santa Fe Tie and Lumber Preserving Company, using the Rueping process, with pentachlorophenol dissolved in a colorless petroleum oil.[2] One hundred of these ties received a net absorption of 5.58 lb. per cu. ft. of treating solution containing 4.9 per cent of pentachlorophenol and 95.1 per cent of petroleum distillate. The other 100 received a net absorption of 7.1 lb. of the aforementioned solution per cu. ft. One hundred of these ties were placed in service in the Cleburn, Tex., test track in 1939. At the 1943 inspection, all of these ties were still in the track and in good condition.

Still further records on experimentally pressure-treated pine will be found in the 1942 Proceedings of the American Wood-Preservers' Association in the report by Daniels, et al. (11).

The first large-scale commercial treating work was done at the Texas Creosoting Company, Orange, Tex. This treating, conducted in 1941 with pentachlorophenol dissolved in colorless petroleum oil, covered the treatment of "considerable quantities of pine lumber, poles, piles and cross arms." (9).

In 1942, more than 100 ties were treated experimentally by the application research department at Monsanto with 5 per cent of pentachlorophenol in black petroleum oil, to study treating schedules, distribution of toxic and solution in the ties, and other such points. The information given in tables VI to IX was taken from this work. (The entire experimental studies involve considerable data, and since they are so extensive, it is hoped they can serve as a basis for a later paper.)

Lacking long-time service records on the quantity of toxic required to give adequate protection over long periods of time, it has been recommended generally that various pressure-treated materials to be used in contact with the ground be given a 10-lb. treatment using a 5 per cent solution of pentachlorophenol, or at least the treated wood should have a 0.5-lb. retention of pentachlorophenol per cu. ft. of wood.

For wood to be used in the interior of buildings or where it will be protected by paint and under conditions where it will not contact the ground or be otherwise susceptible to leaching, as little as 0.25 lb. of pentachlorophenol per cu. ft. of wood seems to be sufficient.

Whether these retentions are correct, or higher or lower than necessary, can only be determined by service records, but as mentioned previously, it is better as a general principle to start too high and ultimately reduce the absorption of dry weight of chemical than to start too low and have failures.

[2] Unpublished data.

Treating Facilities for Pentachlorophenol Applications

The treating facilities required for applying pentachlorophenol solutions to wood depend upon whether the preservative is purchased in the solid form or in a solution, and whether the preservative is to be applied as a dip, as a submersion bath, or by pressure methods. If the solid form is purchased, a suitable dissolving tank is required, the tank to be equipped with facilities for heating the solution, for effective agitation, and for venting. Adequate pumping facilities are also required. Regardless of whether the solution is made at the treating plant or is purchased ready to use, storage space must be provided. If a colorless solution is to be used, all equipment and supply lines must be used only for the clear solutions. Where dark solutions or mixtures are to be used, the requirements call for suitable facilities for blending and mixing the solutions, for storage and for keeping them free from contamination from other lines, tanks, etc.

Treating tanks, cylinders and other equipment can be the standard type available in commercial treating plants, except, of course, that where clean treatments are required, all equipment must be free from colored materials such as creosote.

Many commercial and private treating plants have treated various wood items with pentachlorophenol in oil solutions. Some of the items treated by these companies have already been referred to. The following is a partial list[1] of companies that have done commercial treating with pentachlorophenol:

A. Pressure treating
   - Atlantic Creosoting Company, Savannah, Ga.
   - Joslyn Manufacturing & Supply Company, Franklin Park, Ill.
   - Santa Fe Tie and Lumber Preserving Company, Somerville, Tex.
   - Texas Creosoting Company, Orange, Tex.

B. Open-tank treatment for poles, piles, posts, cross arms, etc.
   - Bell Lumber & Pole Company, Minneapolis, Minn.
   - Consolidated Treating Company, Minneapolis, Minn.
   - Rainier Cross Arm Company, Chehalis, Wash.
   - Southern California Edison Company, Los Angeles, Cal.
   - Valentine–Clark Corporation, St. Paul, Minn.

Besides these commercial treating plants, there are a large number of woodworking plants and lumber yards dipping large quantities of stock-sash, doors, frames and various other wood items in vats installed in their manufacturing plants. Potential users of wood treated with a clean treatment oil solution will be interested to know that practically all stock-sash manufacturers

[1] Any omissions are unintentional. Since the list of lumber and other companies doing open-tank treating is large, only commercial treating plants and producers of treated poles, ties, piles, etc., are listed.

now use an oil treatment for sash, doors, frames, etc., and the toxicant is, in general, pentachlorophenol. Application is made by immersing in cold solution. Standards and treating specifications have been set up by the National Door Manufacturers Association, and by a license system a check is kept to see that materials bearing the Seal of Approval are treated according to specifications. Also, large volumes of lumber and plywood now used in construction of knocked down barracks and in package work receive a pentachlorophenol-in-oil treatment.

It might be mentioned here that for these latter types of work, formulations have been developed which not only utilize a 5 per cent solution of pentachlorophenol in suitable petroleum oils, but which also contain moisture impedient materials which help "dimensionalize" lumber, i.e., that retard the rate of shrinking and swelling of lumber.

Because of the large number of millwork plants equipped to clean-treat wood according to the National Door Manufacturers' Association standards, no attempt will be made to list them in this paper. Information of this type can be obtained from the National Door Manufacturers' Association, Chicago, Ill.

Qualities to Be Considered in Handling and Using Pentachlorophenol as a Wood Preservative

Through the numerous uses that have been made of pentachlorophenol in the preservative field, no marked objectionable qualities have appeared. Pentachlorophenol dust tends to cause local irritation of the nose and throat if inhaled and the crystals also tend to cause local irritation when they enter the pores of the skin, especially during periods of perspiration. Such irritation can be prevented by suitable handling precautions and by wearing protective garments. Treating solutions consisting of pentachlorophenol dissolved in suitable solvents may also be irritating to the skin, but experimental evidence shows that if suitable precautions are taken, health complications need not develop because of the use of such treating solutions. It must always be remembered that chemicals which are sufficiently toxic to control various wood-destroying organisms and insects, may generally be considered as substances which should be handled with due care to avoid irritation or harmful effects to human beings.

When pentachlorophenol was first put on the market there existed only a modest knowledge of the toxicological and dermatological effects of this chemical. Because of this lack of knowledge, the necessity for careful handling was emphasized sharply. Now extensive experimental studies on the toxic effects of pentachlorophenol have since been completed, and these data, together with seven years experience in the manufacture of pentachlorophenol

and the accumulated experiences of hundreds of customers using pentachlorophenol in a wide variety of fields, show the practicability of using pentachlorophenol as a wood preserving chemical.

The literature dealing with the toxicology of pentachlorophenol is not voluminous, and as is often the case when data are presented on new chemicals, one can find conflicting statements in the literature. The latest article reviewed was published by Machle et al. (20) in May, 1943. This article refers to the previous work done at the Kettering Laboratory of Applied Physiology (12), (13), (19), as well as to publications by Boyd et al. (4) and McGavack et al. (21). The results given in these various publications are not always in full agreement with each other. Machle's article also refers to the work of Goodnight (15) on the toxicity of pentachlorophenol to fish, a study undertaken to determine the effects of pentachlorophenol on stream pollution around paper mills.

The final analysis of all these toxicological studies indicates that pentachlorophenol when used as an industrial preservative, must be used judiciously. Besides the accumulated data the manufacturers have from their own plant operators and from their many customers, intensive toxicological work has been done on such animals as rabbits, rats, cats and guinea pigs. Representative of the information obtained from these scientific studies is the information already referred to by Deichmann et al. (12). These workers show that no cumulative functional or organic injuries are produced by repeated ingestion of small sublethal doses of pentachlorophenol. This was demonstrated by feeding rats 3.9 mg. of pentachlorophenol per rat each day for 28 weeks. The rats showed no sign of acute poisoning and post-mortem examination of various tissues of the rats revealed no gross and only insignificant histological abnormalities. When administered orally to rats, the lethal dose of pentachlorophenol in olive oil required to kill 50 per cent of the test animals is 77.9 mg. per kilo of body weight. Solutions of pentachlorophenol in petroleum oils such as fuel oils are more toxic with the lethal dose required to kill 50 per cent of the rats being 27.3 mg. per kilo of body weight.

In considering such toxicological data, cognizance must also be taken of the type of solvent used as a carrier of the pentachlorophenol.

The foregoing data indicate that pentachlorophenol is not a cumulative poison, but notwithstanding, the precautions given by the manufacturers should be heeded until further toxicological data are available.

Summary

In summarizing, it can be said that there is a growing literature on pentachlorophenol both as to its use and its value as an industrial preservative. Each year as new records are added as to its

performance, these new records bear out previous predictions on the preservative value of pentachlorophenol. The fact that the preservative is a single chemical compound and contains a specific preservative value per unit weight means that its constancy of performance can be predicted and assured.

Literature Citations

1. Baechler, R. H. A Method for Determining Chlorinated Compounds Dissolved in Petroleum Oils. Proceedings American Wood-Preservers' Association. 35:361–364. 1939.
2. Bateman, Ernest and Baechler, R. H. Some Toxicity Data and Their Practical Significance. Proceedings American Wood-Preservers' Association. 33:91–104. 1937.
3. Blew, J. O. et al. Report of Committee 7–9—Post Service Records. Proceedings American Wood-Preservers' Association. 39:132–136. 1943.
4. Boyd, L. J., McGavack, T. H., Terranova, R., and Piccione, F. V. Toxic Effects Following the Cutaneous Administration of Sodium Pentachlorophenate. New York Med. Coll. and Flower Hospital Bulletin. 3:323. 1940.
5. Buckman, S. J., and Pera, J. D. Non-Pressure Treatment of Wood. Southern Lumberman. 165(2081):223–226. 1942.
6. Buckman, Stanley J., Pera, John D., and Browne, Robert Y. Non-Pressure Treatment of Wood. Southern Lumberman. 167(2105):156–158. December 15, 1943.
7. Carswell, T. S., and Hatfield, Ira. Pentachlorophenol for Wood Preservation. Industrial and Engineering Chemistry. 31 (11):1431–1435. 1939.
8. Carswell, T. S., and Nason, H. K. Properties and Uses of Pentachlorophenol. Industrial and Engineering Chemistry. 30(6):622–626. 1938.
9. Chapman, Dale. The Preservative Treatment of Wood With Pentachlorophenol. Edison Electric Institute Bulletin. 10 (2):57–58. 1942.
10. Consolidated Treating Co. "Life-Span" Cedar Poles. Booklet issued by the company at Minneapolis, Minnesota. 1941.
11. Daniels, A. S. et al. Report of Committee 7–4–1—Marine Piling Service Records. Proceedings American Wood-Preservers' Association. 38:364–370. 1942.
12. Deichmann, Wm., Machle, W., Kitzmiller, K. V., and Thomas, G. Acute and Chronic Effects of Pentachlorophenol and Sodium Pentachlorophenate upon Experimental Animals. J. Pharmacol. & Exper. Therap. 76(2):104–117. 1942.
13. Deichmann, Wm., and Schafer, Lawrence J. Spectrophotometric Estimation of Pentachlorophenol in Tissues and Water. Ind. and Eng. Chem., Analytical Ed. 14(4):310–312. 1942.

14. Doolittle, Fred B. Pentachlorophenol Substituted for Creosote. Electrical West. 89(4):58–61. 1942.
15. Goodnight, C. J. Toxicity of Sodium Pentachlorophenate and Pentachlorophenol to Fish. Ind. and Eng. Chem. 34(7):868–872. 1942.
16. Hubert, E. E. Preservative Treatment of Timbers with Permatol. The Timberman. 42(1):17, 20, 22, 24, 26. 1940.
17. Hubert, Ernest E. The Preservative Treatment of Millwork. Industrial and Engineering Chemistry. 30(11):1241–1250. 1938.
18. Hubert, Ernest E. Toximetric Method for Oil-Soluble Wood Preservatives. Ind. and Eng. Chem. 12(3):139–141. 1940.
19. Kehoe, Robert A., Deichmann-Gruebler, Wm., and Kitzmiller, K. V. Toxic Effects Upon Rabbits of Pentachlorophenol and Sodium Pentachlorophenate. Journal of Industrial Hygiene and Toxicology. 21(5):160–172. 1939.
20. Machle, Willard, Deichmann, Wm., and Thomas, G. Observations on the Fate of Pentachlorophenol in the Animal Organism. Journal of Industrial Hygiene and Toxicology. 25(5):192–194. 1943.
21. McGavack, T. H., Boyd, L. J., Piccione, F. V., and Terranova, R. Acute and Chronic Intoxications with Sodium Pentachlorophenate in Rabbits. Journal of Industrial Hygiene and Toxicology. 23(6):239–251. 1941.
22. McKean, Herbert B. et al. Report of Committee 7–9—Post Service Records. Proceedings American Wood-Preservers' Association. 38:418–435. 1942.
23. Morrill, H. L., and Benignus, P. G. A Review of Analytical Methods for Determining Pentachlorophenol and its Sodium Salt. Monsanto Technical Bulletin No. 0–24. August 1, 1943.
24. Western Pine Association. Permatol. A Preservative Treatment for Exterior Millwork. Technical Bulletin 6 (Sept. 1, 1936; revised April 1, 1937, April 1, 1938, March 1, 1940).

OFFICE OF
General Supt. Timber Preservation
BRAINERD, MINN.

St. Paul, Minn., January 30, 1946

File 166-11

Mr. A.J.Loom
General Superintendent Timber Presv.

Referring to your letter of January 25th to Mr. Blum, enclosing copy of one dated January 22nd from A.D.Chapman & Company, Chicago, regarding suggested use of a 50/50 mixture of creosote and pentachlorphenol:

I received an identical letter from Chapman & Company and was about to take it up when your letter to Mr. Blum reached me. Since then, I have copy of Mr. Yager's letter of January 28th, to Mr. Blum, in view of which I am taking no action on the Chapman letter, or on your suggestion, unless and until I am requested to obtain additional information.

(Signed) E. M. WILLIS

cc: Mr. B. Blum
Mr. L. Yager

OFFICE OF
CHIEF ENGINEER
JAN
31
1946
NOR. PAC. RY.
ST. PAUL, MINN.

3659A

At Billings, January 28,1946

MR. A. J. LOOM:

Your letter of the 25th transmitting letter from the A.D.Chapman Co. Inc. concerning the use of creosote Penta mixture as an alternate to straight creosote:

As I unde stand this matter it is suggested that instead of using the 50-50 creosote petroleum oil mixture we use 25% creosote, 25% Pentachlorphenol, and 50% petroleum oil.

You raise question if the petroleum we use is suita le for mixture: can you not find that out from the Forest Products Laboratories? It is my understanding that Mr. Willis will ask the Chapman Co. for prices.

Will you conclude such investigation as can be made in the short time available.

cc-Mr. B. M. Willis
Mr. L. Yager

bb/s

St. Paul, Minnesota
January 28, 1946

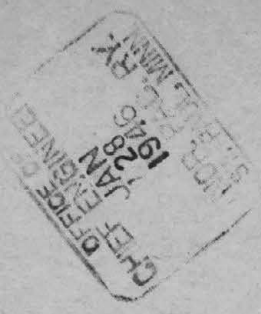
Mr. Bernard Blum:

Referring to the attached copy of Mr. Loom's letter of January 21 to Messrs. Johnson, Willcutt, and Stone, about the creosote situation:

Mr. Loom sent me a copy of that letter and I had a telephone conversation with him about this subject a few days ago in which I stressed the necessity for reserving some supply of creosote at Brainerd and Paradise sufficient to treat switch ties and emergency material because that reservation appears to be more important than the continuation of treating ties in the present emergency.

Mr. Loom's letter of January 25 concerning letter from A. D. Chapman and Company, exclusive distributors of wood preservatives, for the Dow Chemical Company, dealing with a substitute for creosote, namely, pentachlorphenol, has a bearing on this general subject of creosote scarcity during the steel strike emergency. I have a faint recollection of having prepared or reviewed a report on this creosote substitute a number of years ago but we have not been able to locate the file. We are asking Mr. Loom for a possible clue to enable us to locate the file.

LY:C


CHIEF ENGINEER
OFFICE
JAN 28 1946
NEW YORK

St. Paul, Minnesota
January 28, 1946

In mail Pouch '5
1/26/46

Mr. Bernard Blum:

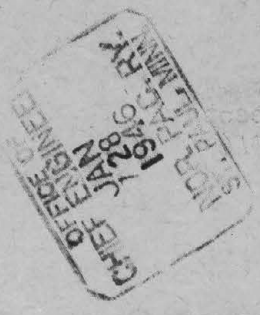
Referring to Mr. Loom's letter of January 25 concerning a letter from A. D. Chapman & Company, Inc., exclusive distributors of the Dow Chemical Company for pentachlorphenol, petroleum timber treatment brought up because of the threatened scarcity of creosote during the duration of the steel strike. In looking through the file I find that the matter was investigated in December, 1941. See Mr. Loom's letter to you of December 16, 1941, in which he attached a copy of letter from Mr. Belcher of the Santa Fe dated December 4, 1941.

The previous reports would appear to indicate the pentachlorphenol has some promising prospects as a preservative for cross ties. I am herein requesting Mr. Loom to immediately take up with the United States Forestry Products Laboratory at Madison, and such other likely sources of information as he may have in mind, to obtain data accumulated in recent years bearing specifically on the type of petroleum required for the most successful results with pentachlorphenol utilization in order that we may be in a position to act if and when the creosote situation becomes critical.

L. W. Sayre

LY:C

Copy Mr. E. M. Willis
Mr. A. J. Loom


OFFICE OF NAVAL RESEARCH
JAN 29 1951
CHIEF

Brainerd, Minn., January 25, 1946

Mr. Bernard Blum:

Referring to the attached letter of January 22nd, from A. D. Chapman & Company, Inc., which was turned over to me by Mr. Sewall today.

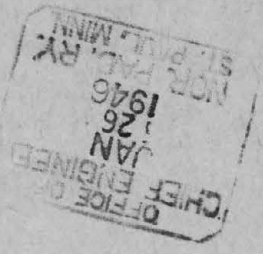
The impending creosote shortage referred to in this letter seems to be confirmed by recent advice from our Purchasing Department and the fact that our supply at the treating plants is running very low.

If the creosote situation does not improve so that our Purchasing Department can obtain our requirements, I believe this suggestion to use pentachlorphenol and petroleum warrants a reply. I am therefore sending a copy of the letter to Mr. Willis for his attention.

The U.S. Forest Products Laboratory has experimented with Pentachlorphenol-petroleum treatment since 1934 and others have been using this chemical in various solutions. The results seem promising but so far, actual service tests are not old enough to prove its comparative value as a wood preservative with that of creosote or creosote-petroleum mixture.

It will be interesting to find out if the petroleums we are now using are suitable for mixture with pentachlorphenol.

AJL/b
cc-Mr.E.M.Willis
Mr.L.Yager


OFFICE OF
CHIEF ENGINEER
JAN
26
1946
NOR. PAC. RY.
ST. PAUL, MINN.

Read:
J. S. S.
E. L. J.
M. A.

REGIONAL OFFICES
LOS ANGELES 21
NEW ORLEANS 12
NEW YORK 17
PORTLAND 5
HOUSTON 2
MEMPHIS 9
ATLANTA 3
CHICAGO 1

A. D. CHAPMAN & COMPANY, INC.

WOOD PRESERVATIVES & INDUSTRIAL CHEMICALS

333 NORTH MICHIGAN AVENUE

CHICAGO 1

DISTRIBUTORS OF
DOWICIDE FOR
THE DOW CHEMICAL COMPANY
EXCLUSIVE SALES AGENTS
FOR
CHAPMAN CHEMICAL COMPANY
MEMPHIS, TENNESSEE

TRADE CCC MARK

January 22, 1946

Northern Pacific Railroad Company
Brainerd, Minnesota

Gentlemen:

In view of the impending shortage of creosote and its high residue characteristics, we believe you will be interested in serious consideration of the use of a 50/50 mixture of creosote and pentachlorphenol solution or straight penta solution.

As you know, for several years the Western Electric Company has approved the 50/50 creosote penta mixture as an alternate to straight creosote. Several treating plants have used it very satisfactorily. Various utilities have approved penta for pole and crossarm treatment. Its chief advantages are lower cost (averages 14¢ per gallon), and a cleaner treatment.

As exclusive distributors of wood preservatives for The Dow Chemical Company, we are prepared to furnish you your requirements of pentachlorphenol (Dowicide 7) for use alone or with creosote. We can advise you definitely with regard to suitable petroleum oils. Adequate supplies of penta will be available.

We would appreciate hearing from you.

Cordially yours,
A. D. CHAPMAN & COMPANY, INC.

Dale Chapman
Dale Chapman

DC:m

(3 copies)

N. P. RY. Co.
OFFICE OF
JAN 25 1946
SUPT. TRK. TRK.
BRAINERD, MINN.

3659

St.Paul, January 24, 1946.

Mr. A. J. Loom:

I am returning progress report No. 2 of the West Coast Lumbermen's Association covering Chemical Seasoning, received with your letter of October 30, 1945.

You will probably want this back for your file.

Chief Engineer

TRG:S

attch

Mr Magee: noted 1/28/46
note
D.B.

Brainerd, Minn., January 21, 1946

Mr. Levi Johnson
Mr. C. L. Willcutt
Mr. G. H. Stone:

The Purchasing Department advises that the Steel Workers strike has already stopped creosote deliveries from several sources. They have assurance of shipment only from the Koppers Company and the Lehigh Briquetting Company.

In view of this situation we will plan to hold in reserve enough creosote at each plant to permit treatment of miscellaneous materials that we anticipate will be required in preference to ties. If the strike is not settled very soon, it may become necessary to stop or at least postpone tie treatment in order to reserve creosote for the other materials.

Our creosote supply at Seattle has been exhausted so we have had to borrow from the contractors stock for some time. It is of course necessary to replace what we have borrowed and build up our stock at that plant in preference. Your records indicate that we have on hand only about two weeks normal supply at Brainerd and Paradise and possibly all of the creosote received from the Koppers Company will go to Seattle during this period.

If we do not have any further information within a week or so please wire how much creosote you have left at that time so we can plan operation to make best use of quantities available.

AJL/b

Mr. Blum:

In line with our telephone conversation today.

Goog 1/31-46

OFFICE OF CHIEF ENGINEER
JAN 22 1946
NOR. PAC. RY.
ST. PAUL, MINN.

3659

Saint Paul, November 27,1945

MR. A. J. LOOM:

Your letter of the 20th and returning your copy of the AWPA report of special committee on handling of forest products:

As you say, this is far from a finished subject. Evidently it is something that requires considerable study and development work.

As I see it it is going to be difficult to obtain economy in machine-handling unless a plant has a large number of ties to handle, as otherwise the plant set-up/carrying charges will be too expensive to develop a return on the investment.

bb/s

x

Brainerd, Minn., November 20, 1945

Mr. Bernard Blum:

Referring to our discussions about the possibilities for mechanical handling of ties and other materials at our treating plants and the investigation of existing facilities developed at various plants throughout the country, now in progress, by the American Wood Preserving Association.

I have just received a copy of the first report of the A.W.P.A. special committee that has this assignment and am sending it to you herewith. I think we can agree with chairman, Larkin that much development work is yet to be done by the industry before we find the answers to our mechanical handling problems but you will note that progress is being made and no doubt something will be developed that can be made to fit into our scheme of things.

After you have looked over this report I shall be glad to have you return it to me at your convenience with any comments or suggestions you may desire to make.

I am keeping in close touch with this development and will keep you informed about any machines or devices that I think we can make any good use of at Brainerd or Paradise.

AJL/b


CHIEF ENGINEER
NOV 23 1945

3659

August 30,1945

MR. G. R. RAMSEY
Vice President,
National Pole & Treating Co.
500 Baker Arcade
Minneapolis 2, Minnesota

Dear Mr. Ramsey:

I am sorry you were not in town when Dr. Pereira appeared on the scene. As Mr. Malgren has told you, the doctor was a delightful fellow and I am sure he was fully taken care of.

I had him out to the house following his visit at your plant; and he was well pleased with all that he saw and was told.

He is very anxious for an American company to build a treating plant in Brazil and is of the opinion that it would be well worthwhile. I asked him about the laws with respect to an overwhelming preponderance of Brazilian ownership - which I believe is required of manufacturing plants. He stated that there would be no trouble in getting around that provision.

You missed something in not meeting Mrs. Pereira.

With kindest regards,

Very truly yours,

bb/s

Brainerd, Minn., Aug. 30, 1945

Mr. Bernard Blum:

With return of the attached letter, referred to in yours of August 29th about a recently patented process for chemical seasoning and storage of untreated poles and piling to avoid decay before treatment and to facilitate landing on trams to assure increased cylinder capacity.

There has been considerable experimental seasoning of wood with concentrated solutions of common salt or certain other chemicals and then drying it in a kiln or in the open air but I do not know of any commercial application of any such process. The only information I have at hand is a progress report on Chemical Seasoning of Douglas Fir, published by the West Coast Lumbermen's Association which I am attaching herewith.

It is not our practice to carry in stock any poles or piling at any of our treating plants and we do not permit steaming in our process of treatment. Our poles and piling are purchased in job lots, treated under our supervision and usually shipped out directly to final destination. A considerable number of our poles are butt treated at commercial open-tank plants but this treatment is also done under our supervision.

Green or partially seasoned poles or piles received at the plants for immediate pressure treatment are seasoned in the treating cylinders by the "boiling under vacuum" method without any appreciable loss of strength.

So far there has been no apparent advantage in carrying a seasoning stock of poles or piles at our plants and under our present practice it seems unlikely that we could make any economical use of a de-hydrating plant such as is called for under the "Tenger Process".

AJL:wp

St. Paul, Minn.
August 29,1945.

New Wood Dehydrating Process

Mr. A. J. Loom:

Note the attached letter from Charles G. Tenger, of San Francisco:

Do you know anything about this.

BB:e
enc.

3659

NATIONAL POLE & TREATING CO.

TREATING PLANTS:
SPOKANE, WASHINGTON
EVERETT, WASHINGTON
MINNESOTA TRANSFER, MINNESOTA

GENERAL OFFICES
500 BAKER ARCADE BUILDING
MINNEAPOLIS 2, MINNESOTA

WESTERN RED CEDAR
NORTHERN WHITE CEDAR
COAST DOUGLAS FIR
POLES—PILING—POSTS
LUMBER—BRIDGE TIMBERS
CROSS TIES

August 28, 1945

Mr. Bernard Blum, Chief Engineer
Northern Pacific Railway
St. Paul 1, Minnesota

Dear Mr. Blum:

Your letter of August 16th to Mr. Halgren, and I just got back today from a trip out west, but if you have not already heard from Dr. Jose Pereira, I thought you would be pleased to know as I was that Dr. Jose showed up out at the Plant, was a very pleasant and intelligent visitor, and all of our folks enjoyed meeting him and gained a lot, I think, through our conversations with him and the Dr. on his side of it reported to us anyway that he had a very instructive and very pleasant visit, so the whole thing seems to have worked out very well all around.

I hope that if the Dr. got in touch with you again that his report to you confirms to you what I have said and in any case, we are appreciative of your thoughtfulness in referring the Dr. to us.

With best regards, I am

Very truly yours,

NATIONAL POLE & TREATING CO.

G.H. Ramsey
Vice President

GHR:jee

1824 Grove Street
San Francisco, 17
California

August 21, 1945

NOTED
H. E. S.
L. S.
L. L. L.
L. D. V.

Northern Pacific R. R. Co.,
St. Paul, Minn.

Dear Sirs:

NEW WOOD DEHYDRATING PROCESS

As Patentee, I desire affiliation with creosote treating firm or party interested in establishing dehydrating plant under patented chemical process to furnish shaved and seasoned poles and piling ready for the treating cylinder, which method increases normal capacity four to six times a day; eliminates steam and vacuum conditioning bath; increases mechanical strength of poles; and many other advantages and economies, without capital expenditure on present creosote plant.

With the "TENGER PROCESS" plants may stock their yards with desired sizes ready for the cylinder without loss from decay and after creosoting they will be mechanically stronger than if given the steam conditioning bath. Loss from decay alone would pay the initial expense of this treatment, besides the advantage of having a stock of poles ready for delivery on short notice.

This process is no laboratory experiment but has been thoroughly tested by recognized institutions, is carried on at normal temperature, thus avoiding high temperatures of steaming so damaging to wood structures as shown by Bulletin 295 March 1927 and conducted at Purdue University concluding that loss of strength thru Steaming is 15 to 50 percent.

Full details on request.

Charles G. Tenger
CHARLES G. TENGER
Patentee.

NORTHERN
PACIFIC RAILWAY
AUG 27 1945
OFFICE OF THE PRESIDENT

~~5448~~

August 16,1945

NATIONAL POLE & TREATING CO.
500 Baker Arcade
Minneapolis Attention: Mr. Hallgren

Dear Mr. Hallgren:

Confirming our telephone conversation today, this will introduce to you

Dr. José Arenta Pereira, of Sao Paulo, Brazil

who is visiting this country to investigate our methods of timber preservation and other matters related to the lumber industry.

The Doctor is in charge of the timber laboratory in Sao Paulo; and I told him that he could undoubtedly obtain considerable first-hand information at your Minneapolis plant.

I am sure you will enjoy meeting him and showing him around.

Very truly yours,

bb/s

Best wishes

~~5648~~

July 23, 1945.

Dr. Jose Aranha Pereira
Tree Ring Laboratory
University of Arizona
Tucson, Arizona

Dear Dr. Pereira:

Acknowledging receipt of your letter of the 19th advising that you now expect to be here about August 14th:

I will be very glad to meet you.

Very truly yours,

BB:S

Tucson, Ariz., July 19th, 1945.

Dear Mr. Bernard Bleum.

In a letter I mailed to you from this city last month, I have written that I expected to arrive in Saint Paul, Minn. in the beginning of September.

But to day, it appears that I shall be in your city somewhat earlier than I have anticipated, probably about August 14th.

I hope this alteration in my program should not interfere with your ordinary business, but because of the difficulties I have found for railroads reservations, I have made arrangements to travel by plane and so the time is to be greatly shortened.

With my best regards,

Sincerelly yours

E. Frank Schulman

Tree Ring Laboratory
University of Arizona
Tucson - Ariz.

To
Mr. Bernard Blum
Chief Engineer
Northern Pacific Railway Co.
St. Paul 1, Minn.

Mr. Blum
noted.
Doom
6/18

Mr. Doom
Pls note and
return B.B.
6/16



Tucson, Ariz, Jan. 10, 945.

Dear. Mr. Blum.

Thank you so much for your letter dated Abril 7, and kind answer affording me the possibility to visit the Northern Pacific R. Company's treating Plants, and to see your working methods.

Your letter was sent to me from Sao Paulo, Brasil, and I received it just yesterday.

I am now filling my program finith part in U.S., staying in Tucson Tree Ring Laboratory, for a preliminary survey of the pos-

sibilities of Tree ring analysis in the dry region of my country. This study, as you know, is connected with droughts and climate concerns.

Afterwards, I want to care of wood preservation and I expected to visit St. Paul and Minnesota in the beginning of next. September. So I shall be very happy to have the opportunity of meeting you and to profit from your most valuable lessons and suggestions.

With best personal regards, I am

Yours, sincerely.

R. Aranda Pacheco

~~5648~~

7 Abril, 1945

Dr. Jose Aranha Pereira
Chief Engineer,
Instituto de Pesquisas Tecnologicas
do Estado de Sao Paulo,
Caixa Postal 141-A
Sao Paulo, Brasil

My dear Dr. Pereira:

In response to your letter dated March 27, permit me to assure you that it will afford me much pleasure to make your acquaintance and to extend to you every facility for examining and reviewing our methods of treating tie and bridge timbers on the Northern Pacific Railway.

It would seem to me that August or September would be a most agreeable time to visit the northern areas of the United States; and if you will advise me in due time the approximate dates you expect to visit Minnesota and Saint Paul, I shall be most happy to arrange my own busy schedule accordingly.

Most cordially yours,

bb/s

INSTITUTO DE PESQUISAS TECNOLÓGICAS (Technological Research Institute)
DO ESTADO DE SÃO PAULO
ANEXO À ESCOLA POLITÉCNICA
Caixa Postal, 141-A — Telefone, 4-9106
SÃO PAULO — Brasil

MM-N. 26/45. São Paulo, March 27, 1945.

MR. BERNARD BLUM
Northern Pacific Railroad
St. Paul, Minnesota, U.S.A.

Dear Sir

I have already acquaintance with you through your interesting paper presented in the annual meeting of the American Wood Preservers' Association and published in the Proceedings of 1942 - titled "Service rendered by various species of tie timbers in the Northwest".

Now, I am happy to have the opportunity to go to North America, with the object of visiting wood preservation plants and centers of studies on this matter.

We are in Brasil starting practical works on the treatement of timbers and, if is not asking too much of your kindness, I should be glad to see you in your city next August or September to profit your large experience and knowledge about ties in general, chiefly hardwoods ties.

If you agree to receive my personal visit, for which I should be very obliged, please send your reply in order to be included in the plot of my travel in your splendid country, the city of St. Paul of Minnesota.

Yours sincerely

José Aranha Pereira
Chief Engineer

jap/lcs

In resposta al carta sua dato March 27, permitte-mim assurarti que affofdarme prazer muito a-encontrarti e entenderti qualquer facilidade per investigando e revistando as nossa modos d'preservacion d' tie e bridge duro no estrada d'ferro Pacifico ~~Nort~~ Norteiro.

Parece-me que Agosto ou Setembre deve-ser mezes muito agradavel per visitar as areas norteiras d U.S.A.; e si Ø avisaro-mi en corso conveniente as datas approximatas quando entenderou achegar en Minnesota e Saint Paul, serei felicissimo arranger schedules urgentes proprio minho concordando.

In resposta al carta sua dato March 27, permitte-mim assurarti que affordarmim prazer muito a-encontrarti e entenderti qualquer as nossas facilidades per investigando e revistando as nossas modas d'preservacion de tie e bridge materiel no estrada de ferro Pacifico Norteiro.

Parece-mim que Agosto ou Setembre deve-ser mezes muito agradavel per visitar as areas norteiras nesta U.S.A.; e si O Dottor avisaro-mim ~~Ø~~ en corso conveniente as datas approximatas quando entenderou achegar en Minnesota e Saint Paul, serei felicissimo arranger schedules urgentes minhas propriias concordando.

Cordialmente

3659

Brainerd, Minn., November 1, 1943.

Dr. German von Schrenk
Consulting Timber Engineer
Tower Grove & Flad Aves.
St. Louis, Missouri (10)

Dear Sir:

In reply to your letter of October 28th, concerning comparative volumetric absorption of oil and water solutions in preservative treatment of Douglas fir:

As you may know, the Northern Pacific has used only creosote, creosote-coal tar solution and creosote-petroleum mixture as preservatives at its treating plants. Recently a few pieces of salt treated Pacific Coast Douglas Fir lumber and bridge material have been purchased for experimental purposes from small commercial plants located near Portland and Tacoma.

In order to make prices compare favorably with creosote treated material these plants are using only the minimum absorption of salts that they think will meet requirements, or from 3/8 to 3/4 pounds per cubic foot. I believe it has been proven that much heavier absorptions of the various salts used would be necessary in order to make wood appreciably fire retardant, but we have no information as to the quantities required for this purpose or the maximum volumetric absorption of salts that is possible in either Southern Pine or Douglas fir.

At the West Coast Wood Preserving Company plant at Seattle, the National Pole and Treating Company plant at Spokane, as well as at our own plants, we have had no difficulty in obtaining the average volumetric absorption of creosote, creosote-coal tar solution or creosote-petroleum mixture in Pacific Coast Douglas fir that is required under our treating specifications or as follows:

Cross Ties & Switch Ties	8	Lbs. per Cu. Ft.
Lumber & Bridge Material	12 to 16	" " " "
Piling for Inland use	10	" " " "
Piling for Marine use	16	" " " "

With very few exceptions all the lumber, bridge

material and piling we have treated during the past 36 years has been Pacific Coast Douglas Fir. We also treat and use a considerable number of cross and switch ties of this species each year.

We have not treated any Southern Pine but from our experience in treatment of Pacific Coast Douglas Fir and many other timbers we use for cross ties, I have no reason to doubt comparative absorptions published by Underwriter's Laboratories, Inc. in their June 15, 1943 "Report on Fire Hazard Classification of Douglas Fir and Southern Yellow Pine Impregnated with Chromated Zinc Chloride", of which you have no doubt received a copy.

Yours truly,

A. J. Loom,
Gen'l Supt. Timber Preservation.

AJL:lp

Mr. Blum -
Copy for your information
Loom

CHIEF ENGINEER
NOV 4 1943
MDR. PAC. DIV.

C O P Y

THE CHESAPEAKE AND OHIO RAILWAY COMPANY
THE NEW YORK, CHICAGO AND ST. LOUIS RAILROAD COMPANY
PERE MARQUETTE RAILWAY COMPANY

Tower Grove & Flad Aves.
St. Louis, Mo. 10

October 28th, 1943.

Mr. A. J. Loom
General Supt. Timber Preservation
Northern Pacific Railway
Brainerd, Minnesota

Dear Sir:

I would very much appreciate it if you would tell me the average volumetric absorption that you get or did get with creosote, water solutions, or creosote-petroleum in the treatment of Douglas fir. At an acrimonious and hectic meeting of the special committee on fire resistive treatment of the A.W.P.A. in Chicago the other day, I was advised that it was possible to get as much volumetric absorption in Douglas fir as in southern pine. This I am inclined to doubt. As you know, in the old zinc days we used to get as high as 50% volumetric absorption in pine and approximately 25% in red oak. I have no figures, however, for Douglas fir. The answer to this Douglas fir question might be in terms of high sapwood content pieces and all heart pieces.

This problem is of great significance at the present time in connection with specifications which are being discussed by the A.S.T.M., A.R.E.A., and A.W.P.A. to treat wood to the extent of leaving 4, 5 and even 6 pounds of dry salts per cubic foot.

Please give me whatever information you have on this subject, as soon as possible. We may wish to use these data in our Committee 17 A.R.E.A. report.

Yours very truly

(Signed) Herman von Schrenk
Consulting Timber Engineer.

HvS:ch

P.S. - I have also asked Messrs. Belcher & Hubley these questions.

3659

SMALLER WAR PLANTS CORPORATION
WASHINGTON, D. C.

June 15, 1943

IN REPLY REFER TO:

Mr. Bernard Blum
Chief Engineer
Engineering Department
Northern Pacific Railway Company
St. Paul, Minnesota

Dear Mr. Blum:

Your letter of June 5 addressed to General Robert W. Johnson has been referred to this Division for attention. We have taken due note that the questionnaire was sent to one of your tie treating plants and in the circumstances mentioned in your letter it is, of course, unnecessary for you to file the return.

For your information we might mention that the questionnaire was sent out by the Bureau of the Census, Department of Commerce, to the smaller concerns within a certain range to all plants which were on its lists.

Very cordially yours,

W. Ernest Seatree

W. Ernest Seatree
Special Assistant to the Chairman

B



3659

June 5, 1943

COL. ROBERT W. JOHNSON
Army of the United States
Chairman Smaller War Plants Corp.
C h i c a g o

Dear Colonel Johnson:

Your letter of May 15 addressed to the smaller plants, with attachments, has been referred to me. It was sent to our Brainerd Minnesota tie treating plant.

The Northern Pacific owns and operates with its own forces two tie treating plants: one at Brainerd, the other at Paradise, Montana, devoted exclusively to the creosote treatment of cross ties, bridge ties, etc. and certain bridge materials. We are not engaged in any commercial operation nor are our plants designed to undertake such work. The Railway Co pany does not nor can it anticipate that it will require assistance from the Smaller Plants Corporation.

For these reasons I am assuming that it is not necessary or desirable to fill out and return the questionnaire.

Very truly yours,

cc-Mr. A. J. Loom

bb/s

MR. BERNARD BLUM:

Your letter of the 29th about inquiry from Col. Robt W. Johnson, Vice Chairman, WPB and Chairman of Smaller War Plants Corp.:

I agree that you should advise him that our tie treating plants are for railroad purposes and that we are not engaged in any commercial operations nor are we in position to undertake such operations.

It does not seem necessary to fill out the questionnaire.

- H. E. Stevens
6/2/43
Portland

MR. H. E. STEVENS:

I am attaching letter Mr. Loom received from Col. Robert W. Johnson, Vice chairman, WPB, and Chairman of the Smaller War Plants Corporation evidently having reference to our tie treating plants.

Attached is copy of their form which shows the information desired.

Col. Johnson's letter states that if we do not need or will not need the assistance of the Corporation it is not essential that we submit a report and that the matter rests entirely with us, although they would like the information in order to have an over-all national picture of the industry.

I do not think that we are at all interested; and it is my suggestion that we advise Col. Johnson that our plants are for railroad purposes only and we are not engaged in any commercial venture and that we do not now, nor will we, require assistance from the Smaller Plants Corporation. It is I think entirely a policy matter.

Do you agree?

- Bernard Blum
5/29/43
Seattle

cc-Mr. A. J. Loom

bb/s

Brainerd, Minn., May 24, 1943.

Mr. Bernard Blum:

The attached Form SWPC-2 - Confidential - For Use of Federal War Agencies Only - and explanatory letter from Robert W. Johnson, Colonel, A.U.S. Vice Chairman, War Production Board Chairman, Smaller War Plants Corporation, were received at this office today.

If information concerning our treating plants is required, I think it should be furnished from the General Offices to avoid possible confusion with other forms which may have been submitted to the Government covering Northern Pacific Departments or properties.

AJL:lp
att.

SMALLER WAR PLANTS CORPORATION

WASHINGTON, D. C.

IN REPLY REFER TO:

May 15, 1943

To the Smaller Manufacturing Plants
of the United States

Dear Sir:

Enclosed you will find four copies of a report form (SWPC-2) which is designed to provide the Smaller War Plants Corporation with the minimum basic information it requires to enable it to direct intelligently the activities with which the Congress of the United States has charged it.

If you desire the assistance of the Smaller War Plants Corporation now, or are likely to need its assistance in the future, it is essential that you furnish the information requested in this form, since, as you will appreciate, it is not possible for us to aid you unless you furnish us with the requisite information to enable us to do so. However, if you do not now need, or are unlikely in the near future to need, the assistance of the Smaller War Plants Corporation, it is not essential that you submit the report. This rests entirely in your discretion, but it would be greatly appreciated if you would furnish the information in order that an over-all national picture of the industries covered may be obtained, and your cooperation in this respect is earnestly desired.

To be of use to the Corporation three copies of the report should be filed and should be mailed in the enclosed envelope, which requires no postage stamp, addressed to:

Industry Survey Branch
Smaller War Plants Corporation
209 West Jackson Boulevard
Chicago, Illinois

The fourth copy of the form is for your own use and files.

Congressional Act, S. 2250, Public Law 603, which was enacted by the 77th Congress on June 11, 1942, created the Smaller War Plants Corporation and directed that action be taken:



> "to mobilize aggressively the productive capacity of all small business concerns, and to determine the means by which such concerns can be most efficiently and effectively utilized to augment war production."

In order to do this it is necessary for the Corporation to have available from time to time, the requisite information concerning the open capacity of the Smaller Plants.

Public Law 603 further states that the Chairman of the Smaller War Plants Corporation is:

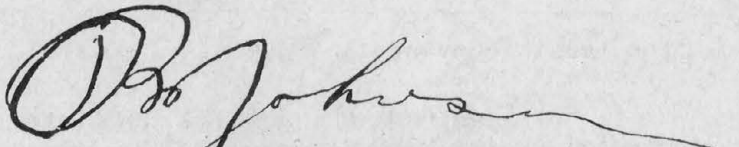
> "to cooperate to the fullest practicable extent with the Director of Civilian Supply and other appropriate governmental agencies in the issuance of all orders limiting production by business enterprises, with a view to insuring that small business concerns will be most efficiently and effectively utilized in the production of articles, equipment, supplies, and materials for both war and essential civilian purposes."

From this statement it will be seen that in enacting this legislation Congress had in mind all small plants and not only those engaged in War work.

The form of report is designed to develop the facts as to which small plants have open capacity and which have not, as well as their location and the nature of their business, etc.

Permit me to thank you in advance for your whole-hearted support and cooperation in this effort to achieve the purpose Congress desires.

Very truly yours,



Robert W. Johnson, Colonel, A. U. S.
Vice Chairman, War Production Board
Chairman, Smaller War Plants Corporation

GPO—War Board 5533—p. 2

IMPORTANT!

Smaller manufacturing plants
Do you need business?
NOW? LATER?

Read attached Letter and furnish information requested

CONFIDENTIAL - For Use of Federal War Agencies ONLY

BUREAU OF THE BUDGET NO. 12-R1038.1
APPROVAL EXPIRES SEPTEMBER 30, 1943

FORM SWPC-2
(5-8-43)

UNITED STATES OF AMERICA
SMALLER WAR PLANTS CORPORATION

REPORT OF SHIPMENTS, ORDERS AND OTHER DATA

NAME OF RESPONDENT AND PLANT

ADDRESS OF PLANT *(Street, City, State)*

TO: Smaller War Plants Corporation, Chicago, Illinois
ATTN: *Industry Survey Branch, 209 West Jackson Boulevard*

INSTRUCTIONS

To be of use to the Smaller War Plants Corporation, *three (3) copies* of this report are required and should be mailed in time to reach Chicago not *later than June 8, 1943* and should be sent to the above address.

This report is designed to provide the minimum basic information required by the Smaller War Plants Corporation to enable it to direct its activities intelligently. If the assistance of the Smaller War Plants Corporation is needed it is essential that the information requested be furnished. However, the submission of the report is voluntary but your cooperation is urgently desired.

1. IF THIS PLANT IS OWNED OR CONTROLLED BY ANOTHER COMPANY, STATE NAME AND ADDRESS OF SUCH OTHER COMPANY.

2-(a). STATE THE PRINCIPAL PRODUCTS YOU NORMALLY MAKE OR WHICH YOU HAVE MADE AND CAN STILL MAKE WITH YOUR EXISTING EQUIPMENT.

2-(b). INDICATE WHAT OTHER PRODUCTS YOU NOW MAKE OR CAN MAKE WITH YOUR EQUIPMENT.

3-(a). HAVE YOU REQUESTED ANY OFFICE OF THE WAR PRODUCTION BOARD TO ASSIST YOU IN OBTAINING EITHER PRIME OR SUB-CONTRACTS?

☐ YES ☐ NO

3-(b). IF YOUR ANSWER IS "YES", STATE WHAT OFFICE.

3-(c). WHAT WERE THE RESULTS OF THIS REQUEST?

4. WHAT WAS THE TOTAL DOLLAR VALUE OF YOUR SHIPMENTS IN 1941?	ANNUAL AMOUNT	MONTHLY AVERAGE	*NOTE; If your business commenced after January 1, 1941 on what date did your shipments commence? In this case state the average monthly dollar value of your shipments since then.*	DATE	MONTHLY AVERAGE
	$	$		194	$

5-(a). WAS 1941 (OR THE PERIOD REPORTED) A FAIRLY REPRESENTATIVE YEAR OR PERIOD FOR YOU? ☐ YES ☐ NO

5-(b). IF NOT, STATE REASONS BRIEFLY.

5-(c). IF 1941 (OR THE PERIOD REPORTED) WAS NOT REPRESENTATIVE, WHAT ANNUAL $ VOL. WOULD BE REPRESENTATIVE? $

6-(a). HAS THE CAPACITY OF YOUR PLANT CHANGED SINCE 1941? ☐ YES ☐ NO

6-(b). IF SO, STATE BRIEFLY THE NATURE OF THE CHANGES.

6-(c). AS A RESULT OF THIS CHANGE IN CAPACITY (IF ANY), WHAT IS THE PRESENT TOTAL ANNUAL DOLLAR VOLUME OF YOUR SHIPMENTS?
$

7. STATE IN THE SPACE PROVIDED BELOW, THE DOLLAR VALUES OF THE ORDERS TAKEN AND SHIPMENTS MADE DURING THE PAST SIX MONTHS ENDING APRIL 30, 1943

ITEM	1942		1943			
	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL
(a). ORDERS TAKEN IN						
(b). SHIPMENTS MADE IN						

8-(a). ARE YOUR SHIPMENTS KEEPING ABREAST OF YOUR PROMISED DELIVERY DATES, OR ARE THEY RUNNING AHEAD OR BEHIND? INDICATE BELOW:

☐ ABREAST
☐ AHEAD *(No. of weeks _____)*
☐ BEHIND *(No. of weeks _____)*

8-(b). IF YOU ARE RUNNING EITHER AHEAD OF OR BEHIND PROMISED DELIVERY DATES, PLEASE STATE BRIEFLY THE REASONS.

9-(a). FOR HOW MANY MONTHS AHEAD DID YOU USUALLY HAVE ORDERS ON HAND IN 1941? — MONTHS

9-(b). FOR HOW MANY MONTHS AHEAD DO YOU HAVE ORDERS ON HAND NOW? — MONTHS

9-(c). IF YOURS IS A SEASONAL BUSINESS, DO NOT ANSWER QUEST. 9(a) BUT INSTEAD STATE THE NO. OF MONTHS FOR WHICH YOU HAD ORDERS ON HAND AT THE END OF THE CORRESPONDING MONTH LAST YEAR. — MONTHS

10-(a). DO YOU NEED THE ASSISTANCE OF THE SMALLER WAR PLANTS CORPORATION TO KEEP YOUR PLANT OPERATING? ☐ YES ☐ NO

10-(b). IF YOU NEED THIS ASSISTANCE, INDICATE THE REASONS:

☐ LACK OF ORDERS ☐ DIFFICULTY OF OBTAINING MATERIAL
☐ SHORTAGE OF LABOR ☐ OTHER REASONS *(Specify)*

10-(c). DO YOU ANTICIPATE ANY FALLING OFF IN ORDERS IN THE NEXT THREE MONTHS? ☐ YES ☐ NO

11. PLEASE INDICATE (BY MARKING AN (X) IN THE APPROPRIATE SQUARES BELOW) THOSE PROCUREMENT AGENCIES WHO HAVE INSPECTED YOUR PLANT SINCE JANUARY 1, 1942, AND ALSO INDICATE THOSE AGENCIES WHO HAVE PLACED PRIME CONTRACTS WITH YOU, IF ANY.

PROCUREMENT AGENCY		ARMY								NAVY									
DESCRIPTION	S.W.P.C.	AIR CORPS	CHEMICAL WARFARE	ENGINEER CORPS	MEDICAL CORPS	QUARTER-MASTER CORPS	ORDNANCE	SIGNAL CORPS	TRANSPORTATION	AIR CORPS	SUPPLIES AND ACCOUNTS	YARDS AND DOCKS	ORDNANCE	SHIPS	MEDICAL CORPS	MARINE CORPS	COAST GUARD	MARITIME COMMISSION	TREASURY PROCUREMENT
(a). INSPECTED AND ACCEPTED BY																			
(b). INSPECTED BUT NOT YET VERIFIED BY																			
(c). ORDERS PLACED BY																			

(d). IF YOUR PLANT HAS BEEN INSPECTED BY, OR YOU HAVE RECEIVED PRIME CONTRACTS FROM ANY *OTHER* GOVERNMENT PROCUREMENT AGENCY THAN THOSE ENUMERATED ABOVE, PLEASE STATE NAMES.

PLANT INSPECTED BY	PRIME CONTRACTS RECEIVED FROM

12-(a). HAVE YOU RECEIVED ANY ORDERS FROM OTHER MANUFACTURERS OR ASSEMBLERS FOR ARTICLES OR PARTS YOU MAKE WHICH YOU BELIEVE EVENTUALLY GO, EITHER IN THE FORM DELIVERED OR AS PART OF A FURTHER FABRICATED OR ASSEMBLED PRODUCT, TO ANY OF THE PROCUREMENT AGENCIES ENUMERATED IN QUESTION 11? ☐ YES ☐ NO

(b). IF YOUR ANSWER IS "YES", STATE WHICH PROCUREMENT AGENCIES.

13. PLEASE FURNISH THE FOLLOWING PARTICULARS REGARDING YOUR SHIPMENTS AND ORDERS FOR THE MONTH OF MAY 1943

DESCRIPTION	DOLLAR VALUE OF		
	SHIPMENTS IN MAY	ORDERS BOOKED IN MAY	UNFILLED ORDERS ON MAY 31
(a). TOTAL GOVERNMENT PRIME CONTRACTS *(if any)*			
(b). TOTAL DOLLAR VALUE OF ALL OTHER BUSINESS			
DOLLAR TOTALS			

NOTE: In Item (a) include only direct contracts you hold with the Smaller War Plants Corporation, Army, Navy, Maritime Commission, Treasury Procurement Department or any other Government Procurement Agency.

14. WHAT WAS THE APPROXIMATE *AVERAGE* NUMBER OF PERSONS YOU EMPLOYED IN MAY OF 1941 AND MAY OF 1943? IF MAY OF 1941 WAS FOR ANY REASON UNUSUAL, GIVE THE NUMBER OF PERSONS EMPLOYED FOR AN AVERAGE MONTH IN 1941.

ITEM	MAY 1941 OR 1941	MAY 1943
TOTAL NUMBER EMPLOYED		
FACTORY WORKERS AND SUPERINTENDENTS		
ALL OTHERS INCLUDING MANAGEMENT, OFFICE, SALES, SHIPPING, ETC.		

REMARKS

CERTIFICATION—THE UNDERSIGNED COMPANY, AND THE OFFICIAL EXECUTING THIS CERTIFICATION ON ITS BEHALF, HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS CORRECT AND COMPLETE TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

NAME OF COMPANY

BY
SIGNATURE OF AUTHORIZED OFFICIAL

DATE

TITLE

CONFIDENTIAL - For Use of Federal War Agencies ONLY

BUREAU OF THE BUDGET NO. 12-R1038.1
APPROVAL EXPIRES SEPTEMBER 30, 1943

FORM SWPC-2
(5-8-43)

UNITED STATES OF AMERICA
SMALLER WAR PLANTS CORPORATION

REPORT OF SHIPMENTS, ORDERS AND OTHER DATA

NAME OF RESPONDENT AND PLANT

ADDRESS OF PLANT *(Street, City, State)*

TO: Smaller War Plants Corporation, Chicago, Illinois
ATTN: *Industry Survey Branch, 209 West Jackson Boulevard*

INSTRUCTIONS

To be of use to the Smaller War Plants Corporation, *three (3) copies* of this report are required and should be mailed in time to reach Chicago not *later than June 8, 1943* and should be sent to the above address.

This report is designed to provide the minimum basic information required by the Smaller War Plants Corporation to enable it to direct its activities intelligently. If the assistance of the Smaller War Plants Corporation is needed it is essential that the information requested be furnished. However, the submission of the report is voluntary but your cooperation is urgently desired.

1. IF THIS PLANT IS OWNED OR CONTROLLED BY ANOTHER COMPANY, STATE NAME AND ADDRESS OF SUCH OTHER COMPANY.

2-(a). STATE THE PRINCIPAL PRODUCTS YOU NORMALLY MAKE OR WHICH YOU HAVE MADE AND CAN STILL MAKE WITH YOUR EXISTING EQUIPMENT.

2-(b). INDICATE WHAT OTHER PRODUCTS YOU NOW MAKE OR CAN MAKE WITH YOUR EQUIPMENT.

3-(a). HAVE YOU REQUESTED ANY OFFICE OF THE WAR PRODUCTION BOARD TO ASSIST YOU IN OBTAINING EITHER PRIME OR SUB-CONTRACTS?

☐ YES ☐ NO

3-(b). IF YOUR ANSWER IS "YES", STATE WHAT OFFICE.

3-(c). WHAT WERE THE RESULTS OF THIS REQUEST?

4. WHAT WAS THE TOTAL DOLLAR VALUE OF YOUR SHIPMENTS IN 1941?

ANNUAL AMOUNT	MONTHLY AVERAGE
$	$

NOTE: If your business commenced after January 1, 1941 on what date did your shipments commence? In this case state the average monthly dollar value of your shipments since then.

DATE	MONTHLY AVERAGE
194	$

5-(a). WAS 1941 (OR THE PERIOD REPORTED) A FAIRLY REPRESENTATIVE YEAR OR PERIOD FOR YOU? ☐ YES ☐ NO

5-(b). IF NOT, STATE REASONS BRIEFLY.

5-(c). IF 1941 (OR THE PERIOD REPORTED) WAS NOT REPRESENTATIVE, WHAT ANNUAL $ VOL. WOULD BE REPRESENTATIVE? $

6-(a). HAS THE CAPACITY OF YOUR PLANT CHANGED SINCE 1941? ☐ YES ☐ NO

6-(b). IF SO, STATE BRIEFLY THE NATURE OF THE CHANGES.

6-(c). AS A RESULT OF THIS CHANGE IN CAPACITY (IF ANY), WHAT IS THE PRESENT TOTAL ANNUAL DOLLAR VOLUME OF YOUR SHIPMENTS?

$

7. STATE IN THE SPACE PROVIDED BELOW, THE DOLLAR VALUES OF THE ORDERS TAKEN AND SHIPMENTS MADE DURING THE PAST SIX MONTHS ENDING APRIL 30, 1943

ITEM	1942		1943			
	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL
(a). ORDERS TAKEN IN						
(b). SHIPMENTS MADE IN						

8-(a). ARE YOUR SHIPMENTS KEEPING ABREAST OF YOUR PROMISED DELIVERY DATES, OR ARE THEY RUNNING AHEAD OR BEHIND? INDICATE BELOW:

☐ ABREAST
☐ AHEAD *(No. of weeks _____)*
☐ BEHIND *(No. of weeks _____)*

8-(b). IF YOU ARE RUNNING EITHER AHEAD OF OR BEHIND PROMISED DELIVERY DATES, PLEASE STATE BRIEFLY THE REASONS.

9-(a). FOR HOW MANY MONTHS AHEAD DID YOU USUALLY HAVE ORDERS ON HAND IN 1941? MONTHS

9-(b). FOR HOW MANY MONTHS AHEAD DO YOU HAVE ORDERS ON HAND NOW? MONTHS

9-(c). IF YOURS IS A SEASONAL BUSINESS, DO NOT ANSWER QUEST. 9(a) BUT INSTEAD STATE THE NO. OF MONTHS FOR WHICH YOU HAD ORDERS ON HAND AT THE END OF THE CORRESPONDING MONTH LAST YEAR. MONTHS

10-(a). DO YOU NEED THE ASSISTANCE OF THE SMALLER WAR PLANTS CORPORATION TO KEEP YOUR PLANT OPERATING? ☐ YES ☐ NO

10-(b). IF YOU NEED THIS ASSISTANCE, INDICATE THE REASONS:
☐ LACK OF ORDERS ☐ DIFFICULTY OF OBTAINING MATERIAL
☐ SHORTAGE OF LABOR ☐ OTHER REASONS *(Specify)*

10-(c). DO YOU ANTICIPATE ANY FALLING OFF IN ORDERS IN THE NEXT THREE MONTHS? ☐ YES ☐ NO

11. PLEASE INDICATE (BY MARKING AN (X) IN THE APPROPRIATE SQUARES BELOW) THOSE PROCUREMENT AGENCIES WHO HAVE INSPECTED YOUR PLANT SINCE JANUARY 1, 1942, AND ALSO INDICATE THOSE AGENCIES WHO HAVE PLACED PRIME CONTRACTS WITH YOU, IF ANY.

DESCRIPTION	S.W.P.C.	ARMY								NAVY								MARITIME COMMISSION	TREASURY PROCUREMENT
		AIR CORPS	CHEMICAL WARFARE	ENGINEER CORPS	MEDICAL CORPS	QUARTER-MASTER CORPS	ORDNANCE	SIGNAL CORPS	TRANSPORTATION	AIR CORPS	SUPPLIES AND ACCOUNTS	YARDS AND DOCKS	ORDNANCE	SHIPS	MEDICAL CORPS	MARINE CORPS	COAST GUARD		
(a). INSPECTED AND ACCEPTED BY																			
(b). INSPECTED BUT NOT YET VERIFIED BY																			
(c). ORDERS PLACED BY																			

(d). IF YOUR PLANT HAS BEEN INSPECTED BY, OR YOU HAVE RECEIVED PRIME CONTRACTS FROM ANY *OTHER* GOVERNMENT PROCUREMENT AGENCY THAN THOSE ENUMERATED ABOVE, PLEASE STATE NAMES.

PLANT INSPECTED BY	PRIME CONTRACTS RECEIVED FROM

12-(a). HAVE YOU RECEIVED ANY ORDERS FROM OTHER MANUFACTURERS OR ASSEMBLERS FOR ARTICLES OR PARTS YOU MAKE WHICH YOU BELIEVE EVENTUALLY GO, EITHER IN THE FORM DELIVERED OR AS PART OF A FURTHER FABRICATED OR ASSEMBLED PRODUCT, TO ANY OF THE PROCUREMENT AGENCIES ENUMERATED IN QUESTION 11? ☐ YES ☐ NO

(b). IF YOUR ANSWER IS "YES", STATE WHICH PROCUREMENT AGENCIES.

13. PLEASE FURNISH THE FOLLOWING PARTICULARS REGARDING YOUR SHIPMENTS AND ORDERS FOR THE MONTH OF MAY 1943

DESCRIPTION	DOLLAR VALUE OF		
	SHIPMENTS IN MAY	ORDERS BOOKED IN MAY	UNFILLED ORDERS ON MAY 31
(a). TOTAL GOVERNMENT PRIME CONTRACTS *(if any)*			
(b). TOTAL DOLLAR VALUE OF ALL OTHER BUSINESS			
DOLLAR TOTALS			

NOTE: In Item (a) include only direct contracts you hold with the Smaller War Plants Corporation, Army, Navy, Maritime Commission, Treasury Procurement Department or any other Government Procurement Agency.

14. WHAT WAS THE APPROXIMATE *AVERAGE* NUMBER OF PERSONS YOU EMPLOYED IN MAY OF 1941 AND MAY OF 1943? IF MAY OF 1941 WAS FOR ANY REASON UNUSUAL, GIVE THE NUMBER OF PERSONS EMPLOYED FOR AN AVERAGE MONTH IN 1941.

ITEM	MAY 1941 OR 1941	MAY 1943
TOTAL NUMBER EMPLOYED		
FACTORY WORKERS AND SUPERINTENDENTS		
ALL OTHERS INCLUDING MANAGEMENT, OFFICE, SALES, SHIPPING, ETC.		

REMARKS

CERTIFICATION—THE UNDERSIGNED COMPANY, AND THE OFFICIAL EXECUTING THIS CERTIFICATION ON ITS BEHALF, HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS CORRECT AND COMPLETE TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

NAME OF COMPANY

BY
SIGNATURE OF AUTHORIZED OFFICIAL

DATE

TITLE

CONFIDENTIAL - For Use of Federal War Agencies ONLY

BUREAU OF THE BUDGET NO. 12-R1038.1
APPROVAL EXPIRES SEPTEMBER 30, 1943

FORM SWPC-2
(5-8-43)

UNITED STATES OF AMERICA
SMALLER WAR PLANTS CORPORATION

REPORT OF SHIPMENTS, ORDERS AND OTHER DATA

NAME OF RESPONDENT AND PLANT

ADDRESS OF PLANT *(Street, City, State)*

TO: Smaller War Plants Corporation, Chicago, Illinois
ATTN: *Industry Survey Branch, 209 West Jackson Boulevard*

INSTRUCTIONS

To be of use to the Smaller War Plants Corporation, *three (3) copies* of this report are required and should be mailed in time to reach Chicago not *later than June 8, 1943* and should be sent to the above address.

This report is designed to provide the minimum basic information required by the Smaller War Plants Corporation to enable it to direct its activities intelligently. If the assistance of the Smaller War Plants Corporation is needed it is essential that the information requested be furnished. However, the submission of the report is voluntary but your cooperation is urgently desired.

1. IF THIS PLANT IS OWNED OR CONTROLLED BY ANOTHER COMPANY, STATE NAME AND ADDRESS OF SUCH OTHER COMPANY.

2-(a). STATE THE PRINCIPAL PRODUCTS YOU NORMALLY MAKE OR WHICH YOU HAVE MADE AND CAN STILL MAKE WITH YOUR EXISTING EQUIPMENT.

2-(b). INDICATE WHAT OTHER PRODUCTS YOU NOW MAKE OR CAN MAKE WITH YOUR EQUIPMENT.

3-(a). HAVE YOU REQUESTED ANY OFFICE OF THE WAR PRODUCTION BOARD TO ASSIST YOU IN OBTAINING EITHER PRIME OR SUB-CONTRACTS?

☐ YES ☐ NO

3-(b). IF YOUR ANSWER IS "YES", STATE WHAT OFFICE.

3-(c). WHAT WERE THE RESULTS OF THIS REQUEST?

4. WHAT WAS THE TOTAL DOLLAR VALUE OF YOUR SHIPMENTS IN 1941?

ANNUAL AMOUNT	MONTHLY AVERAGE
$	$

NOTE; If your business commenced after January 1, 1941 on what date did your shipments commence? In this case state the average monthly dollar value of your shipments since then.

DATE	MONTHLY AVERAGE
194	$

5-(a). WAS 1941 (OR THE PERIOD REPORTED) A FAIRLY REPRESENTATIVE YEAR OR PERIOD FOR YOU? ☐ YES ☐ NO

5-(b). IF NOT, STATE REASONS BRIEFLY.

5-(c). IF 1941 (OR THE PERIOD REPORTED) WAS NOT REPRESENTATIVE, WHAT ANNUAL $ VOL. WOULD BE REPRESENTATIVE? $

6-(a). HAS THE CAPACITY OF YOUR PLANT CHANGED SINCE 1941? ☐ YES ☐ NO

6-(b). IF SO, STATE BRIEFLY THE NATURE OF THE CHANGES.

6-(c). AS A RESULT OF THIS CHANGE IN CAPACITY (IF ANY), WHAT IS THE PRESENT TOTAL ANNUAL DOLLAR VOLUME OF YOUR SHIPMENTS?

$

7. STATE IN THE SPACE PROVIDED BELOW, THE DOLLAR VALUES OF THE ORDERS TAKEN AND SHIPMENTS MADE DURING THE PAST SIX MONTHS ENDING APRIL 30, 1943

ITEM	1942		1943			
	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL
(a). ORDERS TAKEN IN						
(b). SHIPMENTS MADE IN						

8-(a). ARE YOUR SHIPMENTS KEEPING ABREAST OF YOUR PROMISED DELIVERY DATES, OR ARE THEY RUNNING AHEAD OR BEHIND? INDICATE BELOW:

☐ ABREAST
☐ AHEAD *(No. of weeks _____)*
☐ BEHIND *(No. of weeks _____)*

8-(b). IF YOU ARE RUNNING EITHER AHEAD OF OR BEHIND PROMISED DELIVERY DATES, PLEASE STATE BRIEFLY THE REASONS.

9-(a). FOR HOW MANY MONTHS AHEAD DID YOU USUALLY HAVE ORDERS ON HAND IN 1941? MONTHS

9-(b). FOR HOW MANY MONTHS AHEAD DO YOU HAVE ORDERS ON HAND NOW? MONTHS

9-(c). IF YOURS IS A SEASONAL BUSINESS, DO NOT ANSWER QUEST. 9(a) BUT INSTEAD STATE THE NO. OF MONTHS FOR WHICH YOU HAD ORDERS ON HAND AT THE END OF THE CORRESPONDING MONTH LAST YEAR. MONTHS

10-(a). DO YOU NEED THE ASSISTANCE OF THE SMALLER WAR PLANTS CORPORATION TO KEEP YOUR PLANT OPERATING? ☐ YES ☐ NO

10-(b). IF YOU NEED THIS ASSISTANCE, INDICATE THE REASONS:
☐ LACK OF ORDERS ☐ DIFFICULTY OF OBTAINING MATERIAL
☐ SHORTAGE OF LABOR ☐ OTHER REASONS *(Specify)*

10-(c). DO YOU ANTICIPATE ANY FALLING OFF IN ORDERS IN THE NEXT THREE MONTHS? ☐ YES ☐ NO

11. PLEASE INDICATE (BY MARKING AN (X) IN THE APPROPRIATE SQUARES BELOW) THOSE PROCUREMENT AGENCIES WHO HAVE INSPECTED YOUR PLANT SINCE JANUARY 1, 1942, AND ALSO INDICATE THOSE AGENCIES WHO HAVE PLACED PRIME CONTRACTS WITH YOU, IF ANY.

PROCUREMENT AGENCY

DESCRIPTION	S.W.P.C.	ARMY								NAVY								MARITIME COMMISSION	TREASURY PROCUREMENT
		AIR CORPS	CHEMICAL WARFARE	ENGINEER CORPS	MEDICAL CORPS	QUARTER-MASTER CORPS	ORDNANCE	SIGNAL CORPS	TRANSPORTATION	AIR CORPS	SUPPLIES AND ACCOUNTS	YARDS AND DOCKS	ORDNANCE	SHIPS	MEDICAL CORPS	MARINE CORPS	COAST GUARD		
(a). INSPECTED AND ACCEPTED BY																			
(b). INSPECTED BUT NOT YET VERIFIED BY																			
(c). ORDERS PLACED BY																			

(d). IF YOUR PLANT HAS BEEN INSPECTED BY, OR YOU HAVE RECEIVED PRIME CONTRACTS FROM ANY ***OTHER*** GOVERNMENT PROCUREMENT AGENCY THAN THOSE ENUMERATED ABOVE, PLEASE STATE NAMES.

PLANT INSPECTED BY	PRIME CONTRACTS RECEIVED FROM

12-(a). HAVE YOU RECEIVED ANY ORDERS FROM OTHER MANUFACTURERS OR ASSEMBLERS FOR ARTICLES OR PARTS YOU MAKE WHICH YOU BELIEVE EVENTUALLY GO, EITHER IN THE FORM DELIVERED OR AS PART OF A FURTHER FABRICATED OR ASSEMBLED PRODUCT, TO ANY OF THE PROCUREMENT AGENCIES ENUMERATED IN QUESTION 11? ☐ YES ☐ NO

(b). IF YOUR ANSWER IS "YES", STATE WHICH PROCUREMENT AGENCIES.

13. PLEASE FURNISH THE FOLLOWING PARTICULARS REGARDING YOUR SHIPMENTS AND ORDERS FOR THE MONTH OF MAY 1943

DESCRIPTION	DOLLAR VALUE OF		
	SHIPMENTS IN MAY	ORDERS BOOKED IN MAY	UNFILLED ORDERS ON MAY 31
(a). TOTAL GOVERNMENT PRIME CONTRACTS *(if any)*			
(b). TOTAL DOLLAR VALUE OF ALL OTHER BUSINESS			
DOLLAR TOTALS			

NOTE: *In Item (a) include only direct contracts you hold with the Smaller War Plants Corporation, Army, Navy, Maritime Commission, Treasury Procurement Department or any other Government Procurement Agency.*

14. WHAT WAS THE APPROXIMATE ***AVERAGE*** NUMBER OF PERSONS YOU EMPLOYED IN MAY OF 1941 AND MAY OF 1943? IF MAY OF 1941 WAS FOR ANY REASON UNUSUAL, GIVE THE NUMBER OF PERSONS EMPLOYED FOR AN AVERAGE MONTH IN 1941.

ITEM	MAY 1941 OR 1941	MAY 1943
TOTAL NUMBER EMPLOYED		
FACTORY WORKERS AND SUPERINTENDENTS		
ALL OTHERS INCLUDING MANAGEMENT, OFFICE, SALES, SHIPPING, ETC.		

REMARKS

CERTIFICATION—THE UNDERSIGNED COMPANY, AND THE OFFICIAL EXECUTING THIS CERTIFICATION ON ITS BEHALF, HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS CORRECT AND COMPLETE TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

_____ BY _____

NAME OF COMPANY — SIGNATURE OF AUTHORIZED OFFICIAL

_____ _____

DATE — TITLE

GPO—War Board 5532—p. 3

CONFIDENTIAL - For Use of Federal War Agencies ONLY

BUREAU OF THE BUDGET NO. 12-R1038.1
APPROVAL EXPIRES SEPTEMBER 30, 1943

FORM SWPC-2
(5-8-43)

UNITED STATES OF AMERICA
SMALLER WAR PLANTS CORPORATION

REPORT OF SHIPMENTS, ORDERS AND OTHER DATA

NAME OF RESPONDENT AND PLANT

ADDRESS OF PLANT *(Street, City, State)*

TO: Smaller War Plants Corporation, Chicago, Illinois
ATTN: *Industry Survey Branch, 209 West Jackson Boulevard*

INSTRUCTIONS

To be of use to the Smaller War Plants Corporation, *three (3) copies* of this report are required and should be mailed in time to reach Chicago not *later than June 8, 1943* and should be sent to the above address.

This report is designed to provide the minimum basic information required by the Smaller War Plants Corporation to enable it to direct its activities intelligently. If the assistance of the Smaller War Plants Corporation is needed it is essential that the information requested be furnished. However, the submission of the report is voluntary but your cooperation is urgently desired.

1. IF THIS PLANT IS OWNED OR CONTROLLED BY ANOTHER COMPANY, STATE NAME AND ADDRESS OF SUCH OTHER COMPANY.

2-(a). STATE THE PRINCIPAL PRODUCTS YOU NORMALLY MAKE OR WHICH YOU HAVE MADE AND CAN STILL MAKE WITH YOUR EXISTING EQUIPMENT.

2-(b). INDICATE WHAT OTHER PRODUCTS YOU NOW MAKE OR CAN MAKE WITH YOUR EQUIPMENT.

3-(a). HAVE YOU REQUESTED ANY OFFICE OF THE WAR PRODUCTION BOARD TO ASSIST YOU IN OBTAINING EITHER PRIME OR SUB-CONTRACTS?

☐ YES ☐ NO

3-(b). IF YOUR ANSWER IS "YES", STATE WHAT OFFICE.

3-(c). WHAT WERE THE RESULTS OF THIS REQUEST?

4. WHAT WAS THE TOTAL DOLLAR VALUE OF YOUR SHIPMENTS IN 1941?

ANNUAL AMOUNT	MONTHLY AVERAGE
$	$

NOTE; If your business commenced after January 1, 1941 on what date did your shipments commence? In this case state the average monthly dollar value of your shipments since then.

DATE	MONTHLY AVERAGE
194	$

5-(a). WAS 1941 (OR THE PERIOD REPORTED) A FAIRLY REPRESENTATIVE YEAR OR PERIOD FOR YOU? ☐ YES ☐ NO

5-(b). IF NOT, STATE REASONS BRIEFLY.

5-(c). IF 1941 (OR THE PERIOD REPORTED) WAS NOT REPRESENTATIVE, WHAT ANNUAL $ VOL. WOULD BE REPRESENTATIVE? $

6-(a). HAS THE CAPACITY OF YOUR PLANT CHANGED SINCE 1941? ☐ YES ☐ NO

6-(b). IF SO, STATE BRIEFLY THE NATURE OF THE CHANGES.

6-(c). AS A RESULT OF THIS CHANGE IN CAPACITY (IF ANY), WHAT IS THE PRESENT TOTAL ANNUAL DOLLAR VOLUME OF YOUR SHIPMENTS?

$

7. STATE IN THE SPACE PROVIDED BELOW, THE DOLLAR VALUES OF THE ORDERS TAKEN AND SHIPMENTS MADE DURING THE PAST SIX MONTHS ENDING APRIL 30, 1943

ITEM	1942		1943			
	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL
(a). ORDERS TAKEN IN						
(b). SHIPMENTS MADE IN						

8-(a). ARE YOUR SHIPMENTS KEEPING ABREAST OF YOUR PROMISED DELIVERY DATES, OR ARE THEY RUNNING AHEAD OR BEHIND? INDICATE BELOW:

☐ ABREAST
☐ AHEAD *(No. of weeks _____)*
☐ BEHIND *(No. of weeks _____)*

8-(b). IF YOU ARE RUNNING EITHER AHEAD OF OR BEHIND PROMISED DELIVERY DATES, PLEASE STATE BRIEFLY THE REASONS.

9-(a). FOR HOW MANY MONTHS AHEAD DID YOU USUALLY HAVE ORDERS ON HAND IN 1941? — MONTHS

9-(b). FOR HOW MANY MONTHS AHEAD DO YOU HAVE ORDERS ON HAND NOW? — MONTHS

9-(c). IF YOURS IS A SEASONAL BUSINESS, DO NOT ANSWER QUEST. 9(a) BUT INSTEAD STATE THE NO. OF MONTHS FOR WHICH YOU HAD ORDERS ON HAND AT THE END OF THE CORRESPONDING MONTH LAST YEAR. — MONTHS

10-(a). DO YOU NEED THE ASSISTANCE OF THE SMALLER WAR PLANTS CORPORATION TO KEEP YOUR PLANT OPERATING? ☐ YES ☐ NO

10-(b). IF YOU NEED THIS ASSISTANCE, INDICATE THE REASONS:
☐ LACK OF ORDERS ☐ DIFFICULTY OF OBTAINING MATERIAL
☐ SHORTAGE OF LABOR ☐ OTHER REASONS *(Specify)*

10-(c). DO YOU ANTICIPATE ANY FALLING OFF IN ORDERS IN THE NEXT THREE MONTHS? ☐ YES ☐ NO

11. PLEASE INDICATE (BY MARKING AN (X) IN THE APPROPRIATE SQUARES BELOW) THOSE PROCUREMENT AGENCIES WHO HAVE INSPECTED YOUR PLANT SINCE JANUARY 1, 1942, AND ALSO INDICATE THOSE AGENCIES WHO HAVE PLACED PRIME CONTRACTS WITH YOU, IF ANY.

DESCRIPTION	S.W.P.C.	ARMY								NAVY								MARITIME COMMISSION	TREASURY PROCUREMENT
		AIR CORPS	CHEMICAL WARFARE	ENGINEER CORPS	MEDICAL CORPS	QUARTER-MASTER CORPS	ORDNANCE	SIGNAL CORPS	TRANSPORTATION	AIR CORPS	SUPPLIES AND ACCOUNTS	YARDS AND DOCKS	ORDNANCE	SHIPS	MEDICAL - CORPS	MARINE CORPS	COAST GUARD		
(a). INSPECTED AND ACCEPTED BY																			
(b). INSPECTED BUT NOT YET VERIFIED BY																			
(c). ORDERS PLACED BY																			

(d). IF YOUR PLANT HAS BEEN INSPECTED BY, OR YOU HAVE RECEIVED PRIME CONTRACTS FROM ANY *OTHER* GOVERNMENT PROCUREMENT AGENCY THAN THOSE ENUMERATED ABOVE, PLEASE STATE NAMES.

PLANT INSPECTED BY	PRIME CONTRACTS RECEIVED FROM

12-(a). HAVE YOU RECEIVED ANY ORDERS FROM OTHER MANUFACTURERS OR ASSEMBLERS FOR ARTICLES OR PARTS YOU MAKE WHICH YOU BELIEVE EVENTUALLY GO, EITHER IN THE FORM DELIVERED OR AS PART OF A FURTHER FABRICATED OR ASSEMBLED PRODUCT, TO ANY OF THE PROCUREMENT AGENCIES ENUMERATED IN QUESTION 11? ☐ YES ☐ NO

(b). IF YOUR ANSWER IS "YES", STATE WHICH PROCUREMENT AGENCIES.

13. PLEASE FURNISH THE FOLLOWING PARTICULARS REGARDING YOUR SHIPMENTS AND ORDERS FOR THE MONTH OF MAY 1943

DESCRIPTION	DOLLAR VALUE OF		
	SHIPMENTS IN MAY	ORDERS BOOKED IN MAY	UNFILLED ORDERS ON MAY 31
(a). TOTAL GOVERNMENT PRIME CONTRACTS *(if any)*			
(b). TOTAL DOLLAR VALUE OF ALL OTHER BUSINESS			
DOLLAR TOTALS			

NOTE: In Item (a) include only direct contracts you hold with the Smaller War Plants Corporation, Army, Navy, Maritime Commission, Treasury Procurement Department or any other Government Procurement Agency.

14. WHAT WAS THE APPROXIMATE *AVERAGE* NUMBER OF PERSONS YOU EMPLOYED IN MAY OF 1941 AND MAY OF 1943? IF MAY OF 1941 WAS FOR ANY REASON UNUSUAL, GIVE THE NUMBER OF PERSONS EMPLOYED FOR AN AVERAGE MONTH IN 1941.

ITEM	MAY 1941 OR 1941	MAY 1943
TOTAL NUMBER EMPLOYED		
FACTORY WORKERS AND SUPERINTENDENTS		
ALL OTHERS INCLUDING MANAGEMENT, OFFICE, SALES, SHIPPING, ETC.		

REMARKS

CERTIFICATION—THE UNDERSIGNED COMPANY, AND THE OFFICIAL EXECUTING THIS CERTIFICATION ON ITS BEHALF, HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS CORRECT AND COMPLETE TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

NAME OF COMPANY

BY
SIGNATURE OF AUTHORIZED OFFICIAL

DATE

TITLE

3659

Saint Paul, February 18, 1942

MR. A. J. LOOM:

Your letter of the 17th, and returning Mr. Evans' letter requesting our cost of treating track ties:

I have no objection to furnishing this information; and you should explain to them that it does not include line haul charges or general office overhead, as they are the figures we use in our tie renewals, on which we cannot assess such surcharges.

You can ask him for similar figures from the Canadian National Railways.

bb/s

encl.

Brainerd, Minn., February 17, 1942

Mr. Bernard Blum:

As you know, we do not give out any cost figures from this office to any outsiders without special authority. Will you kindly furnish a reply to the attached letter from Mr. W. E. Evans, General Tie and Timber Agent, of the Canadian National Railways?

I have noted in pencil on the attached, figures that would be in direct reply to the questions asked, based on our present actual costs without any home line freight charges or General Office overhead.

I would consider it of no advantage to us to furnish this information unless we could obtain the equivalent from them.

AJL:kp



3659

Saint Paul, January 31, 1942

MR. L. YAGER:

Your letter of the 27th in regard to the Permatox-A wood preservative:

I had interesting talks with Chamical representatives at the Minneapolis meeting this week.

Mr. Morris informed me that his people, the Montesano Chemical Co. likewise manufacture pentachlorofinol, and that they are competitive with the Chapman people who handle the Dow pentachlorofinol.

I talked to Mr. Horrocks' chemist about the experimental work they are carrying on, and he told me that their experimentation is not commercial, but simply some work in their pilot plant. He indicated to me that he was favorably impressed with the possibilities of pentachlorofinol, and evidently looks on it as a true toxic reagent, and not as one of the numerous wood preservative salts.

Mr. Willis informed me that he has already furnished us 900,000 gallons of creosote on our requisition, or one-third of it , and appeared somewhat confident that he could keep up the shipments.

While at the Minneapolis meeting the OPM representative announced that they anticipated a reasonable delivery of creosote from England in returning tankers, although to date only one boatload had been so received.

This may automatically solve our problem.

bb/s

St. Paul, January 27, 1942

Mr. Bernard Blum:

Referring to the attached portion of our file terminating with Mr. Loom's letter of January 19 about Permatox A wood preservative put out by the A. D. Chapman Company:

Permatox A is a trade name for pentachlorphenol manufactured by the Dow Chemical Company. Pentachlorphenol is a coal tar phenol to which has been added the highly toxic element, chlorine, which produces a stable compound of unquestioned high toxic value. Since this material is only slightly water soluble but completely soluble in the various types of oils available for a carrying medium there is every reason to believe that the toxic values of pentachlorphenol for wood preservative will prevail over long periods of time and the material, therefore, from present indications is a promising prospect either as a medium for fortifying toxic values due to a decreased percentage of creosote or utilizing the material by itself in some appropriate oil solution as an original preservative.

I am much encouraged by the fact that Mr. Horrocks has also seen fit to experiment at this time with this material for the purpose of obtaining such information as may be immediately available as to the results likely to be obtained from using this material as a substitute for creosote.

In a very rough way it seems to me the situation shapes itself up into three possible choices in the event that a creosote shortage should really develop: 1) Reduce the present creosote percentage by roughly one-half and fortify this mixture through an appropriate percentage addition of pentachlorphenol to make certain that the original toxic values are as high as at present. 2) Use the so-called 5% pentachlorphenol solution with regular fuel oil as a direct substitute for creosote. 3) Reduce the present 45-55% creosote-petroleum mixture to a 25-75% mixture without any other additions.

All of the interest in this material, of course, centers about the possibility that a creosote shortage may develop. So far the Purchasing Agent's predictions on creosote delivery have been fulfilled.

LY:m
encl.

3659

Saint Paul, January 29, 1942

MR. H. E. STEVENS:

Your notation on the attached file about Santa Fe experience and tests on the seasoning of timbers:

I think that Mr. Belcher's letter simply confirms the conclusions the Northern Pacific came to 35 years ago when after investigating various methods of treatment it was decided to build two treating plants to creosote ties according to the Lowry process, first air seasoning the timbers. Nothing appears to have developed in the past 35 years to change the facts that were known at that time.

I think Mr. Loom knows as much about this matter as anyone else - as he has been chairman of the Wood Preservers' Association and the Railway Engineering Committee on tie service records for a number of years, and has kept himself informed as to the experience throughout the country. He strongly advocates air-seasoning.

Mr. Belcher's letter on Santa Fe tests confirms our opinion that ultimate economy is obtained in the use of air-seasoned stock.

bb/s

encl.

St. Paul, January 21, 1942

Mr. Bernard Blum:

The attached file terminating with Mr. Loom's letter of January 29 is a rather interesting confirmation of the views which we have heretofore expressed on the subject of the importance of air seasoning of Douglas fir before treatment.

LY:m

encl.

705

OFFICE OF ASSISTANT GENERAL MANAGER
JAN 21 1942
NORPAC-BYCO
ST. PAUL, MINN.

Brainerd, Minn., January 19, 1942.

Mr. L. Yager:

Mr. Blum requests that the attached file be forwarded to you with my comments and then returned to him.

In his letter to Mr. Lowry Smith you will note that Mr. Belcher has explained perhaps more clearly than I have the advantages of air seasoning wood before treatment. The Santa Fe tests confirm our statements that for greatest ultimate economy air seasoned material is best.

At the time our plants were constructed about 35 years ago it had been quite definitely proven by laboratory and service tests that treatment resulted in less damage to the strength properties of air seasoned wood than was evident in wood that was treated without proper air seasoning. Air seasoning was recommended by all of the leading authorities of that time and it was for that reason that we adopted this practice. For several years as chairman of the A.W.P.A. and A.R.E.A. Committees on Tie Service Records, I have had access to records of service life of cross ties on the principal railroads in this country. To my knowledge no railroad has ever reported as long service from artificially seasoned treated ties as from air seasoned treated ties.

Like ourselves, many railroads have at various times had difficulty in maintaining a schedule of purchase and delivery to the treating plants in due time to allow for proper air seasoning before treatment and have therefore had to treat ties that were only partially seasoned. At other times they have not been in position to treat their ties at the time they had reached the proper moisture content for best treatment and this has resulted in over seasoning which in such woods as Douglas Fir and Tamarack, makes them highly resistant to penetration and absorption of preservatives.

Rather than carry a large stock of piling, lumber and other materials for enough in advance of actual requirements to permit air seasoning some railroads prefer to treat these materials green. It is of course difficult

to anticipate in advance the exact quantities of these miscellaneous materials that will be required, so if a desirable surplus is not permitted to be carried in railroad stock the required time in advance of actual use, these materials must be treated partially seasoned or green or purchased already treated from a contractor's stock.

For the reasons mentioned, green treatment of Douglas Fir ties, piling and lumber by the Boulton Process has increased in recent years on the Pacific Coast and as you know at least one of the plants now recommends this to be the best process. It is of course known that this plant has no yard room to permit air seasoning of any appreciable quantity of any material.

Compared with the other timbers we treat Douglas Fir has a very low moisture content and as Mr. Belcher states we get as deep, if not deeper, penetration in green Boulton treated fir as in air seasoned fir but checking after treatment exposes untreated wood to decay and I agree with him that green treated ties do not show the same resistance to mechanical wear and therefore in my estimation can not last as long as air seasoned treated ties.

I think the Santa Fe is fortunate in being able to air-season all of their material and to be able to treat it when it has reached the proper degree of seasoning.

It seems very doubtful if any other plan can be considered other than a temporary expedient to be resorted to under circumstances that will not permit consideration from the standpoint of the greatest ultimate economy.

3659

Train 3, Yellowstone Division
January 10,1942

MR. A. J. LOOM:

I am attaching letter from R. S. Belcher of the Santa Fe about loss of strength of Douglas fir treated green and air seasoned, both incised and not incised, and untreated.

It is evident that the Santa Fe has made a large number of laboratory tests. As I view them these tests indicate the superiority of air seasoned timber.

Would be glad to have you look over the letter and transmit it to Mr. Yager with your comments, then to be returned to me.

bb/s

encl.

Brainerd, Minn., December 16, 1941

Mr. Bernard Blum:

Referring to your letter of November 1st and my reply of November 7th about pentachlorphenol as a wood preservative.

You will recall literature received from the A. D. Chapman Company of Chicago. Since that I have received, through Mr. Yager, bulletins from the Wood Treating Chemicals Company of St. Louis recommending treatment with this chemical. Mr. Morriss, President of the Wood Treating Chemicals Co., advises that his company is also promoting treatment with oil-tar creosote which they hope to have manufactured by the Portland Coke and Gas Company.

In response to my inquiries about these preservatives I have so far found only one railroad user, namely the Santa Fe. Am attaching copy of Mr. Belcher's letter herewith.

AJL:kp
att.

Copy-Mr. L. Yager

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

Topeka, Kansas
December 4, 1941
File 41327

Copy

Mr. A. J. Loom,
Gen. Supt. Timber Preservation,
Northern Pacific Railway Co.,
Brainerd, Minnesota.

Dear Mr. Loom:

I have your letter of December 1 regarding pentachlorphenol and am sorry to say that our tests are too recent to be of much benefit. However, I am very glad to tell you about such tests as we have started. We have some ties, fence posts, and saplings treated with pentachlorphenol in a gas oil solution, which have been in the ground two and three years, as per tabulation attached. This, of course, is not long enough to tell much about it, but in general, pentachlorphenol in petroleum solutions looks quite favorable.

Heretofore, we have treated cotton platform flooring used in the South with beta naphthol-pine oil-gas oil solution and have had very good results from this treatment. The reason for the use of this instead of creosote is that there is objection to the creosote because of its color and staining cotton bales. This treatment costs more than pentachlorphenol treatment would cost and I plan to switch to a 5% gas oil solution with pentachlorphenol. The gas oil has a flashpoint of something like 210 deg. F., which is a higher flash than most coal tar creosote. Some mineral spirits or other kerosene-like petroleum distillates are sometimes used with pentachlorphenol and, of course, these have the disadvantage of lower flashpoints. However, they dry better and can be painted over if not too heavy a treatment, whereas, a gas oil usually works through the paint.

I am attaching hereto a copy of a statement showing the ties and fence posts treated with pentachlorphenol solution which we have in Texas. Also our sapling test at Somerville, insofar as it applies to pentachlorphenol with untreated for comparison.

As to the oil tar creosote, I know very little about this. I have looked over the bulletin which you mentioned--in fact, Mr. Morriss gave me a copy of it a short time ago. The specific gravity of the oil tar creosote is low compared with coal tar creosote, which would indicate that it is not exactly the same as the coal tar creosote. I am sorry I cannot give you any information regarding the oil tar creosote.

In addition to the use of pentachlorphenol in cotton platform flooring, I am planning to treat about 5,000 ties with a 5% solution of pentachlorphenol in petroleum residuum for use in our 26 experimental sections.

Hoping this finds all going well with you, and with kindest personal regards, I am

Yours sincerely,

(Signed) R. S. Belcher

Encl.

PENTACHLORPHENOL

5% Solution in Gas Oil

Hewn Southern Yellow Pine Pentachlorphenol-Gas Oil Ties

Location	Lbs. Abs.	Year Instd	No. Instd	Number Removed	% Removed to 1-1-41	Ave. Life to 1-1-41
Cleburne, Tex	5.58	1938	50	None	0.00	2.00
" "	7.10	1938	50	None	0.00	2.00
Cleveland, "	5.58	1939	50	None	0.00	1.00
" "	7.10	1939	50	None	0.00	1.00

4-ft. Southern Yellow Pine Fence Posts

Location	Lbs. Abs.	Year Instd	No. Instd	Condition	% Removed to 1-1-41	Ave. Life to 1-1-41
Cleveland, Tex	11.19	1938	15	All Sound	0.00	2.00

7-ft. Southern Yellow Pine Fence Posts

Location	Lbs. Abs.	Year Instd	No. Instd	Condition	% Removed to 1-1-41	Ave. Life to 1-1-41
Cleveland, Tex	4.98	1939	9	All Sound	0.00	1.00
" "	8.30	1939	10	" "	0.00	1.00

Sapling Test - Somerville, Texas

Saplings Sap Southern Pine 3/4" Square

No. Inserted	Pounds Absorption	Date Inserted	Condition June, 1941	% Rem. to 6-41	Ave. Grade after 18 Mo.*
16	4.86	Dec., 1939	Sound	0.00	100
16	7.19	Dec., 1939	"	0.00	100
16	Untreated	Dec., 1939	4 Sound	0.00	72
16	Untreated	Dec., 1939	4 Sound	0.00	66

*Graded according to method described by Drefahl and Bescher, page 36, AWPA Proceedings for 1939.

Office Manager Treating Plants, System,
Topeka, Kansas, November 11, 1941.

3659

MR. L. YAGER:

Your letter of the 2nd about chemicals for timber treatment:

I have consistently advocated the use of all the Lehigh creosote we could get, for the reason that Mr. Loom told me from the beginning that it evidently had high toxicity and on account of its lack of residue it did decrease the percentage of residue when mixed with No. 1 creosote.

I note that the Santa Fe has consistently used a creosote containing less residue than the A.R.E.A. No. 1 creosote.

I would certainly go to a thinner creosote mixture before considering zinc chloride or using the ties untreated.

It is interesting to note that experimentation has been made with Pentachlorphenol and fuel oil. I showed you the letter I had from the A.D.Chapman Co. some weeks ago, which I referred to Mr. Loom for consideration.

bb/s
x

St. Paul, Minnesota
December 2, 1941.

Mr. Bernard Blum:

Referring to your letter of November 25 from Seattle about changing the percentage in the creosote-petroleum mixture:

I have been very much concerned about this matter and have endeavored to keep in close touch with Mr. Willis about the prospect of creosote delivery this fall and for the treating requirements during the year 1942. Much to my surprise the inquiries made during the past three weeks indicate that Mr. Willis would be able to supply the creosote ordered in reasonable conformity with the amounts and scheduled deliveries. I am still quite skeptical about this immediately favorable situation being representative of the circumstances for the next twelve months.

I have had in mind that as soon as we had any definite intimation that standard creosote would prove to become short we should resort to a number of possible expedients as might be indicated by the then existing circumstances. The first proposal is naturally the one dealing with reducing the percentage of creosote. Some six months ago I asked Mr. Loom to investigate the record of what may have been done in the past by any other railroad using a smaller percentage of creosote in the creosote-petroleum mixture. Mr. Loom referred to the Santa Fe experience which was based on 30% creosote mixture and the service results, fairly well authenticated, have been satisfactory.

The use of a smaller percentage of creosote immediately precipitates a discussion in that still unexplored field of timber preservation dealing with the qualitative aspects and retention of toxicity. As you know, the timber preserving experts in whom we have confidence are all inclined to be conservative with respect to any important modifications. There are some apparently contradictory views held by these experts. The difficulty arises largely from the fact that it takes anywhere from 10 to 25 years to determine the

reliability of any reasoning with respect to modifications in the preservative art.

I am attaching a portion of recently accumulated file on this immediate subject of preservative and direct your attention to Mr. Harris' letter to me of November 28 of the Santa Fe situation. Mr. Harris speaks about his willingness to reduce the creosote percentage to 30 in the case of his standard creosote which is based on a residue of 20% as distinguished from the A.R.E.A. creosote which makes no residue limitation and has been known to develop a residue of 30% or even higher. In our situation we have available a considerable amount of Lehigh creosote which you know is light and high in tar acids and exceedingly low in residue. All of these facts for the moment to me suggest that we would not be making any serious mistake in utilizing if necessary a 30% creosote mixture by taking advantage of the Lehigh creosote addition to our standard creosote supply.

Returned 1/9

I have been investigating the oil tar creosote to be made available in large quantities at Portland. That, however, is of no assistance in our immediate problem. There is also available pentachlorphenol which may possibly be successfully utilized as a petroleum mixture as suggested by some preliminary work conducted by the Santa Fe. I have such alternates in mind for possible utilization before resorting to zinc chloride treatment or the use of untreated ties.

L. Yager

LY:m
encl.

3659

At Seattle, November 25, 1941

MR. L. YAGER:

In case you have not seen the correspondence, Herman Von Schrenk has asked whether we have made any change in our practice of using the 45-55 mixture of creosote-petroleum in the treatment of ties, inasmuch as the Santa Fe on November 1 changed to a 30-70 creosote-petroleum mixture.

Probably we are justified in making some modification in our treatment, such as a 40-60 or 35-65 mixture. What do you think of this?

bb/s

Brainerd, Minn., November 21, 1941.

Dr. Herman von Schrenk,
Consulting Timber Engineer,
Tower Grove & Flad Aves.,
St. Louis, Mo.

Dear Dr. von Schrenk:

In reply to your letter of November 18th.

I was told that the Santa Fe expected to start treating with a mixture of 30% creosote and 70% petroleum if the creosote situation did not improve.

So far we have made no plans to change our practice of using a 45-55 creosote-petroleum mixture for treatment of cross ties and switch ties but it seems hard to say what we may be forced to do if the present creosote situation continues.

Yours truly,

Gen'l Supt. Timber Preservation.

Mr. Blum —
Copies for your information.
11/21

Copy

Tower Grove & Flad Aves.
St. Louis, Mo.
November 18, 1941.

Mr. A. J. Loom,
Gen. Supt. Timber Preservation,
Northern Pacific Railway,
Brainerd, Minnesota.

Dear Sir:

The last data that I have indicates that you are using 45/55 creosote-petroleum mixture, 8 pounds retention, in the treatment of ties. Have you made any change in this practice?

As you probably know, effective November 1, the Santa Fe changed to a 30% creosote and 70% petroleum mixture.

Yours very truly,

Signed - Herman von Schrenk
Consulting Timber Engineer

HvS:ch

Seattle, Wash., November 7th, 1941.

Mr. Bernard Blum:

Referring to your letter of November 1st, and my wire reply of November 5th, concerning the A. D. Chapman & Company PERMATOX A wood preservative which is a 5% solution of pentachlorphenol in a suitable petroleum solvent.

I now have copies of Mr. Dale Chapman's letter to you of October 29th, and the Permatox Bulletin 41-D, Revised October 1st, 1941 that you refer to.

On my recent attendance at the A.R.E.A. Wood Preservation Committee meeting at Chicago I inquired of the members present about this treatment. Mr. R. S. Belcher, Manager Treating Plants on the Santa Fe was the only one who seemed to know anything about it. He told me that he was experimenting with it on a small scale and that he thought it had possibilities in the event of a scarcity of creosote. He thinks that pentachlorphenol can be mixed satisfactorily with heavy fuel oil such as we are now using in our creosote-petroleum mixture. If so he thinks it should prove superior to zinc Chloride for treatment of ties and timbers that do not require a clean treatment such as is recommended in the bulletin for millwork.

From my discussion with Mr. Belcher I am inclined to believe that a 5% solution of pentachlorphenol in the fuel oil we are now using would be the best substitute for our present creosote-petroleum mixture.

It seems to me that the only additional equipment we would require would be something to insure a uniform mixture of this chemical in the fuel oil. Possibly a centrifugal pump.

No doubt Mr. Chapman is inposition to know what equipment we would need for unloading from tank cars and also for making and maintaining a satisfactory mixture with our present fuel oil.

D. Stowe

N. P. 1386 12-24

TELEGRAM—BE BRIEF

TIME FILED M.

19MDA

PARADISE NOV 5 1941

BERNARD BLUM

STPAUL

YOUR LETTER NOVR FIRST AM INFORMED THAT DALE CHAPMANS PRESERVATIVE CONSISTS OF "PENTACHLOROPHENOL" MIXED WITH PETROLEUM. UNDERSTAND SANTA FE IS EXPERIMENTING BY MIXING WITH FUEL OIL LETTER TO FOLLOW L-9.

A J LOOM

403AM6

359

Saint Paul, November 1, 1941

MR. A. J. LOOM:

You have copy of Mr. Dale Chapman's letter of the 29th, to me, about their PERMATOX-A for use in treating timber.

I presume he sent you copy of bulletin 41-D, revised October 1, 1941, consisting of ten sheets. Will be glad to have your comments.

Is Permatox-A a solution in water or other vehicle that is readily soluble in water?

bb/s

Cable Address
Chemtreco

Regional Offices
New Orleans
Portland
Chicago

Distributors of
Dowicide for
The Dow Chemical Company

A. D. Chapman & Company, Inc.
Chemicals For Wood Preservation
333 North Michigan Avenue
Chicago

October 29, 1941

Mr. Bernard Blum
General Engineer
Northern Pacific Railroad
Saint Paul, Minnesota

Dear Mr. Blum:

Following our letter of last month we are pleased to enclose a copy of our revised PERMATOX Bulletin 41-D in which you will find a complete description of the properties and use to date in wood preservation of our PERMATOX A, which as you know, is 5% pentachlorphenol in suitable petroleum solvents.

As you may know, both cedar and pine poles are now being regularly treated with this product, and the Joslyn Manufacturing & Supply Company here is also treating some cross ties, using a dark fuel oil solution of pentachlorphenol. With the recent advances in the prices of creosote, PERMATOX A is now slightly lower in cost, and we are finding considerable interest among railroads, utilities and treating plants in this product.

We are sending a copy of this letter to your Mr. A. J. Loom together with the copy of PERMATOX Bulletin 41-D, and if there are any questions or comments you or he may have on the use of this product, please do not hesitate to write us.

Thanking you, we remain

Cordially yours,
A. D. CHAPMAN & COMPANY, INC.

Dale Chapman

Dale Chapman

DC:pj
Enclosure
CC-Mr. A.J. Loom
Brainerd, Minnesota

REGIONAL OFFICES
NEW ORLEANS
PORTLAND
CHICAGO

CABLE ADDRESS
CHEMTRECO

A. D. CHAPMAN & COMPANY, INC.

CHEMICALS FOR WOOD PRESERVATION

333 NORTH MICHIGAN AVENUE

CHICAGO

Permatox Bulletin 41-D
Revised Oct. 1, 1941

PERMATOX A ----- for the PRESERVATION of LUMBER, POLES and POSTS.

I. INTRODUCTION

This bulletin gives a brief summary of the properties, use to date, and recommendations for the effective preservative treatment of lumber, poles, posts, and other forest products with PERMATOX A. This product has shown outstanding promise as a highly effective and permanent oil preservative for many wood products. Compared with creosote, the PERMATOX A treated wood is clean, non-bleeding, paintable, and easily handled by workmen, and the preservative oil penetrates better and is more uniformly distributed through the wood. Compared with clean, water-soluble salt treatments, much more permanent protection is provided; and the cost, trouble, and checking losses encountered in redrying salt-treated wood are avoided. Set forth briefly also, are our recommendations for the effective preservative treatment of lumber, poles, posts and other forest products with PERMATOX A, based upon our experience to date.

II. DESCRIPTION OF PRODUCT

PERMATOX A is a 5% solution of pentachlorphenol* in suitable petroleum solvents. It is also known to the millwork trade as "Permatol A", the trade name used by the Western Pine Association and the National Door Manufacturers' Association. The concentration of pentachlorphenol and the specifications of the solvent-carrier may be varied to some extent depending upon the products to be treated, but the 5% solution in light fuel-oils is the standard PERMATOX A. The usual PERMATOX A is a clear, dark-amber-colored solution, with a characteristic fuel-oil odor. It has a specific gravity of 0.87 at 38° C./15.5°C. (100° F./60° F.), and weighs 7.25 lbs. per gallon at 100° F.

Following are the essential data on pentachlorphenol, and the solvent carrier, together with recommendations and suggestions for operators who prefer to prepare their own treating solution:

A. PENTACHLORPHENOL

1. Chemical and Physical Properties Affecting Permanence

Pentachlorphenol is a crystalline organic chemical, moderately soluble in oils and other organic solvents, but very slightly soluble in water. Its solubility in water ranges from 17 parts per million (0.0017%) at 70° F., to 50 ppm. (0.005%) at 140° F.

* Manufactured by The Dow Chemical Company

The volatility or vapor pressure of pentachlorphenol is also very low, ranging from about 0.0002 mm. of Hg at 70° F. to 0.9 at 212° F., the boiling point of water.

2. Toxicity of Pentachlorphenol

Pentachlorphenol is highly toxic to practically all fungi, bacteria, and other microorganisms. Its killing toxicity to most wood-destroying fungi, including U.S. Forest Products Laboratory #517 and Lenzites trabea is between 0.002% and 0.008%. The killing concentration of 5% pentachlorphenol in fuel-oil is 0.1% as compared to 0.1% to 0.5% for coal tar creosote.

3. Theoretical Preservative Value

In view of the foregoing, pentachlorphenol, from a theoretical standpoint, should be comparable or superior to coal tar creosote as a wood preservative.

4. Results of Service Tests to Date

During the summer of 1935, two large test plots were established in the South, one near Bogalusa, Louisiana, and the other near Jacksonville, Florida. Fifty-five different preservative compositions, both water-soluble salts and oil solutions, and including the proprietary preservatives in use today, were used in from 2 to 4 different absorptions on Southern pine sapwood specimens. During the 6 year period to date, many of the treatments have shown partial or entire failure under relatively severe conditions of soil exposure to both decay and termites. All of the test specimens treated with fuel-oil solutions of pentachlorphenol are still sound and free from termites and decay.

B. SOLVENT CARRIER USED IN PERMATOX A

The solvent-carrier in PERMATOX A may be varied considerably, depending upon the use requirements. For example, the solvents which have been used for the pressure treatment of Southern pine poles are described as "Light Fuel or Distillate Oils, No. 1, 2, or 3". Such oils are used in Diesel motors and furnaces and are generally available from refineries. Some of the heavier and darker fuel-oils, such as No. 4 and 5, also generally available, are satisfactory for certain uses and possess the advantages of showing penetration and reducing the checking of the treated wood in service. PERMATOX A is prepared for the consumer with solvent-carriers best adapted for his use requirements. For example, PERMATOX A to be used in soaking treatments contains a special plasticizing material of high solvency for pentachlorphenol. The special plasticizing solvent prevents "blooming" or crystallization of the pentachlorphenol on the surface of the treated wood, which may occur in the case of soaking treatments, but rarely or never with pressure treatments.

C. FLEXIBILITY OF PERMATOX A SOLUTIONS

The fact that pentachlorphenol is sufficiently soluble in a wide range of cheap petroleum solvents means that any desired color, flash point, viscosity and other properties may be obtained. However, it should be mentioned that some petroleum solvents such as the light naphthas, kerosenes, and some of

the heavy petroleums will dissolve and carry only 1 to 3% of pentachlorphenol. Generally speaking, the higher the aromatic content, as expressed by low aniline point, the greater the solvency for pentachlorphenol. The solvency of any oil for pentachlorphenol can be readily determined.

While most fuel oils dissolve 5 to 6% of pentachlorphenol, some high aromatic petroleum oils will dissolve and carry up to 25% by weight of pentachlorphenol. This also suggests the desirability of a Concentrate which can be used straight or diluted by cold mixing to furnish a solution of any desired concentration. Our PERMATOX A CONCENTRATE is such a product and is described as follows:

D. PERMATOX A CONCENTRATE

PERMATOX A CONCENTRATE contains 13.2% of Pentachlorphenol in a plasticizing solvent, weighs 8.53 lbs. per gallon, and when diluted with 2 parts by volume of light fuel-oil forms the 5% solution, PERMATOX A, weighing about 7.4 lbs. per gallon. It is furnished in 5 and 55 gallon drums and in tank cars. Since it can be cold mixed with oils obtainable locally, its use means savings in freight costs as compared to the ready-to-use product. This is the most economical method of handling for the operator whose scale of operation does not warrant large storage facilities and the installation of equipment to dissolve the dry pentachlorphenol and completely prepare the treating solution.

PERMATOX A CONCENTRATE can be used straight to give a very high concentration of toxicant in certain wood products, or can be diluted to give any desired concentration. The plasticizing solvent prevents "blooming" on the surface of the treated wood, such as may occur with soaking treatments. It may also be used to increase the toxicity of creosotes or creosote-petroleum mixtures for certain uses.

III. COST OF PERMATOX A SOLUTIONS

PERMATOX A is now about the same in cost as coal tar creosote, ranging from 11¢ to 32¢ per gallon, depending upon the quantities, oil carrier, and distance from source of supply. A large operator who buys pentachlorphenol, and the solvent carrier in large quantities can prepare his own PERMATOX A at a cost of 11¢ to 13¢ per gallon. Purchasing tank cars or drums of PERMATOX A CONCENTRATE and diluting with fuel-oil obtainable locally is next in economy. Tank car and drum quantities of PERMATOX A ready-to-use are also available at certain points throughout the country.

IV. APPLICATION OF PERMATOX A SOLUTION TO WOOD

A. PRESSURE AND NON-PRESSURE PROCESSES

Whether PERMATOX A should be applied by pressure impregnation or by some non-pressure process as soaking, dipping, spraying, or brushing, depends on the penetration and absorption of preservative required. No matter how effective a preservative may be, insufficient penetration and poor distribution in the wood will result in early failure when the conditions of exposure are sufficiently severe.

Many years of experience have shown that pressure impregnation is the best means of treating wood to be placed under severe conditions of exposure. The initial cost may be higher, but owing to better control of preservative absorptions, and more uniform penetration and distribution of preservative, the annual cost is usually lower. However, for many uses, non-pressure processes can be used to real advantage. The hot and cold bath treatment has proved effective for millions of poles and posts of cedar and other species, and has multiplied their service life many times. Even the low cost cold soaking treatment with creosote has resulted in greatly extending the service life of poles, posts and lumber. Where the exposure is not severe, cold-soaking treatments are certainly warranted, particularly if it can be demonstrated that adequate penetration can be obtained. A highly toxic low viscosity oil solution such as PERMATOX A is very useful for the low cost cold-soaking treatment of many items which do not require a pressure treatment.

B. PRESSURE TREATMENT OF WOOD WITH PERMATOX A

1. General Recommendations

Since test plot service data and toxicity studies furnish evidence that PERMATOX A is comparable in effectiveness to coal tar creosote, substantially the same absorptions are recommended. Following are the ranges of net retentions recommended for various wood products:

	Lbs.per cu.ft.
Lumber - all species	
For contact with soil and severe exposures	8 to 12
For use above ground, where present salt treatments are now being used	4 to 6
Poles -	
Pine - all species	8 to 10
Douglas fir	6 to 8
Cedar - full length	3 to 5
Ties - (Cross, switch and bridge ties)	
All species	6 to 8

2. Commercial Experience to Date

Considerable quantities of Southern pine lumber, poles, and cross arms have been pressure-treated during the past year. The lumber is being treated with 6 to 10 lbs. of PERMATOX A and is used largely in the construction of homes, factory buildings and bridges. The poles and cross arms are being treated with 8 to 12 lbs. of PERMATOX A, and are being furnished to large utilities.

In all of the stock given this clean oil treatment, the penetration and distribution of pentachlorphenol in both sapwood and heartwood, have been satisfactory and better than with higher viscosity preservatives. The treated wood is clean, dry, and paintable, and no evidence of bleeding has been found in absorptions up to 12 lbs. per cu. ft.

C. SOAKING TREATMENTS - RECOMMENDATIONS AND COMMERCIAL USE TO DATE

1. Sash, Frames and Millwork Products

For sash, frames, and other millwork products, a 3 minute immersion in PERMATOX A or B is recommended as a minimum treatment and meets the National Door Manufacturers' Association standards for their "Toxic-Approved Millwork". This treatment results in absorptions ranging from .75 to 1.0 lb. solution per cu. ft., and since most of the toxicant is concentrated in the joints, appears to give adequate protection under ordinary exposures except in the most humid areas. Naptha or naptha-fuel oil mixtures are preferable since the treated wood dries readily and permits rapid subsequent puttying and finishing.

There is a growing demand for a toxic water-repellent treatment for all millwork products, which will minimize shrinkage and swelling as well as protect from decay, stain and termites. From our work with toxic water repellents, it appears that a high degree of protection afforded by a good product against dimensional changes as well as fungus attack is worth many times the cost.

2. Dry Lumber

For surfaced sap Southern pine lumber the approximate absorptions and cost per M bd. ft. for different periods of cold-soaking are as follows:

	Immersion Period	Absorption gal.per M bd.ft.	Cost $ per M bd. ft.
For 1" lumber	1 min.	15 to 20	$3.00 to 4.00
	15 "	20 to 25	4.00 to 5.00
	1 hr.	25 to 30	5.00 to 6.00
	4 "	35 to 40	7.00 to 8.00
For 2" lumber	1 min.	8 to 10	1.60 to 2.00
	15 "	10 to 15	2.00 to 3.00
	1 hr.	15 to 20	3.00 to 4.00
	4 "	20 to 25	4.00 to 5.00

These data and examinations of the penetrations obtained support the recommendation of a 1 hr. cold-soaking treatment for 1" lumber, and a 4 hr. soaking for 2" lumber.

Douglas Fir Crossarms - Sufficient work has now been done to indicate that the effective preservative treatment of Douglas fir cross arms can be accomplished by soaking 2 to 4 hours in cold PERMATOX A solution. The absorptions average about 1½ lbs. per cu. ft., but the toxic pentachlorphenol is deposited in the vulnerable area around the pin holes.

3. Cedar Poles

a. New Dry Poles

Large scale full length treating of new cedar poles is now being done in the Minneapolis area. At the present time, the primary object

is to protect the sapwood above the ground line, and for this is recommended a cold-soaking treatment of approximately 2 hrs. which will give penetrations ranging from 1/4"to 5/8", and absorptions from 4 to 5 lbs. of PERMATOX A per cu. ft. of sapwood, 1/2" basis. It seems likely that the use of a somewhat more concentrated PERMATOX A solution and longer immersions will result in sufficient penetration and absorption in the incised area to permit both butts and tops to be adequately treated in one simple soaking operation.

The penetrations are considerably better than those obtained with products of higher viscosity. The absorption of 5 lbs. of solution, or 0.25 lb. pentachlorphenol per cu. ft. of sapwood should protect the sapwood above the ground line for the mechanical life of the pole. A class 5 - 50 ft. pole for example, contains about 6 cu. ft. of sapwood (1/2" basis) and would thus require only 30 lbs. or about 4 gallons of PERMATOX A. The cost therefore, is relatively low, and permits the full-length treated pole to be sold without a large increase in price.

The PERMATOX A treatment of new cedar poles is thus the first clean, highly penetrating, oil treatment used on an extensive commercial scale to permanently protect such poles from so-called "Shellrot" above the ground line.

b. Cedar Poles in Service

After a cedar pole has been in service four or five years, the sapwood becomes very porous and absorptive as the result of weathering and checking. Such poles can be adequately treated against further "Shellrot" by simply spraying with PERMATOX A.

One large utility company is thus spraying several thousand cedar poles, using specially designed portable spraying equipment, with hooded spray nozzles to prevent loss of solution. The poles will readily absorb the required 5 lbs. of PERMATOX A per cu. ft. of sapwood and complete penetration of the sapwood is obtained.

Many utility companies reclaim their used cedar poles, cutting them off at the ground line and treating at least the butts of the shortened poles. The sapwood of these used poles is of course very absorptive and can be readily and effectively treated by cold soaking in PERMATOX A solution. The tops may be treated by spraying.

It is possible to effect an economy in such work with the use of spent transformer oil (petroleum only) to dilute the PERMATOX A CONCENTRATE.

4. Fence Posts (Round, dry: 6 - 7 ft. long)

The cold soaking treatment with PERMATOX A should be very useful in fence post preservation. Heretofore, fence posts had to be pressure-treated at high cost, or given a hot and cold bath treatment, which required equipment and attention outside the scope of many users.

Unless posts are made from split logs, they are likely to contain a high proportion of sapwood; As a matter of fact, round pine posts from 3" to 5" in diameter are largely sapwood. While sapwood decays more rapidly,

it also absorbs light oil solutions more readily than heartwood, and adequate treatment can usually be accomplished cheaply by soaking 2 to 18 hours in PERMATOX A, depending upon the size of the posts and degree of protection required.

The fact that posts can be effectively treated by cold-soaking with PERMATOX A for several hours, using ordinary oil drums or tanks, should be interesting to highway maintenance engineers, railroads, and farmers, many of whom use short-lived untreated posts with high replacement costs simply because of the high initial cost or unavailability of pressure-treated stock.

Following is a summary of the average absorptions and penetrations which can be reasonably expected from the cold-soaking treatment of posts of various kinds of woods, based on our work to date.

Wood	Diameter Inches	Soaking Period Hrs.	Average Absorption Gals. Per Post	Lbs.per Cu.Ft.	Usual proportion of posts with complete sapwood penetration
Pines -					
Southern	3 to 5	2	0.3	4	10%
Northern		4	0.4	5	50%
Western		18	0.5	7	80%
Hardwoods	3 to 5				

In general, seasoned posts of red oak, sap gum, honey locust, cottonwood, willow, aspen, birch and sycamore require about the same immersion periods as given above for pine. In some hardwoods such as white oak satisfactory penetrations and absorptions are much more difficult to obtain.

Treating Procedure

Posts can be treated either by full length horizontal immersion in a tank of suitable dimensions, or by standing them upright in 55, 65 or 100 gallon steel drums, reversing the ends for complete treatment. The 65 gallon drum is more suitable, since the posts can be immersed to a depth of about $3\frac{1}{2}$ ft. and by reversing the ends both the butt and top of a 7 ft. post can be completely treated. One advantage in this method is that the tops can be given a lighter treatment than is necessary for the butts.

Very light and dry posts must be weighted down to keep them from floating. This can also be accomplished by the method recommended by the Forest Products Laboratory; that of fitting the bottom of each drum with a plate studded with screws or nails, onto which the posts are caught and held from slipping or floating.

V. DETERMINATION OF PENTACHLORPHENOL IN SOLUTIONS AND IN WOOD

A. QUANTITATIVE METHODS

1. Pentachlorphenol in Fresh Solutions

A sample of the solution is dissolved in methanol and titrated to a bromo thymol blue end point with N/50 sodium hydroxide.

Reagents:

1. N/1 HCl and NaOH: Prepare in the usual manner and check against each other.
2. N/50 HCl: Dilute 10.0 ml. N/1 HCl to 500 ml. with distilled water.
3. N/50 NaOH: Dilute 10.0 ml. N/1 NaOH to 500 ml. with methyl alcohol. Standardize against N/50 HCl using bromo thymol blue indicator.
4. Methyl alcohol.
5. Bromo thymol blue indicator: Dissolve 0.1 gm. bromo thymol blue in 20 ml. methyl alcohol and 80 ml. distilled water.

Procedure:

Weigh 2.0 cc. of solution, or determine the sp. gr. and pipette 2.0 cc. into 20 ml. methyl alcohol in an Erlenmeyer flask. Add 0.3 ml. bromo thymol blue, and titrate with N/50 NaOH to the change from yellow to green. A blank containing 20 ml. methyl alcohol and 0.3 ml. bromo thymol blue is titrated to the same color, and the titration subtracted from that of the sample.

$$\text{Percent pentachlorphenol} = \frac{\text{Net ml. N/50 NaOH} \times .533}{\text{Wt. sample (or ml. sample} \times \text{sp.gr.)}}$$

Note:

a. This method gives slightly lower results than those obtained by the determination of the total chloride content. If more accurate results are desired, the method may be standardized on a freshly prepared treating solution, the pentachlorphenol content of which is accurately known.

b. This method will give high results on treating solutions which have been used and therefore contain wood acids. For this reason, this method is recommended only for fresh solutions. For used solutions, the Rapid Lime Ignition Method described below is better.

2. Pentachlorphenol in Treated Wood or Fiber, and in Solutions

Following is the so-called Rapid Lime Ignition Method of determining the pentachlorphenol content of treated wood or fiber, and oil solutions:

When a chlorinated phenol is ignited with calcium hydroxide the chlorine is liberated and combines with the lime, forming $CaCl_2$. The chloride may then be determined volumetrically by the Volhard Method or any other suitable method for the determination of chlorine.

Apparatus:

1. No. 3 porcelain crucibles, capacity 60 ml.
2. Mekker burners.
3. Chemical glassware: beakers, stirring rods, graduate, funnels, burettes, etc.
4. Analytical balance: capable of weighing accurately to 0.1 gram.

Reagents:

1. Calcium hydroxide: Analytical Reagent grade.
2. Concentrated nitric acid: C.P. grade.
3. Standardized N/20 silver nitrate.
4. Standardized N/20 ammonium sulphocyanate (thiocyanate).
5. Volhard indicator: a 10% solution of ferric alum with 10 ml. conc. HNO_3 added per liter.

Procedure:

Solid Samples: Weigh a sample containing up to .035 grams chlorine, the weight of sample not exceeding 5 grams, to the nearest .01 gram. Cut into pieces not larger than 1/8" in diameter. Mix intimately with 5 grams of calcium hydroxide in a porcelain crucible, wetting if necessary to obtain a good mixture with fluffy materials. Cover with 10 more grams of $Ca(OH)_2$. Heat the crucible slowly at first increasing the heat gradually until the full heat of the Mekker burner is obtained. Heat until crucible becomes a dull red color and continue heating at this temperature for 10 minutes. Allow to cool, then dump the ignited mixture into a dry 400 ml. beaker. Add cautiously enough water to thoroughly wet the mixture; rinse the crucible with water to which a few drops of nitric acid have been added, and add the rinse to the contents of the beaker. Carefully dissolve the lime with 30 ml. concentrated nitric acid, then add 5 to 10 ml. excess. Add N/20 silver nitrate so there will be an excess of not more than 5 ml. based on the expected analysis of the sample. Boil the sample until the silver chloride has coagulated, taking care that none of the material is lost by spattering. Filter off the precipitated AgCl and the carbon on a No. 1 Whatman filter paper. Rinse the beaker and wash the paper several times with distilled water. If the volume of the filtrate exceeds 150 ml. it should be concentrated by boiling. Titrate the filtrate by the Volhard method for chloride; add 5 ml. ferric alum indicator, and titrate to the first permanent pink with N/20 ammonium thiocyanate.

Oil Solutions: Weigh a sample containing up to 0.035 grams chlorine into 5 grams of calcium hydroxide in the 60 ml. crucible and cover with 1 gram of powdered cane sugar. This decreases the volatility of the oil, preventing any burning above the top of the crucible with the possible loss of Dowicides. Then make the second addition of 10 grams of $Ca(OH)_2$, and bump the crucible gently on the desk top to compress the contents slightly. Continue as for solid samples.

Calculation:

$$\% \text{ Dowicide} = \frac{(\text{ml. N/20 } AgNO_3 - \text{ml. N/20 } NH_4CNS) \times \text{Factor } 0.266}{\text{Wt. Sample}}$$

Notes:

1. This method gives results comparable, in accuracy and precision to those obtained by the Oxygen Bomb Method.

2. One determination can be completed in about 30 minutes elapsed time, but the time per determination is somewhat less if several samples are being run.

3. A blank should be run on the reagents to check their chloride contents. 15 grams of calcium hydroxide are dissolved in 35 to 40 ml. concentrated nitric acid and titrated in the same manner as the unknown samples.

4. The use of muffle furnace for this heating has not been satisfactory.

B. QUALITATIVE METHODS

1. Copper Acetate Method

This depends upon transferring pentachlorphenol from the surface of the wood to a paper impregnated with cupric acetate. A yellow or red stain on the paper indicates the presence of pentachlorphenol. This test is better suited for use on borings than on split or sawn sections.

Reagents:

Impregnated paper. Dip filter paper or a good grade of uncoated white paper (adding machine paper will be satisfactory) in a 5% solution of cupric acetate which has been filtered if necessary. Try to coat this paper evenly, then allow it to dry and cut into strips of convenient size.

Solvent:

Ethanol or isopropanol, in a dropping bottle.

Procedure:

Moisten the wood chip or boring to be tested with solvent and also moisten a strip of impregnated paper. Roll the sample in the paper and press well with the fingers. Unroll and allow to dry. The presence of pentachlorphenol is shown by a stain which is very faintly yellow with small amounts, increasing to a stronger yellow or red with larger amounts. Comparison with a blank or untreated wood is advisable.

Notes:

The test appears to be sensitive to about 0.2% pentachlorphenol in wood, the sensitivity depending some upon the kind of wood and the amount of solvent used and the length of time allowed, as well as the way in which the sample is taken (grain exposed, etc.) The stain is produced slowly with small amounts of pentachlorphenol since the latter does not come out of the wood readily.

2. Ammoniacal Copper Sulphate Method

When dark-colored oils are not present in PERMATOX A solutions, as is the case with the standard product, the penetration can be shown fairly well by the application to a freshly split surface of the treated wood of a 1% ammoniacal solution of copper sulphate, which reacts with pentachlorphenol to form reddish brown copper pentachlorphenate.

Determinations of penetration are best made at least a week after treating, since maximum penetration has not occurred until at least that period has elapsed and care must be exercised to always use a freshly split surface, as sawing or cutting may spread solution over an untreated area. These solutions also creep rapidly over the surface, and for best results, the indicator solution should be applied with an atomizer very soon after splitting. As indicated above, this method is not very suitable for use on borings.

3. Beilstein Method

This test is quite satisfactory for detecting the presence of chlorinated phenols in wood and is of value in certain cases. A boring or chip can be removed from any desired location in the treated piece of wood wrapped with a small copper wire, and suspended in the flame of a Bunsen burner. If pentachlorphenol is present, a green flame will be observed.

Saint Paul, September 5, 1941

MR. A. J. LOOM:

You have copy of Mr. Dale Chapman's letter of the 3rd to me about his PERMATOX application to tie treatment.

Possibly you know about it. Would like to have your comments at your early convenience.

bb/s

Cable Address
Chemtreco

Regional Offices
New Orleans
Portland
Chicago

Distributors of
Dowicide for
The Dow Chemical Company

A. D. Chapman & Company, Inc.
Chemicals For Wood Preservation
333 North Michigan Avenue
Chicago

September 3, 1941

Mr. Bernard Blum,
General Engineer
Northern Pacific Railroad
Saint Paul, Minnesota

Dear Mr. Blum:

In my recent visit to Minneapolis, I phoned your office but found that you were away on a field trip. I talked with your Mr. Gibson; however, and he suggested that I write you sending a copy of my letter to your Mr. A. J. Loom at your Brainerd plant.

As you may know, we have done considerable work with pentachlorphenol, and as indicated in the enclosed Permatox Bulletin 41-B, is now being used very effectively for the preservation of poles, lumber, and other forest products. In view of the pending shortage and price increases on creosote, and because our product is of practical interest to the pole and tie treating companies, we would very much appreciate your consideration of its use.

Pentachlorphenol is a highly toxic preservative, soluble in most petroleum oils, and can be used very effectively in straight petroleum or to fortify your creosote petroleum mixture.

If, after reading the enclosed bulletin, you have any questions whatever with regard to its use; or if you would like to send us a sample of your petroleum, we shall be glad to determine its solvency for pentachlorphenol and suggest treating schedules.

Thanking you and looking forward to a word from you at your convenience, we remain

Cordially yours,
A. D. CHAPMAN & COMPANY, INC.

Dale Chapman

Dale Chapman

DC:ET

CC: A.J. Loom
Brainerd, Minnesota

CHIEF ENGINEER
SEP
3 4
1941
NOR. PAC. RY.

REGIONAL OFFICES
NEW ORLEANS
PORTLAND
CHICAGO

CABLE ADDRESS
CHEMTRECO

A. D. CHAPMAN & COMPANY, INC.
CHEMICALS FOR WOOD PRESERVATION
7 SOUTH DEARBORN STREET
CHICAGO

May 1, 1941

PERMATOX APPLICATION DATA BULLETIN NO. 41-B

PERMATOX B

for the

PRESERVATION OF MILLWORK AND OTHER DRY WOOD PRODUCTS

PERMATOX B MOST SUITABLE FOR MILLWORK

While we furnish all of the so-called Permatol formulas, we have found after extensive experimentation and commercial usage, that PERMATOX B gives the best results where permanent protection from stain, decay, and termites is required at minimum cost.

AVAILABLE IN BOTH READY TO USE AND CONCENTRATED FORM

PERMATOX B is furnished ready for use in 55 and 5 gallon drums, and can also be readily prepared for use on the job by simply diluting PERMATOX B CONCENTRATE with suitable petroleum solvent obtainable locally, thus saving high freight costs.

Following is a detailed description of both the PERMATOX B ready to use, and the B CONCENTRATE, how they are applied to millwork and meet the recommended preservative standards.

I. PERMATOX B

DESCRIPTION AND SPECIFICATIONS

PERMATOX B is an amber-colored, oily liquid consisting of a 5% solution in suitable petroleum solvent of a mixture of the best chlorinated phenols in accordance with the following formula:

2% pentachlorphenol
2% 2-chlororthophenylphenol
1% tetrachlorphenol
95% suitable petroleum solvents containing anti-blooming and plasticizing agent.

It has a flash point of 130°F. minimum (Tagliabue Closed Cup-Method), a specific gravity of 0.870 at 76°F., and weighs 7.25 lbs. per gallon. It has a characteristic fuel oil-naphtha odor, and the toxicants dissolved in the oil possess killing toxicities ranging from .004% to .008% to the standard decay test fungus F. P. L. #517, and from .004% to .008% to the test fungus C. pilifera #3. Since both tetrachlorphenol and 2-chlororthophenylphenol possess high toxicites to certain stain fungi which occur on millwork in service, their combination with pentachlorphenol affords the greatest protection from both stain and decay.

Both pentachlorphenol and tetrachlorphenol possess high toxicity to termites, and are now widely used to control these insects.

PERMATOX B is furnished in 55 and 5 gallon drums and in tank cars, and is especially suited to those users who require a high flash point product ready to use with no further mixing. The total delivered cost for PERMATOX B ranges from 18¢ to 45¢ per gallon, depending upon the quantities ordered and distance from source of supply. For large users it would be more economical to prepare their own PERMATOX B solution by simply diluting the PERMATOX B CONCENTRATE which is described as follows:

II. PERMATOX B CONCENTRATE

DESCRIPTION AND SPECIFICATIONS

PERMATOX "B" CONCENTRATE is a dark-amber-colored oily liquid consisting of 45% by weight of the three chlorinated phenols named above incorporated in a mixture of solvents which keeps the Concentrate fluid at all times. It weighs 9.34 lbs. per gallon and is sold on a gallon basis. It is furnished in 55 and 5 gallon drums.

PREPARATION OF PERMATOX B FROM THE CONCENTRATE

In preparing the PERMATOX B from the Concentrate, the latter is simply added to the proper solvent at the rate of 1 gallon of PERMATOX B CONCENTRATE to 10 gallons of solvent. An easy method used by many operators is to mix together a 5 gallon drum of PERMATOX B CONCENTRATE and a 50 gallon drum of solvent.

The choice of a solvent depends upon the rapidity with which the stock must be processed after treating. If at least 48 hours can be allowed for drying, the use of a light fuel or stove oil is satisfactory. Generally speaking, the use of a 50-50 mixture of naphtha or mineral spirits with light fuel is most satisfactory as a diluting solvent, although a straight naphtha or mineral spirit can be used very satisfactorily if a low flash point solution is preferred.

COMPOSITION, COLOR, ODOR, FLASH POINT AND COST OF TREATING SOLUTION

PERMATOX B prepared from the Concentrate is the same as given above for the Permatox B ready to use solution. The flash point and odor will vary according to the kind of Solvent used. Even with the use of straight Stoddard Naphtha the flash point should be well above 100°F. As in the prepared Permatox B, there will be no crystalline deposit or "bloom" on the surface of the treated stock.

Obviously the use of the 1 to 10 Concentrate means a very considerable saving in final cost. Large users of PERMATOX B CONCENTRATE find that their cost for the PERMATOX B treating solution averages only about 20¢ per gallon.

SHIPPING CLASSIFICATION

All of the Permatox oil solutions take the shipping classification, "Liquid Wood Preservative N.O.I.B.N." - 4th class.

III. APPLICATION OF PERMATOX SOLUTIONS TO MILLWORK TREATING STANDARDS.

A. METHOD OF TREATMENT OF MILLWORK

All millwork to be treated should be sanded before treatment and the sander dust blown off. This will avoid gumming of the sander and reduce the accumulation of sander dust in the treating tank.

All wood parts or assemblies, either separate or bundled, are to be completely immersed in the solution. Thorough spraying or brushing, although much better than no treatment at all, will not give the penetration required for effective and lasting protection. Penetration in wood varies with the density and texture of the wood, but in general, a minimum immersion of three minutes is recommended.

There are several types of treating equipment now in use. Probably the most practical one in which both millwork and relatively long length of lumber can be dipped is that consisting of a series of hand-operated chain hoists which pick up truck loads of sash or lumber, and carry them on a monorail to a vat about 4'x 6'x 16' in size. After a three-minute immersion the excess solution is allowed to drain from the lumber into the vat.

Another is the so-called "squirrel cage" type of vat which consists of a framework and shaft mounted in a half-cylindrical tank containing the solution. The several compartments in the revolving framework are filled with bundled sash or sash parts and revolve slowly, giving the wood an immersion period averaging three minutes. There are many variations in the size and operation of treating equipment, particularily in those operated more or less by hand. We will be glad to send further information on suitable treating equipment.

Concerning absorption, 1 gallon of treating solution will treat from 36 to 40 window sash of average size, or about 8 cubic feet of wood. After immersion, the treated sash and other wood products should be allowed to drain for about five minutes to remove the excess treating solution.

The drying time required for the Permatox solutions prepared with the fuel oil type of solvent is considerably longer than for solutions prepared with the naphtha solvents. The rate of drying, of course, depends upon the atmospheric conditions and the method of handling. Millwork treated with naphtha solutions should be allowed to dry about 12 hours before further handling, and about 48 hours of drying time should be given stock treated with fuel oil solutions.

B. PERMATOX B MEETS MILLWORK TREATMENT STANDARDS OF WESTERN PINE ASSOCIATION AND NATIONAL DOOR MANUFACTURERS' ASSOCIATION.

The standards for the preservative treatment of millwork as recommended by both the Western Pine Association and the National Door Manufacturers' Association are fully realized when PERMATOX B is used in accordance with the above recommendations, as the following points show:

1. Penetration

Penetration in wood of PERMATOX B varies considerably with the character of the wood and ranges from about 1/16" to 1/2" across the grain and from 1/2" to 4" with the grain from the end or joint line. When immersed for 3 minutes in the treating solution, Ponderosa Pine sapwood shows a penetration averaging 1/4" across the grain and 2" with the grain.

2. Absorption

Absorption also varies considerably, depending upon the character of the wood and temperature, but in general, an average minimum of .045 lbs. of dry toxic is absorbed per cubic foot of treated sapwood when the millwork is given a 3-minute immersion in PERMATOX B. This is equivalent to about 1/8 gallon of the preservative solution per cubic foot of treated sapwood.

3. Odor and Color

Millwork treated with PERMATOX B prepared with light naphtha solvents is practically odorless, while that treated with fuel oil solutions has a characteristic fuel oil odor which, however, tends to disappear after several days and is then not of sufficient intensity to be at all objectionable. PERMATOX B solution does not appreciably change the color of Ponderosa or White Pine Wood.

4. Toxicity to Fungi and Termites

As indicated above, the toxicants in PERMATOX B possess toxicities to F. P. L. #517 well within the required minimum of 0.02%. The toxicants are present in solution to a total of at least 5% of weight, and will meet the requirements for decay prevention when reduced to half-strength by volume by the addition of Stoddard Solvent and then tested by the Standard N. D. M. A. Wood Block Method.

Results of tests conducted by us in our Florida and Louisiana exposure plots, show that PERMATOX B is highly effective in preventing termite attack. Southern Pine sapwood specimens, half-buried in termite infested soil in both areas and containing as little as .4 to .6 lbs. of dry toxic per cubic foot of wood, are still practically free from both termite and decay attack after more than five years exposure. These conditions of exposure are of course, much more severe than would be given treated millwork or lumber going into ordinary building construction.

While effectiveness against decay fungi and termites is, of course, very essential, probably more replacements of untreated sash and frames are made because of the occurrence of black or blue stain. Stain fungi seem considerably more difficult to control than decay fungi and termites, and the problem is becoming increasingly important owing to air-conditioning installations with relatively high humidities and moisture condensation. PERMATOX B best combines high effectiveness against stain with permanent protection against decay.

5. Permanence

Permanence in a wood preservative depends upon two factors - volatility and solubility in water. All three chlorinated phenols used in PERMATOX B possess low volatility and solubility. The vapor pressure of all three is less than 1 mm. Hg. at 100°C. As for solubility in water, the figures for these three toxicants at 25 C. (77°F) are as follows:

	% in Solution	Parts per Million
Pentachlorphenol	0.0017	17
Tetrachlorphenol	0.0120	120
2-Chlororthophenylphenol	0.0215	215

It is apparent that these toxicants used in PERMATOX B possess those qualities which make for high permanence and long service.

6. Moisture Repellency

There is now much interest in moisture-repellent treatments for wood. During the past two years also, it has become widely accepted that no short immersion treatment will waterproof wood, but on the other hand the trade has begun to recognize that good moisture repellents will greatly minimize changes in moisture content, and resultant swelling and shrinking. The high degree of protection from swelling and shrinking during conditions of service which is afforded by a good moisture-repellent treatment is well worth the slight cost.

Most good moisture-repellents substantially increase the effectiveness of a toxic preservative. PERMATOX B CONCENTRATE is compatible with practically all commercial moisture-repellents and can be used to real advantage with them at little extra cost. The same proportions of Concentrate and moisture-repellent solutions are used as with the straight petroleum solvent.

7. Putty Adhesion

Several years' use had demonstrated that proper treatment with PERMATOX B solution prepared with light naphthas does not affect putty adhesion. On millwork treated with PERMATOX solutions using the fuel oil solvent, the putty should not be applied for at least 48 hours after treating, and requires 24 to 48 hours longer to set firmly than on untreated wood. After proper drying however, the putty bond seems to be just as firm as on untreated sash.

8. Paintability

There is now little question but that millwork treated with PERMATOX B solution is entirely satisfactory so far as the application of subsequent paint, varnish, and shellac finishes are concerned, provided that adequate drying time (at least 48 hours) is given to the treated stock prior to finishing.

9. Blooming

Since a plasticizing agent is incorporated in PERMATOX B and its CONCENTRATE, there is no objectionable blooming on the wood treated with it.

10. Effect on Metals and Lacquers

PERMATOX B solution tends to tarnish copper and brass or bronze fastenings, but does not affect the strength and serviceability of the metals themselves. Iron and aluminum are not affected by this solution. Only black or galvanized iron, however, is recommended for treating tanks or vats.

Japanned or lacquered coatings on millwork hardware may be slightly softened by the 3 minute immersion in PERMATOX B, but soon regain their original hardness upon drying.

IV. PROTECTION AGAINST SKIN IRRITATION

PERMATOX B solution may be somewhat irritating to the skin, although workmen vary greatly in their sensitivity to these materials. In many cases the petroleum solvents may be the main cause of such irritation, rather than the toxicant. As a general rule, all workmen should be kept from continued contact with these solutions. With mechanical treating equipment there is of course much less chance of irritation, but in any case, workmen who are apt to come in constant contact with the solution should wear suitable gloves and aprons. Neoprene and Neoprene-coated gauntlet gloves are the most suitable for oil solutions, and are furnished by the following firms:

American Anode, Inc.,	Akron, Ohio
Hood Rubber Company,	Watertown, Mass.
Surety Rubber Company,	Carrollton, Ohio
Continental Rubber Company,	Chicago, Illinois

The so-called "inner-tube mittens" made from discarded inner-tubes are also useful in handling the freshly-treated millwork. Suitable aprons if needed may be obtained from almost any firm handling such rubber goods.

V. USE OF PERMATOX B FOR CONTROL OF LYCTUS BEETLES IN HARDWOOD PRODUCTS

Lyctus (Powder Post) Beetles destroy annually millions of dollars worth of hardwood products, particularly those made from ash, oak, and hickory. These beetles can be effectively and economically controlled by dipping or spraying the dry wood products with PERMATOX B. A three-minute dip is recommended, altho two thorough sprayings usually prove effective in killing the larvae and adult beetles.

In Lyctus Beetle control work, PERMATOX B is also known as Lyctocide 2, and is doing an effective and economical job in the hardwood product industry.

Called again by phone 8/18/41

Mr. Blum:

Regarding telephone call from Dale Chapman yesterday, representing the A. D. Chapman Co., Chicago. He will be unable to be here Monday but expects to be back in about a week.

Mr. Loom has letter from this Company dated last March. They handle a preservative called "Dentachlortagnol" which sells for 18¢ a lb and which when mixed with petroleum makes a solution which they claim will cost about 10¢ a gallon or equal to creosote at 17¢ and fuel oil at 3¢.

The present price of creosote is 14¢ and fuel oil 2¢. Our present mixture costs only about 8¢ per gallon.

We do not appear to have any previous correspondence in our file on this material and Mr. Loom advises he knows of no tests except one in progress by the Forest Products Laboratory which has been in only about four years.

T.R.G.

St. Paul, November 24, 1941

Mr. Bernard Blum:

I am attaching a copy of my letter November 3 to Mr. Witchel, a copy of his reply of November 10, and a copy of my letter in reply to Mr. Witchel November 22, about treatment of fir cross ties.

It has seemed to me that as long as we have gone into this subject again it would be desirable to emphasize certain economic considerations because there is always the possibility that some individuals may be led into the belief that treated ties are necessarily economically justified under any and all circumstances.

I am, of course, conscious of the fact that in the troubled times of redent years it is not always easy to consistently maintain the long range outlook on maintenance costs, particularly when many current difficulties suggest following various types of expediencies. It should be possible for all concerned to resort to expedients when necessary by still maintaining rational outlook on the procedure.

L. Yager

LY:m
encl.

cc Mr. A. J. Loom

November 22, 1941

Mr. A. J. Witchel
Chief Engineer
S. P. & S. Ry. Co.
Portland, Oregon

Dear Sir:

Referring to your letter of November 10 in which you make reference to some parts of my report of October 17 to Mr. Blum about the treatment of cross ties by the Boulton and Lowry processes:

I do not desire to have the appearance of trying to over-persuade you with respect to your outlook on this subject; however, since the discussion was started and there is in our view a great disparity in the economic aspects it seems desirable to re-emphasize certain features of the discussion.

In order to dissipate the possibility that any parties might have obtained the impression that the Boulton process is a new discovery, I devoted some time to the discussion of seasoning material prior to treatment. The Boulton process is at least as old as the preservation of timber in this country. It arose because of the same urge which now in some places makes use of the process. The time element is the dominant feature in this consideration.

I desire to emphasize the fact that it is the belief, at least of that large conservative group of users of treated timber, that the utilization of the Boulton process for the advantages which that process offers is at the sacrifice of some considerable portion of the ultimate economic possibilities. The discussion of this subject for our particular purpose should of course be limited to treatment of the various species of Douglas fir and the several types of pine found in the West. The pioneers in the treatment of these woods for cross ties and other railroad purposes named roughly in the order of their length of experience are: Santa Fe, Southern Pacific, Burlington, Union Pacific, Northern Pacific, and Great Northern. The prominent users of the Boulton process for these woods are the Milwaukee and the SP&S. The record would indicate that the choice of the Boulton process was in both instances to a considerable degree influenced by the limitations of the concerns performing the treatment for their customers.

Of this group the Santa Fe is the most positive in its outlook on the subject of seasoning. Most of the other roads utilize the Boulton process for treatment of bridge timbers and other structural material because of the difficulties involved in anticipating the seasoning stock. The Santa Fe on the other hand are willing to make the necessary investment in the required seasoning stock long enough in advance to be certain to have adequately seasoned material available for treatment. They believe that the structural damage to the timber through the utilization of the Boulton process is sufficiently important to justify the elimination of that process for their requirements.

In my previous discussion of this subject I made mention of the fact that all of the so-called pioneer users in the field of treated fir have for years taken it for granted that the Boulton process does sufficiently more damage to the timber than occurs in the Lowry process to decrease the ultimate service life in some important degree, and it is for that reason they have utilized the Boulton process only when they were deprived of their normal choice. The Union Pacific makes some variation in this because of the belief that the Boulton process does have a material effect on decreasing serious checking and ultimate splitting. This phase of the case has not been completely explored. I say this because there is a great deal of evidence to suggest that the destructive checking and consequent splitting is related to inherent qualities of some Douglas fir ties as well as the climatic conditions in which the treated ties render their service. In this connection I make reference to the fact that there are recorded cases of treated Douglas fir ties which were perfectly air seasoned before treatment without showing any signs of checking whatever and after a service of 8 to 10 years in certain localities were as badly split as ties treated by the Boulton process and likewise ties treated by the Lowry process after air seasoning under unfavorable conditions which left bad seasoning checks. You saw on our several days trip many cases of badly split Boulton treated Douglas fir ties. Judgment with respect to relative difference in splitting must be based on the final influence of this feature on the ultimate service life rather than being influenced by the freedom of checks on examination immediately after the completion of the treatment. Advocates of the Boulton process appear to have been content with reciting the evidence with respect to the relative freedom of checking observed immediately after treatment.

I am not yet altogether satisfied that the Southern Pacific method of boring their ties at the time of treatment with a 5/8" hole for the subsequent installation of a bolt with two large washers is a real economic solution. I am intending to obtain more information

on this practice. I am doubtful because of the fact that checking and splitting of fir ties is quite different from the splitting of hardwood ties which can be economically salvaged through the bolting process.

For the purpose of illustrating what I have pointed to as being the important economic consideration in the treatment of cross ties, as in any way influencing the ultimate service life, I am attaching a copy of a memorandum on which I have shown certain typical calculations to illustrate the increased yearly cost for maintaining main track ties on the basis of several assumptions of average service life. It is apparent that the decrease of five years in service life is of much greater importance from the standpoint of annual cost of tie maintenance than any consideration in the difference in cost of treatment.

I believe it is essential that we keep in mind the fact that as the cost of the ties, treatment, handling, and installation of the same increase that we periodically review the economics of tie treatment. It is not necessarily a foregone conclusion that treated ties are economically justified under all conceivable cost circumstances. There has been in some instances a tendency to over-rate the importance of certain initial considerations dealing with the acquisition and treatment of ties as against the fundamental considerations of annual cost per mile for maintaining the tie account. Stated otherwise would be to say that not sufficient attention has been given to the reliability of evidence with respect to the ultimate service life of the ties. Very often difficulties in the immediate foreground have been permitted to overshadow financial considerations which mature over a period of 15 to 35 years.

I believe it proper that I should direct attention again to the rather obvious fact that the most persistent advocates of the Boulton process are related to those treating concerns which are not from the standpoint of plant capacity provided with the facilities to perform treating service on adequately air seasoned material. Opposed to that group from the standpoint of economic outlook is the representation of a considerable number of persistent users of the Lowry process over a period of more than a generation. It has seemed to me that it should be incumbent upon the advocates of the Boulton process to make a convincing demonstration concerning reliable average service life records if it really is their intention to claim that the service life of Boulton process ties is equal on the whole to that of Lowry process ties. If that is not the claim, then the matter is very much simplified because it is then possible to definitely classify the Boulton process in the area of short range view with respect to maintenance expenditure. The Boulton process then is definitely classified with the outlook which has heretofore justified the utilization of zinc treated

ties with the important exception that the Boulton process as a rule is more expensive then the Lowry process and therefore results in higher annual cost per unit than the zinc treated ties.

Summing up the intent of the foregoing discussion would be to say that I have been endeavoring to make the point that it is incumbent upon the advocates of the Boulton process to demonstrate the economic justification of that process for treatment of Douglas fir ties in the area in which that timber is used for cross tie purposes and the historical situation at least has not yet placed the advocates of the Lowry process on the defensive. I am under the impression that many maintenance men have failed to fully comprehend the significance of sustaining a high average service life for treated ties. The importance of this phase of maintenance cost, I believe, is illustrated by the economic comparison set up in the memorandum attached.

Yours very truly,

L. YAGER

LY:m
encl.

MEMORANDUM

Elements of cost involved in determining the annual cost for ties in main tracks as influenced by the average service life of treated Inland Douglas Fir Cross Ties. Ties Treated at Hillyard, Wash.

1.	Cost #5 7"x9"x8'6" tie 44.625 FBM @ $17		$ .76
2.	Plant cost treatment 10.75¢ cu.ft. $8.96 per M.		.40
3.	Creosote per gallon		.15
4.	" haul, St. Paul to Hillyard @ 3 mills per T.M.		.0209
5.	Fuel oil per gallon		.0210
6.	" " haul, Tacoma - Hillyard @ 3 mills		.0048
7.	Preservative mixture creosote 45% Crude Oil	55%	
8.	Preservative cost 45-55 per M FBM 7# retention		6.29
9.	Cylinder seasoning 2¢ per cu ft $1.67 per M.		

SUMMARY COST

1.	Cost #5 tie @ $17 per M.	$ .76
2.	" plant treatment	.40
3.	" preservatives @ $6.29 per M.	.28
4.	" handling and placement	.40
5.	Total cost tie in place	$1.84

1.	Cost per year at 25 year average life	$ .0736
2.	" " " " 20 " " "	$ .0920
3.	" " " " 15 " " "	$ .1226

COSTS PER 1000 MILE MAIN TRACK PER YEAR

1.	25 year life	3000 x $.0736 x 1000	$220,000 per year
2.	20 " "	3000 x $.0920 x 1000	$276,000 " "
3.	15 " "	3000 x $.1216 x 1000	$364,000 " "

Increased cost per year due to 5 year change in average service life.

1. Decrease from 25 to 20 years $276,000 - $220,000 = $54,000 per year.

2. Decrease from 20 to 15 years $364,800 - $276,000 = $88,800 per year.

Asst. Chief Engineer
St. Paul, Minnesota
November 22, 1941

SP&S RY CO

Portland, Nov. 10, 1941

Mr. L. Yager
Asst. Ch. Engr.
N. P. Ry. Co.
St. Paul, Minn.

Dear Sir:

Your letter October 17 to Mr. Blum about the seasoning of ties:

I believe you expressed the situation very appropriately when you stated, last paragraph, page 5 of your letter, that, "the information is not sufficiently specific or otherwise to warrant anyone making any dogmatic conclusions." On our recent trip over the SP&S and over the Vancouver-Kelso section of the N.P. some of the things we saw seemed to me to be quite contradictory.

I am inclined to believe the Southern Pacific may be adopting the right course in boring their ties for a 5/8" bolt used with a large washer, I presume in place of the usual "S" or other irons. The latter are not always effective, the bolts entirely through the tie, I believe, would be more effective.

Should conclusions be reached that would require the SP&S to adopt the air seasoning method, the matter will have to have careful study as the St. Helens plant has no available ground for storing large numbers of ties for seasoning.

Yours truly,

(Signed) A. J. WITCHEL

Chief Engineer

COPY

November 3, 1941

Mr. A. J. Witchel
Chief Engineer
S P & S Ry. Co.
Portland, Oregon

Dear Sir:

I am attaching a copy of my letter of October 17 to Mr. Blum reporting on the results of the investigation of the probable comparative life of Douglas fir cross ties treated by the Boulton and Lowry processes, as based largely on evidence developed during inspection of the SP&S track about a month ago. I previously sent you copies of correspondence exchanged with the Southern Pacific outlining their views on seasoning ties in the treating cylinders.

I am now attaching a copy of my letter of October 5 to Mr. Prater, Chief Engineer of the Union Pacific, and a copy of his reply of October 28. It is clear from Mr. Prater's reply that the Union Pacific are likewise convinced that the best results are obtained from the treatment of adequately air seasoned ties.

The Union Pacific are also concerned with the issue of serious checking of Douglas fir ties and believe that this situation can to some considerable degree be minimized through utilization of the Boulton process. It is a fact, of course, that air seasoned ties start out with what appears to some to be a handicap of considerable checking due to seasoning; however, these seasoning checks are penetrated with preservative which in many cases forms a reservoir for follow-up penetration after the checks become deeper through seasoning after treatment. The Boulton processed ties do eventually suffer a considerable amount of checking and some to the extent of splitting the ties into two pieces. That statement is confirmed by our observations on the three main line districts of the SP&S. The checking of Bouleton treated ties after treatment naturally exposes untreated wood to the attack of destructive fungi.

The seasoning conditions at Dells, Oregon, Hillyard, Washington, and Paradise, Montana are unfavorable because of too rapid seasoning during certain months of the year so that the best results can be obtained as outlined by Mr. Prater through treating immediately after seasoning for sixty to ninety days.

The issue of average service life of ties is an important one from the standpoint of economics. In order to disclose some relative values I shall quote some representative figures based on current NP price levels for, say, 1000 miles of main track using #5 Douglas fir cross ties treated by the Lowry process:

Over an extended period of years the reduction of average life from 25 years to 15 years would mean an increased cost for ties of $145,500 per year; similarly reduction from 25 years to 20 years would increase the cost $54,600. A reduction from 20 years to 15 years would mean an increased cost of $91,200 per year. SP&S costs would show a similar trend although at somewhat higher levels because of the somewhat greater cost of SP&S treated ties.

Yours very truly,

LY:m
encl.

Cy BB
ALL 11/24

Saint Paul, November 1, 941

MR. H. E. STEVENS:

We have discussed several times, both in conversation and by letter, the question of treating ties under the Lowry method - which calls for air seasoning - and under the Boulton method - in which the seasoning is done in the cylinders through heat pressure and vacuum. Our discussions have related particularly to the practice on the SP&S Railway.

Mr. Yager informs me that on his trip over the line this summer Mr. Denney raised the question when they were at Seattle. It was brought out that it was inconsistent to have air-seasoning on the Northern Pacific and treat green timber on the SP&S. He suggested that Mr. Yager check into the comparative results of the treatments on the two railways.

Mr. Yager went over the SP&S by motor car with Messrs. Mitchel, Ashworth, and the roadmasters, on his recent two trips; and I am attaching in duplicate copy of his report of October 17. A summary of his report is as follows:

1. Based on National Pole & Treating Co. charges at Hillyard plant, Lowry process ties cost 3½¢ less than under the Boulton process. Under the Lowry method ties are less subject to shatter in cylinders and are there for an average of 10 hours compared with 26 hours under the Boulton process, and greater heat and pressure are exerted under the Boulton process.

2. Most of the checking of ties that are seasoned occurs before treatment, and the preservative penetrates into the checks; while ties treated green under the Boulton process check largely after treatment, exposing the untreated wood to the elements.

3. While true that Lowry process ties occasionally check after treatment their observation indicates that there was no decay from this cause in ties less than 20 years old; while many ties treated under the Boulton method were observed to be decaying in 10 years after treatment. They estimate the life of fir ties treated under the Lowry process at 20-25 years, compared to 15-20 years under the Boulton method.

4. The Milwaukee on lines west of Mobridge use fir ties treated by the

West Coast Wood Preserving Co. under the Boulton process. They are not equipped to air-season ties for that railway. The Southern Pacific, Santa Fe, and Burlington air-season ties before treatment.

In these studies it is shown that ties treated under the Boulton method cost 3½¢ more than under the Lowry process. That difference does not apply under our contract with the West Coast Wood Preserving Co. at their Seattle plant, as in that contract we pay the same price for either process, the reason being that at the time the contract was made they had a surplus of cylinder time, whereas now there is such demand for treating timbers that there is a difference in the price.

Some months ago, while in Portland, I discussed this subject with Mr. Witchel. At that time he used as an argument that the Union Pacific had recently changed at the Dalles plant from air-seasoning to cylinder seasoning. I mentioned that to Mr. Yager, and he wrote to Mr. Prater that on the Northern Pacific we were of the opinion that the longest service life could be obtained through treatment of ties after complete air-seasoning, but that by reason of deliveries we have at times resorted to treating ties partially seasoned, and in extreme cases treating them green, and asking Mr. Prater what the Union Pacific were doing at the Dalles plant. Mr. Prater's reply of October 28 is attached; from which you will note that his opinion and Union Pacific practice is quite similar to ours - and the fact that they have treated non-air-seasoned ties at the Dalles is on account of lack of time before the ties are needed in track, or on account of non-delivery of green stock in the early fall and winter months. I think it fair to say that Mr. Prater's reply confirms our views.

As Mr. Yager points out, either method does result in over-all economies, but the investigation confirms the desirability of complete air-seasoning if possible in order to produce the greatest economies.

bb/s
2x
encl.

Fir ties, Lowry & Boulton processes.

Lowry process ties cost 3/4 cents less in first cost, are less subject to shattering in the cylinders as they are there for an average of 10 hours compared with 26 hours for Boulton ties.

Lowry ties check before treatment & the preservative penetrates the checks while Boulton ties check after treatment, exposing the untreated wood to the elements.

Lowry ties sometimes check after treatment but no decay from this cause observed in ties less than 20 years old, many 10 year Boulton ties observed to be decaying.

Life of Lowry ties estimated 20 to 25 years, Boulton Ties 15 to 20 years.

Milwaukee use Boulton ties, coal of Mobridge are satisfied with them. All their Boulton ties come from N. Coast Preserving Co. who are not equipped to do air season ties for that railway.

(G.N. may have changed from Lowry to Boulton process S.P, A.T.&S.F, & C.B.&Q all air season.

Note-: We pay the N. Coast Co. same price for either Boulton or Lowry process, this because they had surplus cylinder time when we made our contract with them.

St. Paul, October 30, 1941

Mr. Bernard Blum:

In my letter of ~~October 17th~~ ? to you about examination of treated ties on the S. P. & S. I made some references to the Union Pacific practice of tie treatment.

I am now attaching hereto copy of my airmail letter to Chief Engineer Prater of October 5th, and copy of his reply of October 28th.

I believe it correct to say that the Union Pacific outlook with respect to this is essentially the same as our own. We have always approved the desirability of treating ties as soon as a certain stage of seasoning has been reached. We have not been able to do this for a number of quite obvious reasons and that explains why we have had some difficulties in the past with extensive seasoning checks. This is more particularly related to such unfavorable seasonal locations as Paradise and Hillyard.

L. Yager

LY:P
enc.

Spokane, Washington
October 5, 1941

AIR MAIL

Mr. B. H. Prater
Chief Engineer
Union Pacific Railroad
Omaha, Nebraska

Dear Sir:

The last six weeks I have been spending considerable time off and on in the West endeavoring to collect information having a bearing on the relative economic results as determined by the service life of ties between the treatment of ties after complete air seasoning or the Boulton process which, as you know, seasons the ties in the treating cylinders by means of heat and a high vacuum.

We have all down through the years been of the firm conviction that the longest service life could be obtained through the treatment of our ties after a complete air seasoning; however, by reason of slow deliveries we have had to resort to treating ties partially seasoned, and in some extreme cases treating ties green. I find that the Boulton process has some very persistent advocates in the Pacific Northwest country, notably the Milwaukee and the SP&S. This has some obvious advantages. The issue is not one of success or failure but rather which method under the particular set of circumstances produces the best economic results.

I have been informed that the Union Pacific have in recent years been utilizing the Boulton process in the treatment of cross ties at the Dalles plant. My purpose in writing you at this time is to inquire whether you can consistently furnish me with information as to your treating practice at the Dalles. I would be interested in knowing when you changed to the Boulton process and for what reasons. I would likewise be interested in knowing what you do in this respect at your other treating plants.

Yours very truly,

LY:m

St. Paul, October 17, 1941

Mr. Bernard Blum:

During the past month I have devoted considerable time in the endeavor to develop information dealing with the issue as to cross tie treatment as between treating ties after thoroughly air seasoning and treating ties after artificial seasoning in the treating cylinders.

Perhaps it will be well to state at the outset that the issue is not one of determining which of the two processes may be a success or a failure. It is clear that both processes may be regarded as being successful methods. The issue is to determine which method best meets the needs under any particular set of physical and financial circumstances. In short, this is one of the economic problems of ascertaining whether the short range or long range viewpoint is best suited to any set of individual circumstances. For the sake of convenience and simplification I shall designate the artificial seasoning method as the Boulton process and the treatment after adequate seasoning as the Lowry process. The Lowry process is the one we have used consistently ever since we began treatment 33 years ago. We have been consistent advocates of the Lowry process because of a conviction that the orthodox method followed by all conservative treating experts provided the most desirable results from the NP standpoint.

The Boulton process originated in England many years ago in response to the necessity in some instances of reducing the time required to air season ties, lumber, and timber. It may be stated that the air seasoning requires the material to be on hand in the neighborhood of 9 to 12 months depending upon the climatic conditions. This long period of stocking material requires planning well ahead and sometimes involves financial complications. The same situation arises in the utilization of lumber and timber where treated material is required or where seasoned material is necessary for various construction purposes. Years ago all such material had to be air seasoned and at times under cover. That led to the development of the dry kiln process which in recent years has been developed through temperature and humidity gradient control so that successful seasoning can be performed on commercial lumber in 3 to 4 days time.

The Boulton process consists of boiling the green ties in the preservatives under a high vacuum at designated maximum temperatures for the purpose of extracting the natural timber moisture to a depth to permit the injection of the required amount of preservative retention. This boiling period varies from a minimum of 16 hours to a maximum under exceptional cases of around 60 hours. The usual maximum of Douglas fir on the coast has been 36 hours. After the designated moisture reduction has been made the preservative is injected through pressure and the application of heat.

The treatment of timber against decay through any process which utilizes temperatures and pressures unavoidably damages the wood fibres as demonstrated by the reduction in physical properties of the treated timber as compared to untreated timber. Fortunately the reduction in these physical properties can be maintained within endurable limits through treatment below the well demonstrated critical temperatures and pressure limits. It is a well acknowledged fact that exposure of timber to temperatures and pressures within the endurable limits brings about cumulative damage effect with the increase in the time that the timber is in the treating cylinders exposed to heat and pressures. It is for this reason that the Lowry process we believe has a decided advantage over the Boulton process in that in the Lowry process the cylinder time is between 7 and 12 hours or, say, an average of 10 hours, where in the Boulton process in treatment of Douglas fir, 16 to 36 hours or average, say, 26 hours, or 2-1/2 times the Lowry process average interval. It is this item of treatment procedure which we believe accounts for the difference in average service life of ties treated by the two processes.

Anyone who has had any extended contact with the treatment of timber by these two processes has seen examples of ruined timber through the application of excessive temperature or excessive pressure or a combination of both above the well defined critical limits. These cases show up in the form of shattered timber in variable degrees, i.e. beginning with individual cracks to the ultimate which is a complete shattering of the timber so that it has no structural values whatever. When I make this statement I desire to have it clearly understood that this abuse is not limited to the Boulton process. It may occur through a mistake or otherwise in either one of the processes. It is alleged that it occurs more frequently in the Boulton process because of the temptation of the treating concern to shorten the time that the timber must be in the cylinders and thus increase production of the plant. This situation clearly indicates the necessity for faithful and persistent inspection of the treating process

which is not always developed where it is necessary to contract the inspection service to some inspection bureau.

The Boulton process makes a great appeal in some situations where seasoning facilities are not available or the Railway Company does not for one of several reasons desire or is not in a position to acquire ties approximately a year in advance of their utilization in the track for the purpose of treating by means of the Lowry process and is content with the average life produced by the Boulton treated ties. We have here a problem in economics. For the purpose of suggesting the principal elements of that problem I am attaching a copy of a memorandum dated Oct. 5, 1941 showing the comparative cost of treating a representative #5 Douglas fir tie by the Lowry and Boulton processes. The assumptions made in this comparative setup are indicated in the six notes. This comparison shows that the Boulton process costs 3-1/4¢ per tie more than the Lowry process, or an increase of approximately 2%. In this comparison I found it necessary to use the price schedule for the two processes set up by the National Pole & Treating Co. at Hillyard. I was not able to use the price structure of the St. Helens plant because they are not in position to use the Lowry process because of lacking seasoning storage facilities and the SP&S has not equipped itself with facilities to store and season ties so that the Boulton process is the only one available at the St. Helens plant. The SP&S have treated ties by means of the Boulton process at the St. Helens plant since about 1927.

The difference in treating cost between these two processes at Hillyard amounting to 2¢ per cft. is fairly representative of what the treating industry regards as the difference in price that they should receive for utilizing their plant to treat ties. Stated otherwise would be to say that the treating company is selling cylinder time and adjusts the price proportionately on that consideration. While that difference generally prevails throughout the treating industry, it is a fact that there are some notable exceptions and one in which we are concerned. In our contract with the West Coast Wood Preserving Co. at Seattle we pay the same price, namely $6.25 per thousand FBM, for treating either seasoned or green ties. This situation came about because at the time the contract was made this company had an excess of treating capacity for which they could not find business and they could afford by reason of plant considerations to make the same price for the two processes.

The really important evidence in passing judgment as to the utilization of either one or the other of these two processes depends upon reliable data with respect to the service life of the ties. It is particularly difficult to obtain reliable data on a

mass basis so that years ago we decided to inaugurate an extensive series of test tracks which could be observed in the necessary detail required to obtain convincing service life results. It may now seem unfortunate that we did not a quarter of a century ago make a test track utilizing Boulton treated ties because we would then have available specific data which would furnish a convincing conclusion. Our predecessors in all probability did not think it necessary to provide such a test track because of their adherence to the orthodox outlook and the belief that such a test track would merely demonstrate the obvious.

In the belief that at least some evidence could be secured through an examination of the SP&S experience as compared with our own in similar climatic conditions and relatively the same traffic circumstances I devoted a day each to each one of the main lines districts of the SP&S accompanied by Messrs. Witchel, Ashworth and Loom, and the district roadmasters. After reaching Spokane we decided to go back over a portion of the first district accompanied by Mr. Robinson, the engineer in charge of the inspection of GN treatment at Hillyard. It is a rather fortunate circumstance that the SP&S used dating nails in all their tie renewals for the period 1926 to 1931 inclusive. That made it possible to obtain some rather convincing data which would otherwise have been too much clouded by uncertainties to be of convincing value.

The first group of treated ties examined was a considerable storage pile of ties treated at St. Helens and unloaded in May and exposed to the summer drying effect until we examined them the latter part of September. These ties were unexpectedly clean and free of seasoning checks. Other piles smaller in size during the succeeding days showed in some instances cylinder checks due to excessive heat or pressures and others showed extensive checks exposing untreated timber due to the escape of interior moisture of the tie.

On the first and second districts, and more particularly the latter, we found a considerable number of treated ties 1928 to 1931 inclusive showing bad shattering at the ends. While it is not easy to definitely distinguish between shattering caused by treating abuse or caused by physical shattering due to passing wheel loads, we were quite certain that most of these cases represented treating abuse. These ties quite certainly all came from the St.Helens plant. I make this statement because while it is not possible at this time to certainly define the limits where St. Helens ties were used, it is quite clear that in general the St. Helens ties were devoted to the first and second districts with possibly a few being sent to the third district. On the other hand ties

treated at Hillyard were largely confined to the third district with some few having been sent to the second district. The treatment of SP&S ties at Hillyard was mixed as between Boulton and Lowry processes in the years 1931 and 1932. In 1933 and later all ties were treated by the Boulton process. All ties treated at Hillyard were on the basis of 6 lbs. per c.ft. retention of creosote-crude oil mixture.

We found a considerable number of treated ties 1928 - 1931 inclusive on the first and second districts which showed unmistakable evidence of decay underneath the tie plate originating in seasoning checks subsequent to treatment which permitted the entrance of destructive fungus. All fir ties are more or less subject to checking and splitting. In the Lowry process these seasoning checks are penetrated with preservative whereas in the Boulton process the subsequent seasoning checks immediately expose untreated timber. NP Lowry process treated ties show similar decay under the tie plate originating in subsequent seasoning checks but in no place have we ever observed such decay basis short of 20 year service life as distinguished from these cases occurring in the SP&S Boulton treated ties in 10 to 11 years. This difference will obviously make for a difference in average service life for the ties treated by the two processes.

The problem is to determine how much the results of these observations promise to decrease the average service life of the Boulton treated ties as compared with the Lowry process treated ties. I do not believe it will serve any useful purpose to extend the recital of the observations on the SP&S. We have sent 8 or 10 representative ties to Brainerd for more detailed examination. Obviously the information is not sufficiently specific or otherwise to warrant anyone making any dogmatic conclusions. I am, however, personally convinced that the trend of the observations made warrants at least a tentative conclusion that the situation may be reliably set forth by stating that the probable average life of the Douglas fir treated ties by the Boulton process is in the range 15 to 20 years as against the Lowry process being a range of 20 to 25 years, making for an approximate spread of 5 years in service life. In view of the foregoing tentative conclusion which is a confirmation of experience and judgment reported by others in this field, we may conclude that the Lowry process is justified from the standpoint of the long range outlook. The Boulton process then would be more consistently related to the shorter outlook. Stated in other words would be to say that it is more closely associated with the outlook which justifies the use of zinc treated ties having an average life of, say, 12 years. The zinc ties having an average life of 12 years are still economically justified against the use of the same ties untreated with an average life of something less than 8 years.

Douglas fir ties by reason of certain physical characteristics are not suitable for the very heavy density traffic lines of the East utilizing rock ballast. These ties, however, provide an adequate service life for traffic density and physical conditions represented by the NP. It is very essential, however, in order to obtain the maximum service life of treated Douglas fir ties that they be adequately protected against initial damage in the treatment process. We believe we are correct in our conclusions based on observations that the unavoidably longer cylinder time of the Boulton process does noticeably affect an increase in the fibre destruction under the tie plates. A large percentage of fir ties is renewed because of deep plate cutting. This cutting with only a few exceptions represents attrition of wood fibre and the shattering of fibres below to a depth that results in a matted mass of fibres causing a depression of the plate of possibly as much as 3/8" under load.

I make this statement to correct possibly a general impression that deep tie cutting indicates decayed wood under the tie plate. The Boulton process has been used in the past for hardwood ties as well as ties of the softwood varieties. The difference in treating results is a matter of degree. The Boulton treatment applied to softwood Douglas fir has been more successful, largely because of the normal lower moisture content in the fir ties. We have known of examples of treating hardwood ties through treating processes in which the seasoning was severely expedited through special means which gave disastrous tie service life results. We have in the past endeavored to insist that our hardwood ties be adequately seasoned before treatment. We have not always been able to follow out our convictions in this respect.

In the 33 years of tie treatment we have not been able to consistently follow our convictions as to the desirability of thoroughly seasoning all ties before treatment. This has come about because of the variable differences resulting from a number of causes preventing the complete seasoning of our tie stock. I would say that for about one-half of the 33 year period we have had to treat ties in variable stages of seasoning. During the treatment of ties for the renewal season of 1940 and 1941 we had to treat a considerable percentage of all ties inadequately seasoned. This situation will be even more extended for the renewal season of 1942 because it will be necessary to treat a considerable number of green ties for the Tacoma Division.

Some five or six years ago we persuaded the Purchasing Department to continue in the market for acquiring cross ties after the filling of annual requisitions and anticipating the succeeding years requisitions for the purpose of making certain that ties would be

accumulated in sufficient quantities to obtain the minimum seasoning before treatment. This worked out quite successfully but it did inflate the M & S tie account and was therefore abandoned in the fall of 1939. Since that time there have been developed some acute situations which have interfered seriously with the delivery of ties in time to obtain adequate seasoning.

Possibly it would be worthwhile at this point to make some reference to the financial aspects dealing with the procurement of cross ties in sufficient time in advance to certainly insure adequate seasoning. The schedule which I made up for seasoning stock tie delivery for the renewal season of 1940 as covered by my report of Dec. 26, 1939 disclosed a weighted average time of ties in seasoning stock of 10 months. The delivery of ties began the first of February and ended in August. It has never in the past been possible to acquire ties during that limited period because it does not provide sufficient leeway to meet the varying changes in the tie production industry.

The investment in ties to the amount of 1,200,000 ties at the prices prevailing a year ago represented an investment of about $820,000. The M & S account would be at this maximum figure for only a few months in case the ties could actually be delivered on the minimum seasoning schedule previously mentioned. The interest rate at 5% on $820,000 represents $41,000 per year. If we should begin to acquire the ties six months earlier the interest charge would be increased $20,000 and similarly in nine months $30,000.

We together with other users of fir ties have considerable difficulty with severe checking and ultimate splitting. Observations indicate quite a variation in this phase of service life and likewise in some features of tie life being affected by decay. Unfortunately we are not able to determine to what extent this situation may be influenced by the fact that we have had in the past to treat ties with variable degrees of seasoning.

I find that the C.M.St.P. & P. started to use treated ties in 1927 on the lines west of Mobridge. These ties were all treated by the West Coast Wood Preserving Co. by means of the Boulton process because of the fact that the treating concern was not in a position to season ties. The Milwaukee have apparently been quite well satisfied with their practice. The Southern Pacific insist on adequately seasoning their ties whereever possible. They have, however, been confronted with the same situation that I have recited in our experience of having to

treat partially seasoned ties because they could not be acquired in time for proper seasoning. The Santa Fe are so insistent on adequate air seasoning that they are willing to go to the extreme of acquiring a full supply of ties for treating season in advance. I was informed that the Union Pacific had in recent years changed from the Lowry process to the Boulton process. I am endeavoring to obtain confirmation of this from Mr. Prater, Chief Engineer of the Union Pacific.

The CB&Q obtained some Douglas fir ties in the Puget Sound territory. In my discussion of this subject with Mr. H. R. Duncan, in charge of timber preservation of the Burlington, I find that they insist on adequate air seasoning before treatment and he confirms our views that all ties should be treated at the proper time to avoid the destructive effects of excessive seasoning.

W. Sayers

LY:m
encl.


OCT
1971

MEMORANDUM

Approximate comparative cost of cross tie treatment as between Boulton and Lowry process. (a) Lowry process assumed to cover treatment of completely air season tie timber, (b) Boulton process consists of seasoning ties in the treating cylinders through boiling under vacuum.

	Lowry	Boulton	Difference
1. Cost of #5 7x9 8'6" Douglas Fir	$ .85	$ .85	$ ---
2. Interest charge @ 5% on tie value 1 year	.0425	---	x.0425
3. Cost of Treatment #9.86 - $1.67 per M	.4100	.485	-.0750
4. Cost of Preservatives	.321	.321	---
5. Total Cost	$ 1.6235	$ 1.656	$ x .0325
6. Difference %			2%

Note 1 -- Douglas Fir estimated to cost $19.00 per M.

Note 2 -- Treatment Costs are those charged by National Pole & Treating Co. at Hillyard, Wash. under current N. P. contract.

Note 3 -- Preservatives figured at: Creosote 15¢ per gallon; crude oil $.021 per gallon, plus home line freight charges at 3 mills per ton mile; mixture 45-55%. Retention 8# per cu. ft.

Note 4 -- Assumed that in Boulton process green ties could be delivered regularly to handle green ties from cars through plant and return treated ties into same cars for shipment.

Note 5 -- Cylinder time Lowry process 7 to 12 hours. Cylinder time Boulton process 16 to 36 hours.

Note 6 -- Current contract rate N. P. contract with West Coast Wood Preserving Co. provides rate for treatment of $6.25 per M for both Lowry and Boulton process.

Asst. Chief Engineer
On Line: Spokane, Wash.
October 5, 1941

7939

At Centralia, Wash.,
August 15, 1941g

Mr. L. Yager:

Your letter of the 11th about inspection trip over the line.

Would appreciate being advised of your itinerary when it is prepared. Superintendents will, if possible, accompany you - if this is not possible, Division Roadmasters will do so.

cc - Mr. Bernard Blum

CHIEF ENGINEER
AUG 18 1941
MONTREAL

7939

MEMORANDUM

Mandan, August 12, 1941

Mr. Bernard Blum:

I am attaching a copy of my joint letter to Messrs. Sloan and Judson about the trip which I am planning in connection with obtaining information on probable future annual tie renewal requirements.

encl.

L. YAGER

B





CHIEF ENGINEER
AUG
15
1941
LOWER PASS. DIV.

Train 1 - St. Paul Division
August 11, 1941

Mr. W. C. Sloan

Mr. W. W. Judson

We are having increasing difficulty in making reliable predictions for our yearly tie renewals, i.e. for the seasoning stock which must be purchased nearly two years in advance of the time that the ties are inserted in track. Our predictions based on the renewal statistics of the past ten or fifteen years have been quite close from the standpoint of total tie renewals but badly off from the standpoint of distribution, i.e. by treating plants and also by grades. One can not take any comfort in being right by accident as to the total number of ties required.

Our difficulties in making reliable predictions arise from the fact that the renewal statistics are not now an adequate guide because as a practical matter it was impossible to make proper allowance for the influence of drastic tie renewal deferments in some districts during the depression. It is also out of the question to make allowance for the effect of a large number of treated ties coming up for attention for which the service life was greatly shortened by reason of inadequate tie plate protection.

It is essential that we make the best possible prediction for the purchase of seasoning stock in order in the first place to have the proper number of ties of the different grades available when required, and in the second place to avoid accumulating excessive stocks a long period in advance of their actual requirements. It has seemed to me that about the only way we can make certain to have a reasonable outlook on the tie renewal requirements is to make a personal inspection and resort to a sort of assay method of inspection of typical track sections to determine the probable renewal requirements for a period of five or six years in advance. It is also the intention to obtain first-hand information on the economic feasibility of substituting a larger number of Grade 3 for Grade 4 treated softwood ties for secondary tracks. I have had in mind covering all of the main line districts for this purpose sometime during the current summer and next fall. It is the intention to spend about two days on each main line district. Examination of branch lines will be made for the same

purposes at the first convenient opportunity.

I am assuming that you would be agreeable to have the Superintendents accompany me on such trips in the event that the arrangements can be made for a mutually agreeable time for the inspection. I want to make it clear that there is no intention to make this a trip with any improper motives in the way of objectionable criticisms of track conditions.

LY:m

L. YAGER

3659

St. Paul, Minn.,
March 10, 1941

Mr. E. M. Willis:

Replying to your letter of the 7th inst., file 329-85, in regard to data requested by the Forest Products Committee of the Purchases and Stores Division of the A.A.R.

The following are replies to the three questions in order:

1. In storing ties for seasoning, ties are separated as to grades and woods and cross-piled on treated sills in accordance with our standard plan, a copy of which is attached herewith.

2. All handling is done by piece work tie handlers.

3. Ties are unloaded from tram cars immediately after treatment and loaded in stock cars, rough box cars or Gons and shipped directly to points where ties are to be used usually at least 30 days in advance of the renewal season, depending on months of the year that the plants are being operated. A small percentage of treated ties are usually stored at the plants to meet requirements for filling emergency or supplementary requisitions during periods when the plants are not operating.

TRG:k

Chief Engineer

Brainerd, Minn., March 8th, 1941.

Mr. Bernard Blum:

With return of Mr. Willis' letter of March 7th and in compliance with yours of the same date, the following data is submitted as information requested by Purchasing and Stores Division of the A.A.R. about ties at our own treating plants.

1. In storing ties for seasoning, ties are separated as to grades and woods and cross-piled on treated sills in accordance with our Standard plan, a copy of which is attached herewith.

2. All handling is done by piece work tie handlers.

3. Ties are unloaded from tram cars immediately after treatment and loaded in stock cars, rough box cars or Gons and shipped directly to points where ties are to be used usually at least 30 days in advance of the renewal season, depending on months of the year that the plants are being operated. A small percentage of treated ties are usually stored at the plants to meet requirements for filling emergency or supplementary requisitions during periods when the plants are not operating.

AJL/HB

Gen'l. Supt. Tbr. Preservation.

OFFICE OF
CHIEF ENGINEER
MAR
8 9 1
1941
NOR. PAC. RY.
ST. PAUL, MINN.

3659

St. Paul, Minn.,
March 7, 1941

Mr. A. J. Loom:

I am attaching letter from Purchasing Agent of the 7th inst., file 329-85, in regard to data requested by the Forest Products Committee of the Purchases and Stores Division of the A.A.R.

Will you please draft reply to these questions.

TRG:k

att.

Chief Engineer

St. Paul, Minnesota

March 7, 1941

File 329-S5

Mr. Bernard Blum,
Chief Engineer.

The Forest Products Committee of the Purchases and Stores Division of the A.A.R. is collecting some information about the handling, storage and care of lumber products, and have submitted the following questions with respect to ties:

"In storing ties, what method is followed in separating ties for seasoning?"

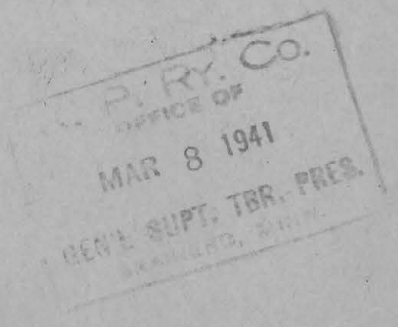
"Are all handlings by manual labor, or do you employ mechanical devices in the loading or unloading of ties?"

"What method do you use in distributing treated ties from the plant to points where ties are to be used?"

I would appreciate your furnishing me with the information requested in these three items.

EMW/rw


CHIEF ENGINEER
MAR 7 1941
NOR. PAC. RY.


P. RY. CO.
OFFICE OF
MAR 8 1941
GEN'L SUPT. TBR. PRES.

3659

Brainerd, Minn., Feb. 8th, 1941.

Mr. Bernard Blum:

Referring to our recent conversation and your letter of Decmmber 26th about Mr. James R. Helson's new patented process for the preservative treatment of green wood.

On my trip to Louisville this week attending the A.W.P.A. annual convention, Mr. Helson explained his process to me and showed me borings from several kinds of timber including Fir that indicated unusually good penetration of creosote with his method, which is essentially as follows:

The charge of ties is submerged in oil, the valves all closed and temperature of the oil raised to 240° F. and held at this temperature for about 6 hours. This heat results in a gauge pressure of about 10 pounds. Oil valves are then opened and the oil blown out with air. Care is taken to maintain a pressure of not less than the original 10 pounds during the blow back. As soon as the cylinder has been drained a quick vacuum of about 22 inches is applied. By this time the moisture in the ties is said to have turned into steam which when the pressure is released and vacuum applied fairly explodes the moisture out of the wood. The moisture and lighter fractions of the oil are drawn through condensers where the actual water content can be measured and subsequently separated from the oil. When the required moisture content has been removed the charge is again submerged in oil and treatment completed by any of the usual pressure methods.

Mr. Helson has not yet been able to sell his proposition to anyone but claims to have had many offers from companies who would buy his patent outright. This he refuses to do so all of his treatment with this process has been more or less experimental.

He was quite doubtful as to what results he would have with green frozen hardwoods such as we have at Brainerd during the winter months, but thinks with a longer heating period he could treat these ties without any damage to the wood. He claims no checking takes place during treatment and with their low moisture content and almost complete penetration there would be no harmful checking of ties after treatment such as he claims connot be avoided by the usual boiling under vacuum method used on the coast.

We are not equipped with either air compressors or condensers at our own plants so to use Mr. Helson's process he thinks we would have to install these facilities at an estimated cost of around $15,000.00 at each plant to obtain best results. He stated that in his opinion he could greatly improve on our present results without installing additional equipment if we would give him a chance to show us what he can do.

Will talk this over with you at the first opportunity.

Gen'l. Supt. Tbr. Preservn.

CC-Mr. Lowry Smith.

OFFICE OF
CHIEF ENGINEER
FEB
3 1941
NOR. PAC. RY.
ST. PAUL, MINN.

3659

Saint Paul, December 26,1940

MR. A. J. LOOM:

I had a call today from James R. Nelson, of Metropolis, Ill., who is engaged in timber treatment.

He informed me that he has a patent on a modification of timber treatment wherein he can treat green timber in 12-13 hours in cylinders, starting at 240°, and eliminate the moisture in the interior of the tie to the extent of about 90 per cent of that obtained by air-seasoning - at the same time of course drying the outside cells so that he can get any normal treatment that we may require.

He showed me some increment borings of Southern Yellow Pine, indicating penetration of three to four inches, which he claimed was accomplished under his system.

What he is after is to license us to use his method in our Paradise and Brainerd plants, and talked of a royalty of 25 cents per M'BM. I told him that I would have you get in touch with him and discuss his system during the February convention of the Wood Preservers' Association in Louisville. Will you please do so; and let me have a report to cover?

cc-Mr. Lowry Smith

bh/s

Jas R Elson

Metropolis

Ill

N. P. 1386 12-24

TELEGRAM—BE BRIEF

TIME FILED 3659 M.

4 PD W

PARADISE DEC 8 1940

BERNARD BLUM BUSINESS CAR 5

SPOKANE

EXPECT TO LEAVE PARADISE FOR BRAINERD ON TRAIN TWO TOMORROW

A J LOOM

157 PM

3659

Brainerd, Minn., Oct. 14th, 1940.

Mr. P. H. McGauley,
Gen'l Supt. Transportation,
St. Paul, Minn.

Brainerd Tie Plant will be opened to start treatment and delivery of next year's renewal ties on Wednesday, October 16th.

The usual empties, switching service and coal will be needed and the daily requirements are being arranged for with local division forces.

Opening dates for Paradise, Millyard and Seattle have not yet been definitely set, but it seems safe to say that none of these plants will start their regular treating programs before December 1st.

Your usual co-oreration will be appreciated.

B

Gen'l Supt. Timber Preservation.

Cy.-Mr.G.H.Jacobus,
Mr.T.H.Flynn,
Mr.J.A.Mercer,
Mr.C.T.Spensel,
Mr.D.C.Colby,
Mr.Fred Brastrup,
Mr.J.F.Alsip.

Mr. Blum —
Copy for your information!
10/14

Tolls Bills

3659A

Brainerd, Minn., October 5th, 1940.

Mr. G. H. Stone:

About the creosote supply at Seattle, as referred to in your note of the 2nd.

We have not yet been advised where the requisition will be placed, but we will depend on the W.C.W.P. Co. to furnish us creosote for our immediate use in line with our conversation with Mr. Horrocks and Mr. Barrell the last time I was in Seattle.

You will recall that Mr. Horrocks offered to sell us creosote at the prevailing price at anytime if we would state our requirements for a definite program of treatment over a definite period.

At present we have instructions to treat the balance of the emergency ties required for the Tacoma Division after you have shipped the storage ties you are applying on these requisitions. This is a definite program to which you might add any miscellaneous orders that you may have for treatment during this period.

After you have found out from the plant how soon they can complete this program, please give Mr. Bennyhoff a close estimate of the creosote required over this period and explain the situation to him so he can deal with the W.C.W.P. Company or obtain creosote elsewhere if the circumstances should warrant.

The Tacoma Division requisitions for the emergency ties call for immediate delivery. It is possible that treatment of the balance of the ties for next year's renewals will not be necessary until the first of the year and by that time the full amount of creosote now on requisition for the Seattle plant will no doubt be provided for.

Please send me your estimate of immediate requirements and quantity loaned us to date.

L Gen'l Supt. Timber Preservation.

Cy.-Mr.Bernard Blum.

Referred to by phone today

10/5

3659

Brainerd, Minn., Sept. 30th, 1940.

MR. BERNARD BLUM:

Your letter of September 27th at hand, advising Form 202 approved for opening of Brainerd Tie Plant and we will wait a couple weeks to enable the Purchasing Department to lay in the necessary supply of oil and this will also allow Mr. Yager's office more time to work up the requisitions for next year's renewal ties.

On August 26th, Brainerd Shops ordered 5 sheets of No. 207 Mica on GSK Reqn. 12569, of which 2 sheets were intended for renewing commutator insulation in our Western Electric Generator which they had expected to have completed by this time. We are informed that shipment is promised by the Westinghouse Electric Co. from Stafford, Pa. tomorrow. Evidently there must be a scarcity of sheet mica and Mr. Sewall states that the Store Department has none in stock. It will take a few days after the mica arrives to complete repairs and we will not be able to operate until this job is finished.

We are told that the Purchasing Department is tracing the shipment and are having it hurried all possible.

Gen'l Supt. Timber Preservation.

Cy.-Mr.E.M.Willis.

Mr Yager noted W.L. 10/5

10/4 Note B.B.

~~8481~~
3685

Saint Paul, September 27, 1940

MR. A. J. LOOM:

Your form 202 of September 21 for force to start up the Brainerd tie treating plant has been approved.

As I said to you, it will be desirable to have the tanks practically full when you start. I suggest that you wait a couple of weeks to see how the entire situation stacks up before starting.

cc-Mr. E. M. Willis

bb/s

~~8484~~
3659

Saint Paul, September 23, 1940

MR. H. E. STEVENS:

While the annual requisition for 1941 cross tie renewals has not been submitted, we have received information from the field that in working up the totals it appears that we will have approximately 511,000 pcs of cross ties to be treated at Brainerd plant for insertion next year.

Such a program will require operating the plant about nine months. In addition there will be a number of switch ties to be treated.

We should finish treating in July, which means that the plant should start operations next month.

I am accordingly submitting herewith form 202 for authority to put on the necessary help. The form shows the authority as effective October 1 but it is my thought that we may not have to start before the middle of October, and the definite date will depend on the deliveries of oil and a further check of the number of ties to be treated.

bb/s

x

attach.

Saint Paul, September 23, 1940

MR. H. E. STEVENS:

While the annual requisition for 1941 cross tie renewals has not been submitted, we have received information from the field that in working up the totals it appears that we will have approximately 5 11 000 pcs of cross ties to be treated at Brainerd plant for insertion next year.

Such a program will require operating the plant ~~at least~~ about nine months.

In addition there will be a number of switch ties to be treated.

We should finish treating ~~about~~ in July ~~1~~, which means that the plant should start operations next month.

I am accordingly submitting herewith form 202 for authority to put on the necessary help. The form shows the authority as effective October 1 but it is my thought that we ~~will~~ may not have to start before the middle of October, and the definite date will depend on the deliveries of oil and ~~a field~~ a further check of the number of ties to be treated.

~~At the present time we have 540,000 pcs of cross ties untreated at Brainerd.~~

bb/s

x

Brainerd, Minn., Sept. 21st, 1940.

Mr. Bernard Blum:

Am submitting herewith Form 202 covering the opening of Brainerd Tie Plant about October 1st or as early as necessary to treat and make satisfactory delivery of ties required next year.

Requisitions for 1941 renewal ties have not yet been received but judging by the incomplete information at hand we estimate about nine months operation of this plant will be required.

Gen'l. Supt. Tbr. Preservn.

CC-Mr. L. Yager,
Mr. E. M. Willis.

Untreated Ties on Hand Brainerd
Cross Ties - 539,846 pcs
Switch Ties - None

Brainerd, Minn., Sept. 21st, 1910.

Mr. Bernard Blum:

Am submitting herewith Form 20E covering the opening of Brainerd Tie Plant about October 1st or as early as necessary to treat and make satisfactory delivery of ties required next year.

Requisitions for 1911 renewal ties have not yet been received but judging by the incomplete information at hand we estimate about nine months operation of this plant will be required.

Gen'l. Supt. Thr. Tenaiyn.

C-Mr. L. Yeager,
Mr. E. M. White.

Brainerd, Minn., July 1st, 1940.

Mr. Bernard Blum:

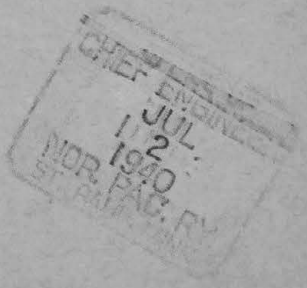
In reply to your letter of June 22nd.

We started using No. 1 creosote instead of creosote-coal tar solution for mixture with petroleum at Brainerd and Paradise on October 1st, 1929.

Only No. 1 creosote has been used at Seattle, either straight or for mixture with petroleum.

Gen'l Supt. Timber Preservation.

BB
See marked
letters also
B 7/2


CHIEF ENGINEER
JUL
12
1940
NOR. PAC. RY.

Mr Beum -

Think letters marked in File 3659-4 attached are the ones you wanted in connection with eliminating coal tar in the treating mixture in 1929

Answer as Mr Yagen's file 205-11

6/22/40

3659A

St. Paul, Minnesota

June 22, 1940

Mr. A. J. Loom:

Please see if you can tell from your files, without going to too much trouble, when we quit using creosote-coal tar solution and started buying No. 1 oil.

LS:wp

Chief Engineer

Mr Bleem –

When the Tie Treating Plants started they bought Creosote and Refined Coal Tar separate and did their own mixing. At that time Mr Gibson was reporting to Mr Slade so that our files do not show the reduction of coal tar in the solution.

Have marked in A.C.E. File 205-11 attached some letters bearing on this with red tabs and the specification adopted by AWPA for No 1 Creosote Oil with green tab.

WM 6/25/40

3659

Saint Paul, June 21, 1940

MR. H. E. STEVENS:

Supplementing my letter of April 8 and 11, about the proposition of Dr. Von Schrenck to use coal tar instead of creosote for tie treatment:

You sent me copy of Mr. S. S. Bruce's letter of June 12 to Mr. Denney, about learning that our representative went to Marion, Ohio to inspect this system. It is evident that Mr. Bruce heard of Mr. Loom's inspection trip, from which he has just returned.

Attached are two copies of Mr. Loom's report of June 19, which I think covers quite fully the observations he made with respect to treatment with straight coal tar at the Indianapolis plant of the American Creosote Company, and at the Marion plant of the Baker Wood Preserving Company.

At the Indianapolis plant they are treating ties for the New York Central, and at Marion they are treating ties for the Erie.

On the basis of getting three gallons of tar into a tie there is an indicated saving of six cents a tie for the chemical, but apparently they have not been able to get all the absorption desired. If, as reported, the additional cost of treating is 3 cents per tie - evidently due to the higher temperatures required, the heavier pressures, and the longer time in the retort - then the net saving would be but three cents a tie. In my opinion the cost of handling sticky tar ties would be more than three cents additional, compared with creosote ties.

You are familiar with our former use of coal tar mixture. About ten years ago we eliminated coal tar on account of the trouble caused by the coal tar.

According to Mr. Loom's report they were treating seasoned Red Oak ties. Red Oak is possibly the easiest wood to treat, as it quite readily absorbs creosote. On the Northern Pacific we have probably the most refractory woods to treat, i.e. Inland Empire, and for that matter, some of the hardwoods in the Brainerd territory. I think that Mr. Loom's report indicates that it would be difficult to obtain satisfactory treatment in our own plants.

With respect to the question of temperatures: Treating as many ties as we do at Paradise and Brainerd we find it necessary to start treatment in the winter in order to complete our program before the

end of the tie renewal season.

Mr. Loom has outlined the difficulties in handling coal tar treatment during cold weather.

I believe that we have purchased considerable creosote from the Koppers interests.

bb/s

x

Saint Paul, June 21, 1940

MR. H. E. STEVENS:

Supplementing my letter of April 8 and 11, about the proposition of Dr. Von Schrenk to use coal tar instead of creosote for tie treatment:

You sent me copy of Mr. S. S. Bruce's letter of June 12 to Mr. Denney, about learning that our representative went to Marion, Ohio to inspect this system. It is evident that Mr. Bruce heard of Mr. Loom's inspection trip, from which he has just returned.

Attached are two copies of Mr. Loom's report of June 19, which I think covers quite fully the observations he made with respect to treatment with straight coal tar at the Indianapolis plant of the American Creosote Company, and at the Marion plant of the Baker Wood Preserving Company.

At the Indianapolis plant they are treating ties for the New York Central, and at Marion they are treating ties for the Erie.

On the basis of getting three gallons of tar into a tie there is an indicated saving of six cents a tie for the chemical, but apparently they have not been able to get all the absorption desired. If, as reported, the additional cost of treating is 3 cents per tie - evidently due to the higher temperatures required, the heavier pressures, and the longer time in the retort - then the net saving would be but three cents a tie. In my opinion the cost of handling sticky tar ties would be more than three cents additional, compared with creosote ties.

You are familiar with our former use of coal tar mixture. About ten years ago we eliminated coal tar on account of the trouble caused by the coal tar.

I believe we have purchased considerable creosote from the Koppers interests.

Bernard Blum

bb/s

x

Brainerd, Minn., June 19th, 1940

MR. BERNARD BLUM:

Referring to your letter of April 12th, about tie treatment with straight coal tar.

Last week I visited the American Creosoting Co. plant at Indianapolis, Ind., and the Baker Wood Preserving Co. plant at Marion, Ohio, where ties are being treated with 100% coal tar.

At Indianapolis I was met by Dr. Herman von Schrenck, Consulting Engineer of Saint Louis, Dr. Stanley J. Buckman of the American Creosoting Company and Mr. G. C. Dixon, Timber Treating Engineer of the New York Central. They took considerable time to show me the plant layout and their results with tar treatment. They did not bore the freshly treated ties that came out of the treating cylinders while I was there, but I was shown a great many borings, sections and pictures of other treated ties indicating good treatment in Red Oak. Treatment was said to take from 7 to 9 hours or a couple hours longer than with creosote or creosote-coal tar solution, and pressure and temperature was considerably higher. Pressure of 200 lbs. per sq. in. was used with temperature around 210° F.

Aside from the high pressure and temperature, the actual mechanics of their treatment with 100% tar are claimed to be a development of the American Creosoting Company which they hope to capitalize, so they are not giving it away to the public. As we had expected, their main problem in treatment with tar is to obtain a relatively uniform temperature throughout the charge during the pressure period. This is not so difficult with creosote, creosote-coal tar solution or creosote-petroleum mixtures that are fluid enough at lower temperatures to penetrate the wood under much lower pressures. Specific gravity of tar being used was 1.16 at 100° F. and residue above 355° C. was running higher than 60%. The specific gravity of the 45-55 creosote-petroleum mixture we are using averages about 1.01 at 100° F. and the residue above 355° C. about 50%.

I found out indirectly that they are experimenting with various methods to keep the tar in circulation under pressure to maintain equal temperatures throughout all parts of the charge during the pressure period. There is in my estimation nothing new about this, as it has been recommended and used by others in treatment with other preservatives.

We have known for many years that temperature in the middle of a tram car load of ties is often lower than in dicated by the thermometer on the treating cylinder which shows temperature of the surrounding oil. To overcome this at our own plants, we allow the charge to stand in the oil from 2 to 8 hours before applying pressure, but with a preservative as viscous and heavy as tar it is of course necessary to employ other methods in order to obtain anything like uniform penetration. White spots on some of the treated ties indicate that they have not yet succeeded in getting uniform results and they do not recommend treatment with tar during cold weather.

At Marion, Ohio I met Mr. F. W. Smith, General Manager of the Baker Wood Preserving Company and most of his force as well as Mr. R. R Poux, Chief Treating Inspector of the Erie Railroad. With the exception of actual details of their methods with straight tar, I was allowed to witness all of their operations. They were treating only Oak ties and a number of freshly treated ties were bored in my presence to show penetration with tar. This proved to be about the same as we are getting with 8 pounds per cubic foot of creosote-petroleum mixture although they stated that they were treating to refusal and were not able to average quite as much as 8 pounds per cubic foot. This is a comparatively new plant and is in my opinion not only efficient, but one of the best and neatest looking layouts I have ever seen.

A few treated ties with white spots on them were found in stock piles where they could not be reached without getting our shoes stuck in the surface tar, but all of the freshly treated ties I asked to have bored, showed good penetration and I believe they are now getting fairly good results in their treatment of red oak in warm weather, although the ties are very sloppy. They did not claim to be having this success with any other wood and do not recommend treatment of any wood with tar in cold weather.

After noting the sloppy surface condition of the ties, I talked with several tie handlers and laborers to find out what difficulties they had in handling. I was told that a charge of ties had to be moved to the point of unloading immediately after it came out of the treating cylinder. If it was allowed to cool off for a short time the tar became so stiff that the wheels would not turn and only a few of the trucks could be moved at one time with their steam locomotive. After unloading, the truck bearings had to be lubricated before they could be moved for reloading,and repairs to bearings were heavy. One man told me that it often took the entire gang of seven men at the Boring and Adzing machine to move one empty truck. I asked one of the tie handlers what difficulty they had in reloading treated ties from storage and he replied that in his opinion they ought to be blasted to get them apart. The tar is so sticky that they have trouble in keeping their mits on their hands. In conversation with a roadmaster about distribution of tar treated ties out on the line he said it was their practice to have buckets of water for the men to dip their mits in, otherwise the mits stuck on the ties and considerable time was lost in retrieving mits.

From what I could find out the cost of tar is around 6c a gallon, which is about 2c less than the cost of our creosote-petroleum mixture. At 3 gallons per tie this would indicate a saving of 6c a tie by treatment with tar, but they have not been able to get an average absorption of 3 gallons.

I was told that the plants receive 3c a tie more for treatment with tar than they do for treatment with creosote-coal tar solution, so in view of the questionable service life and added expense of handling these sticky ties after they leave the plant, the ultimate saving by treatment with tar, in my estimation, seems doubtful.

(A. J. Loom)
Gen'l Supt. Timber Preservation

cy Mr. Lowry Smith

Brainerd, Minn., June 19th, 1940.

MR. BERNARD BLUM:-

Referring to your letter of April 12th, about tie treatment with straight coal tar.

Last week I visited the American Creosoting Co. plant at Indianapolis, Ind., and the Baker Wood Preserving Co. plant at Marion, Ohio, where ties are being treated with 100% coal tar.

At Indianapolis I was met by Dr. Herman von Schrenck, Consulting Timber Engineer, of St.Louis, Dr. Stanley J. Buckman of the American Creosoting Company and Mr. G. C. Dixon, Timber Treating Engineer of the New York Central. They took considerable time to show me the plant layout and their results with tar treatment. They did not bore the freshly treated ties that came out of the treating cylinders while I was there, but I was shown a great many borings, sections and pictures of other treated ties indicating good treatment in Red Oak. Treatment was said to take from 7 to 9 hours or a couple hours longer than with creosote or creosote-coal tar solution, and pressure and temperature was considerably higher. Pressure of 200 lbs. per sq. in. was used with temperature around 210° F.

Aside from the high pressure and temperature, the actual mechanics of their treatment with 100% tar are claimed to be a development of the American Creosoting Company which they hope to capitalize, so they are not giving it away to the public. As we had expected, their main problem in treatment with tar is to obtain a relatively uniform temperature throughout the charge during the pressure period. This is not so difficult with creosote, creosote-coal tar solution or creosote-petroleum mixtures that are fluid enough at lower temperatures to penetrate the wood under much lower pressures. Specific gravity of tar being used was 1.16 at 100° F. and residue above 355° C. was running higher than 60%. The specific gravity of the 45-55 creosote-petroluem mixture we are using averages about 1.01 at 100° F. and the residue above 355° C. about 50%.

I found out indirectly that they are experimenting with various methods to keep the tar in circulation under pressure to maintain equal temperature throughout all parts of the charge during the pressure period. There is in my estimation nothing new about this, as it has been recommended and used by others in treatment with other preservatives.

We have known for many years that temperature in the middle of a tram car load of ties is often lower than indicated by the thermometer on the treating cylinder which shows temperature of the surrounding oil. To overcome this at our own plants, we allow the charge to stand in the oil from 2 to 8 hours before applying pressure, but with a preservative as viscous and heavy as tar it is of course necessary to employ other methods in order to obtain anything like uniform penetration. White spots on some of the treated ties indicate that they have not yet succeeded in getting uniform results and they do not recommend treatment with tar during cold weather.

At Marion, Ohio I met Mr. F.W. Smith, General Manager of the Baker Wood Preserving Company and most of his force as well as Mr. R.R. Poux, Chief Treating Inspector of the Erie Railroad. With the exception of actual details of their methods with straight tar, I was allowed to witness all of their operations. They were treating only Oak ties and a number of freshly treated ties were bored in my presence to show penetration with tar. This proved to be about the same as we are getting with 8 pounds per cubic foot of creosote-petroleum mixture although they stated that they were treating to refusal and were not able to average quite as much as 8 pounds per cubic foot. This is a comparatively new plant and is in my opinion not only efficient, but one of the best and neatest looking layouts I have ever seen.

A few treated ties with white spots on them were found in stock piles where they could not be reached without getting our shoes stuck in the surface tar, but all of the freshly treated ties I asked to have bored, showed good penetration and I believe they are now getting fairly good results in their treatment of red oak in warm weather, although the ties are very sloppy. They did not claim to be having this success with any other wood and do not recommend treatment of any wood with tar in cold weather.

S.B.-#3

After noting the sloppy surface condition of the ties, I talked with several tie handlers and laborers to find out what difficulties they had in handling. I was told that a charge of ties had to be moved to the point of unloading immediately after it came out of the treating cylinder. If it was allowed to cool off for a short time the tar became so stiff that the wheels would not turn and only a few of the trucks could be moved at one time with their steam locomotive. After unloading, the truck bearings had to be lubricated before they could be moved for reloading and repairs to bearings were heavy. One man told me that it often took the entire gang of seven men at the Boring & Adzing Machine to move one empty truck. I asked one of the tie handlers what difficulty they had in reloading treated ties from storage and he replied that in his opinion they ought to be blasted to get them apart. The tar is so sticky that they have trouble in keeping their mits on their hands. In conversation with a roadmaster about distribution of tar treated ties out on the line he said it was their practice to have buckets of water for the men to dip their mits in otherwise the mits stuck on the ties and considerable time was lost in retrieving mits.

From what I could find out the cost of tar is around 6¢ a gallon, which is about 2¢ less than the cost of our creosote-petroleum mixture. At 3 gallons per tie this would indicate a saving of 6¢ a tie by treatment with tar, but they have not been able to get an average absorption of 3 gallons.

I was told that the plants receive 3¢ a tie more for treatment with tar than they do for treatment with creosote-coal tar solution, so in view of the questionable service life and added expense of handling these sticky ties after they leave the plant, the ultimate saving by treatment with tar, in my estimation, seems doubtful.

L

Gen'l Supt. Timber Preservation.

Cy.-Mr.Lowry Smith.

OFFICE OF CHIEF ENGINEER
JUN 20 1940
CORPS OF ENGINEERS

St. Paul, Minnesota,
June 19, 1940

Mr. C. E. Denney:

Your notation on attached letter from Mr. Bruce of the Koppers Company.

In my letter to you of January 23rd I mentioned that we would arrange for Plant Superintendent Loom to visit one or two of the plants using the coal tar process. These plants were not in operation during the winter and I am now advised Mr. Loom has just returned from an inspection of one or two plants and expects to make a report within the next few days.

cc Mr. Bernard Blum

Mr. Paul, Minnesota.
June 19, 1940

Mr. C. V. Demuth,

Your memorandum on attached letter from Mr.

Bruce of the Koppers Company.

In my letter to you of January 23rd I mentioned that we would arrange for Plant Superintendent Dean to visit one or two of the plants using the coal tar process. These plants were not in operation during the winter and I am advised Mr. Dean has just returned from an inspection of one or two plants and expects to make a report within the next few days.

Yours very truly,

Fidelity Oven Si

COPY

KOPPERS COMPANY

Pittsburgh, Pa. June 12, 1940

Mr. C. E. Denney, President,
Northern Pacific Ry.
St. Paul, Minn.

Dear Charlie:

What is there to the sand-house gossip that your company is going to or has sent representatives to Marion, Ohio to inspect the treatment of Erie ties with straight tar in lieu of creosote oil? This has been tried by two or three of the eastern railroads but it has not proven entirely satisfactory. In fact, the C&O discarded this type of treatment some time ago and are now using the good old reliable creosote oil.

Would appreciate your giving us an opportunity to discuss this matter with your people before reaching a definite conclusion.

With kindest personal regards, I am

Yours very truly,

S S Bruce

3659

St. Paul, Minnesota
April 12th, 1940

Mr. A. J. Loom:

In regard to our discussion about straight coal tar for tie treatment -

You reported that the plants were not operating in the St. Louis area at the time you attended the Wood Preservers' convention. Will you keep in touch with the operation of these plants when they start to treat, and make a trip to watch their operations, particularly the condition of the ties after treatment and if you figure any additional expense would be involved in handling these ties as compared with the creosote oil mixture.

BB:wp

cc Mr. Lowry Smith

St. Paul, Minnesota,
April 11th, 1940

Mr. Bernard Blum:

Your letter of April 8th about some of the Railroads using straight coal tar instead of creosote or creosote-crude oil mixture for tie treatment.

I note you state that the New York Central have appointed a committee to investigate the results of their tie treatment. I think it would be well for you to arrange to have someone inspect the operation at these plants, particularly the condition of the ties as they leave the plant and the additional expense, if any, involved in handling, transporting and placing them.

I do not understand the statement that tar treatment is not a success in cold weather as frozen ties will not permit penetration of the tie. I would not suppose you would be able to get penetration with any treating medium in a tie that was really frozen, nor would I suppose a tie would remain frozen very long in the temperature to which it is subjected in the retort.

OFFICE OF CHIEF ENGINEER
APR 12 1940
NOR. PAC. R.R.
ST. PAUL, MINN.

3659

St. Paul, Minnesota
April 11, 1940

Mr. H. E. Stevens:

Our telephone conversation about my letter of April 8th to you concerning the use of straight coal tar in tie treatment.

In the last paragraph on page one of my letter I made the statement that users of 100% tar state that it is not a success in cold weather as the frozen ties will not permit penetration of the tar.

The plants that have been using this treatment are commercial plants treating for railroads for which Doctor Von Schrenck is consultant. Naturally they are on a production basis and generally they do not operate their plants in cold weather. I think it may be said that none of them have the severe cold to work against that we do at Brainerd. It is obvious that the colder the weather, and the more frost in the tie, the longer it will take to heat the ties and liquid in the retorts. This heating is done by steam. In order to have the viscosity of the coal tar sufficiently low to permit penetration of the wood the temperature must be higher than with the lower viscosity creosote oil; in other words, it is simply a matter of time of treatment.

Due to the higher density of the coal tar as compared with creosote oil, it is difficult to get satisfactory penetration under the most favorable circumstances. With a decrease in temperature the difficulties increase very materially. Undoubtedly this situation has led to the users of coal tar to refrain from treating during the winter months.

Mr. Loom in reporting to me pointed out that all tars are not considered adaptable for this use, and possibly Doctor Von Schrenck is best suited to determine from which source the tars should be purchased.

BB:wp

3659

Train 4, Yellowstone Division

April 8, 1940

MR. H. E. STEVENS:

With reference to my letter of January 15 in answer to yours of December 20, about the suggestion of employing Doctor Hermann Von Schrenck to make a study of our tie situation:

In that letter I told you that Mr. Loom would look over the method of using straight coal tar instead of creosote and creosote mixture.

At the recent convention of the American Wood Preservers' Association in Saint Louis Mr. Loom discussed the matter with several members who had treated with 100% tar. He had hoped to visit treating plants but they were not operating at the time.

He was informed that success in obtaining satisfactory penetration depends on the tar furnished. Some tars are apparently equivalent to a 50-50 cresote and coal tar solution. With the better qualities of tar they claim fairly good penetration, but higher temperatures and longer pressures are required. One user advised that he had secured fairly good penetration in pine and oak but not so good in hardwood, such as beech and maple..

The cost of tar has been about half that of creosote; and that was the reason that they were using 100% tar.

His investigation at Saint Louis indicated that four railroads were using 100% tar - the New York Central, Lackawanna, New Haven, and Erie -. The latter road at only two of its plants. The C&O, Pere Marquette, and Nickel Plate did treat to some extent with 100% tar but have now returned to the creosote coal tar solution. Mr. Loom was informed that the New York Central had appointed a committee to investigate the results of their tar tre tment.

The Wood Preservers' Association and the Forest Products Laboratory at Madison do not recommend 100% tar as a wood preservative, and we do not know of any service records to indicate what the ultimate results might be. Mr. Loom informs me that users of 100% tar state that it is not a success in cold weather, as the frozen ties will not permit penetration of the tar. It is our practice to start treatment of ties in the early winter, continuing through the winter so as to have them available at the beginning of the tie

renewal season, starting the first of January on the Coast, and it has been necessary to start our plants even at Brainerd somewhat earlier than would appear necessary for the immediate territory; this for the reason that we ship hardwood ties to the Western District for curves.

As you know, up to about ten years ago, we employed the creosote coal tar mixture, but changed to creosote fuel oil, as it produced much cleaner ties, was less costly, and we were of the opinion that it would give us better results.

I do not believe that we should resort to the coal tar treatment at this time, but should wait for the results of the present experimentation. While the cost of the coal tar is less than for creosote, the other factors would wipe out at least a portion of the difference, and might result in no over-all economy.

bb/s

x

3659

St. Paul, Minnesota
April 2nd, 1940

Mr. Bernard Blum:

You will probably recall that on the trip of the President's party eastward over the S P & S last December there was some discussion originated by Mr. Witchel about a test track alleged to contain treated jack pine ties in the G. N. extension south of Bend. This test track was originated by Mr. Budd on the assumption that the adjoining territory would produce a good many jack pine ties economically because the jack pine had a limited commercial value. I followed this through and am now attaching hereto a copy of my letter of December 4 to Mr. Davis, and a copy of Mr. Davis' letter in reply of December 15.

Mr. Witchel wrote me further on March 25, copy attached. All of the latter information indicates that we were not dealing as we supposed with jack pine timber but with the lodge pole pine.

The file is terminated with a copy of Mr. Loom's letter of March 30th outlining our experience with lodge pole cross ties treated at Paradise. Our experience would indicate that we are obtaining creditable life from treated lodge pole pine ties.

H. Sayer

encl.

L. S.

Note
B. B.

4/4
R4/9

OFFICE OF CHIEF ENGINEER
APR 2 13 1940
NOR. PAC. RY.
ST. PAUL, MINN.

COPY

Brainerd, March 30, 1940

Mr. L. Yager:

With return of the attached letters and in reply to yours of March 28 about Lodgepole Pine ties -

Comparatively few ties of this species have been treated at Paradise during the past 20 years, but we have never experienced any difficulty in the treatment of Lodgepole Pine. The characteristics of this wood are, in our estimation, very much the same as Jack Pine. In fact, I have found that it is called Jack Pine in many localities in the west and it looks the same to me as our Minnesota Jack Pine except that the trees grow higher and usually have less branches on them. In Montana a good stand of Lodgepole Pine was referred to by the lumber jacks as a tie-hack's paradise, because the tree trunk is straight with only slight taper and few limbs to cut off, so after felling the tree it was considered a simple job for a good broad-axe man to hew two sides and saw it up in the required lengths. He was often able to make 5 or 6 ties from one tree and it was, of course, much easier than making ties by hand from any of the other species.

In 1926, the U. S. Forest Service at Missoula, estimated the total stand of Lodgepole Pine in Montana to be 11 billion feet and that the principal privately owned bodies of Lodgepole Pine of any size are located in Montana. They reported that the State and the N. P. RR. hold considerable tracts. They state that as lumber it compares favorably with Western Yellow Pine and Western White Pine, and is often mixed with these species and that the holding power of nails in both the end grain and side grain is considerably greater for Lodgepole than in the other pines mentioned.

I have always considered Lodgepole Pine to be a good cross tie timber and in my opinion our treated ties of this species are giving good service.

In 1915, 199 Lodgepole cross ties were treated at Paradise and placed in our Tie Record Test Track No. 15, on the main line just west of Thompson Falls, Montana.

Our record of renewals of these ties is as follows:

Year	Renewals	Year	Renewals
1921	1	1935	47
1925	9	1936	38
1930	1	1937	19
1931	2	1938	11
1932	2	1939	6
1933	10		
		Total -	146 Ties

Total Renewals - 73% after 24 years.

According to the Forest Products Laboratory Tie Life curve, this indicates an average life of 22 years for this group. There are no other Lodgepole Pine ties in any of our test tracks.

(Signed) A. J. LOOM

COPY

Portland, March 25, 1940

Mr. L. Yager, Asst. Ch. Engr.
Northern Pacific Ry. Co.
St. Paul, Minnesota

Dear Sir:

Please refer to your letter of March 18, file 229-40:

I could not find in our files any record of the testimony that was introduced at the hearing before ICC examiners in 1927 when Oregon Trunk Ry. applied for certificate to build, Bend to Klamath Falls. I sat through that entire hearing which, as I recall, lasted very close to one week, and I know much testimony was given by various informed witnesses that there were millions of feet of lodge pole pine adjacent to the proposed line that would have no commercial value except possibly for ties. It was based on that testimony that the lodge pole pine ties were cut and treated for test purposes.

Not being able to find any data, I asked our Purchasing Agent to ascertain the volume of suitable tie size lodge pole pine tributary to the G. N. Ry., Bend south, and to the logging roads of Shevlin-Hixon and Brooks-Scanlon. Purchasing Agent referred my request to Mr. Isted, General Manager of Shevlin-Hixon Co., who replied as follows:

> "In reply to your letter of the 8th inst. inquiring in regard to lodge pole pine suitable for railroad ties being available in Central Oregon area, I wish to say that we are using more or less lodge pole for ties for our logging railroad and they do prove fairly satisfactory for such purpose. However, lodge pole pine of sufficient size for ties is very scattering and only a very small percentage large enough for ties. I doubt very much if there is sufficient lodge pole adjacent to your road to make it worthwhile, for as this timber is not being considered merchantable we never make any note of lodge pole in our ordinary cruises and therefore have no records of this timber available in Central Oregon.
>
> "The methods we have used in getting these ties in the past is that when we are in need of additional ties we give a contract to some local man and he shops around and picks them up wherever he can find them of sufficient size for the purpose.
>
> "We regret we cannot give you more encouraging information."

Mr. Isted's reply was a surprise to me in the light of what I know was given as testimony. However, Mr. Isted is undoubtedly dependable, although as I read his letter, he rather leaves it to be implied that there are stands of tie sized lodge pole pine.

It would, of course, entail some expense to have a cruiser make an estimate and from what Mr. Isted says I judge that would be the only way we could obtain definite information, because records have not been made since the timber was not considered merchantable.

Yours very truly,
(Signed) A. J. WITCHEL
Asst. Superintendent.

GREAT NORTHERN RAILWAY COMPANY

St. Paul, Dec. 15, 1939

Mr. L. Yager, Asst. Chief Engineer
Northern Pacific Railway Company
St. Paul, Minnesota

Dear Sir:

In reference to your letter of December 4th, regarding test ties placed near Chemult, Oregon:

I believe the ties that you have reference to were Lodge Pole Pine ties purchased from the Shevlin-Hixon Co. and were produced in the Bend, Oregon territory. The object of the test was to ascertain approximately the service life that could be obtained from this species of wood when treated.

This particular test consists of 608 Lodge Pole Pine ties that were shipped from Bend, Oregon into the Hillyard plant and treated with zinc chloride, net retention .509# per cu. ft. They were placed in track November 21st and 22nd, 1927, between MP 60-61, near Chemult, Oregon, Station 1729 plus 37 to Station 1741 plus 03. Signs were placed at each end of the test section.

The last inspection of these ties was made Sept. 26, 1938, at which time none had been removed and the Roadmaster expected to remove five during this year due to broken ends.

I consider a Lodge Pole Pine tie treated a very good tie, but believe that they should be oil treated instead of salt, in order to obtain the best results. It is my understanding that the Northern Pacific in past years treated a considerable number of Lodge Pole Pine ties at your Paradise, Montana treating plant.

In May 1930 we had some correspondence with Mr. Lem Adams of the Union Pacific regarding Lodge Pole Pine ties, and he wrote as follows:

> "Practically all of the ties treated at our Laramie plant (which is approximately 1,000,000 per year) are Lodge Pole Pine, and about 90% of these are hewed, and we find that the life of the Lodge Pole Pine tie is in every way equivalent to that of Fir."

Probably the timber that Mr. Witchel and yourself were looking at south of Bend, Oregon and designated as Jack Pine, was really large size Lodge Pole, as I doubt if there is much Jack Pine in that territory.

Yours very truly,

(Signed) J. R. W. DAVIS

Chief Engineer

COPY

Train 4 - Rocky Mountain Division
December 4, 1939

Mr. J. R. W. Davis
Chief Engineer
Great Northern Ry. Co.
St. Paul, Minnesota

Dear Sir:

While we were at Portland on this trip discussing the future tie situation, Mr. Witchel called our attention to a test which Mr. Budd directed to be made in about 1928.

It appears that in the territory south of Bend there is quite a stand of timber which Mr. Witchel, for want of a more specific term, designated as jack pine. It is stated that this timber grows to a good size, much of it two feet or more in diameter. It was at that time assumed that this particular species of timber had little or no commercial value. It was this fact that prompted Mr. Budd to make a test for the purpose of determining whether or not it would make suitable tie timber.

Mr. Witchel stated that about 500 pieces of this jack pine and a like number of pieces of Douglas fir were treated at St. Helens. These were #5 ties 7 x 9 x 8'. It is Mr. Witchel's recollection that they were inserted in the main line at the time of construction somewhere in the vicinity of Chemult.

We believe that the SP&S properties as well as the parent lines would be interested in learning whether this so-called jack pine is promising tie timber and for that reason I am inquiring what your records may disclose on this test.

Yours very truly,

Brainerd, Minn., Feb. 14th, 1940.

Mr. Lowry Smith:

Am attaching for your information copy of my letter of January 31st to Mr. Hunt and copy of his reply of February 12th with special reference to treatment with straight tar.

Evidently the Laboratory has no new information on the subject that would tend to contradict the results obtained in investigation and experimental treatment with tar many years ago.

So far I have been unable to find that the situation with reference to tar treatment has changed to any appreciable extent since our early unsatisfactory experiences with it.

Am glad to have the 1909 Specification for Refined tar received with your letter of February 6th. It seems odd that the same firm of chemists mentioned in this agreement should also be retained by present users of tar as the only authorities on this subject in spite of recommendations of the A.W.P.A. or the Forest Products Laboratory.

Gen'l. Supt. Tbr. Preservation.

OFFICE OF CHIEF ENGINEER
FEB 15 1940
NOR. PAC. RY.
ST. PAUL, MINN.

UNITED STATES DEPARTMENT OF AGRICULTURE

Forest Service

Forest Products Laboratory

Madison, Wisc.

February 12, 1940.

Northern Pacific Railway Company,

Brainerd, Minn.

Attention: Mr. A. J. Loom

Dear Mr. Loom:

I greatly appreciate your letter of January 31 and the information it contains.

It appears that we shall not be able to go very far in setting limitations on specific gravity and residue of creosote petroleum solutions at the present time because the subject is too new and we might unintentionally set up an impractical limitation. With sufficient study, however, such limits should prove practical and I hope that the A.W.P.A. Preservatives Committee will not delay very much longer in trying to work out the problem.

We have not studied the question of using straight tar nor have we made any experiments recently that apply to the problem. It has seemed rather doubtful to us, however, that there is much real economy in the practice and there are several ways in which one can get into trouble. Undoubtedly it is of primary importance to have a tar that is clean and not too viscous. There may be some tars that will not give more trouble than the ordinary creosote-tar solutions. The toxicity of the tar should also be taken into consideration, to make sure that it is high enough to warrant expectation of satisfactory protection. If I were considering the use of tar in ties for which I was to be held responsible, I think I would be content to wait awhile longer and let someone else do the pioneering and make the original blunders.

Very truly yours,

(Signed) George M. Hunt,
Chief, Division of Wood Preservation.

C O P Y

Brainerd, Minn., Jan. 31st, 1940.

Mr. George M. Hunt,
Chief, Divn. of Wood Preservation,
U.S. Forest Products Laboratory,
Madison, Wis.

Dear Mr. Hunt:-

Am sending you herewith some representative analyses of the creosote, petroleum and the 45-55 creosote-petroleum mixtures we are using for treatment of our ties. Also copy of a formula developed by Messrs. Dreitzler, Hopkins and Harding at Seattle some years ago for finding the percentage of creosote and petroleum in any unknown mixture of the two when the specific gravity of creosote, petroleum and mixture is known. This they claim, after much experimenting, gives results accurate within 2%, depending of course upon the care with which the specific gravity determinations are made. I think it is fairly accurate and have been using it to check our mixtures which as you know, are made by volume.

Sorry we did not find time at St.Louis to talk over the proposed Federal Treating Specifications referred to in your letter of December 27th. I put in all of the time available to me in an attempt to get the low-down on 100% tar treatment. I found that members of the A.W.P.A. who are using 100% tar were not permitted to give out any information except that their Consulting Engineer, Dr. von Schrenk and Dr. Buckman of the American Creosoting Company were conducting experiments to obtain the results of this kind of treatment and to make changes or improvements, if possible. Information given me confidentially indicates that satisfactory treatment depends entirely on the kind of tar furnished for this purpose. Some tars were said to be equivalent to a 50-50 creosote-coal tar solution and with such tars they got satisfactory penetration and absorption, although longer pressure periods and higher temperatures were necessary. I was warned not to attempt to treat with 100% tar in the winter time, so from such information as I was able to gather, I am afraid it will not fit into our scheme of things. Most of our ties are, as you know, treated during the winter months. I would greatly appreciate any additional information that you can furnish.

After looking over your proposed Federal Specifications, I do not feel that there is anything that I can criticise or improve.

There may be some question as to the comparative qualities of straight creosote and creosote-coal tar solution for treatment of Douglas Fir for marine use. We use only straight creosote for this purpose.

I believe the net minimum retentions of preservatives recommended for treatment with salts are in common use, but have always felt that such low absorptions per cubic foot do not permit penetrations in line with those required for desirable treatment with creosote, especially in material of small dimensions.

I do not feel capable of making any improvement and think you have done a fine job.

Yours truly,

A. J. Loom,

Gen'l Supt. Timber Preservation.

L
enc

AGREEMENT made this 20th day of October, 1908, between ANGLO-AMERICAN TAR PRODUCTS COMPANY, Indianapolis, Indiana, hereinafter designated as "Angle-American", and NORTHERN PACIFIC RAILWAY COMPANY, St. Paul, Minnesota, hereinafter designated as "Railway Company".

Angle-American hereby agrees to sell to Railway Company, and Railway Company hereby agrees to buy from Angle-American, during the period below named, Refined Tar of the quality and in the quantity, and under the terms and conditions hereinbelow set forth, viz:

QUANTITY:

One Million (1,000,000) gallons during each of the five (5) years beginning with January 1, 1909, the same to be delivered and taken in as near regular monthly quantities as possible:

QUALITY:

The Tar to have the water and the light oils taken off by distilling to 212° C., if necessary, and to be essentially of the quality now produced, as shown by analysis of Alfred L. Kammerer, August 17, 1908, (copy attached); the analysis referred to being analysis of Crude Tar before being refined. If for any reason there are material changes in the quality of the Tar, making it unsuitable for creosoting purposes, then the Railway Company shall have the right to cancel this contract upon sixty (60) days' notice.

The present quality of the Tar to be determined as follows:

A one gallon sample shall be taken at the producing plant at Milwaukee, Wisconsin, from each car shipped during the first thirty days. These samples shall be combined and submitted to the firm of Von Schrenk, Fulks and Kammerer for analysis, and the resulting analysis shall determine the quality as now produced for the purpose of this contract.

It is understood and agreed between the contracting parties hereto that should any controversy arise as to the quality of the Tar conforming to this contract or as to its being suitable for creosoting purposes, as contemplated in this contract, the contracting parties agree to submit all questions pertaining to the firm of Von Schrenk, Fulks and Kammerer, whose decision shall be final and binding on both the contracting parties hereto.

DELIVERY:

Delivery is to be made F.O.B. the producing plant at Milwaukee, Wisconsin, in Angle-American's tank cars.

PRICE:

The price of this Tar shall be six (6) cents per U. S. gallon in Anglo-American's tank cars, f.o.b. the producing plant at Milwaukee, Wisconsin.

TERMS:

All Tar shipped during any one month to be paid for, at Anglo-American's office, on or before the last day of the following month.

STRIKES, ETC.

This agreement is made subject to strikes, accidents, or shut-downs of the producing plant, or other causes beyond the control of either party.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their proper officers, respectively, the 2nd day of December, 1908.

ANGLO-AMERICAN TAR PRODUCTS COMPANY
By Thos. B. Taylor, Secy-Treasurer

NORTHERN PACIFIC RAILWAY COMPANY
By F. G. Prest, Purchasing Agent

ANALYSIS OF ALFRED L. KAMMERER

AUGUST 17, 1908

* * * * *

Specific Gravity at 38° C.	1.130
Water	1.8
Free Carbon	3.0
Distillation:	
Below 210°	4.4%
210° - 270°	14.3
270° - 315°	6.9
315° - 355°	12.1
Residue	62.1

L. S.

Brainerd, Minn., Feb. 7th, 1940.

MR. L. YAGER:

We received today your letter and your memorandum of February 5th showing "Comparative Costs of Cross Tie Treatment at Brainerd, Paradise, Hillyard and Seattle during the year 1938". I prepared a similar statement which should be in your hands this morning.

Comparison of figures indicates that we agree very closely. I note you have left off interest and depreciation and I agree to this. 186% of the original investments at Brainerd and Paradise had already been charged off. Item 12 of your memorandum should read 6.95 for Brainerd, otherwise I find no differences worth mention, except that due to elimination of the Interest and Depreciation from the Brainerd and Paradise costs.

Explanation of the larger variations in cost items is as follows:-

Item 2. Labor. Lower piece work rates at Paradise.

Item 3. Material & Supplies. Switching Charges are included in this item. At Brainerd an arbitrary switching charge is made, which for 1938 totaled $6333.23. At Paradise where only inter-plant switching is charged to us, the bills for 1938 totaled only $1619.97. This accounts for $4713.26 of the difference between Brainerd and Paradise.

Brainerd Mat'l & Supplies	$11231.00
Paradise " " "	5750.00
Difference	$5481.00
Due to Switching Charges	4713.00
Balance	$ 768.00

This balance of $768 includes chemicals for water softener and the cleaning of tank cars which was done at Brainerd Shops. Also some additional supplies for the Boring & Adzing machine at Brainerd.

Only the usual overhaul and repairs were made in 1938.

Item 5. Supervision. High at Paradise due to small number of ties treated at Seattle. Mr. Hopkins' time was charged to supervision at both plants and Mr. Stone, is as you know, located at Seattle and most of his time is charged to the work at this plant.

Quantities of preservatives used, as shown on my statement will, I believe, explain the major variations in total cost of treatment at the four plants.

Comparison with the "Erie" statement indicates that their labor costs are considerably higher than labor costs at our own plants. Without knowing prices or quantities used we are unable to make any comparison of the costs for preservatives from which relative saving in first cost or ultimate economy might be determined.

L

L.A.

Copy for your information.

11-40

CHIEF ENGINEER
FEB 3
1920
NOR. PAC. RY.

3659

St. Paul, Minnesota
February 6, 1940

Mr. A. J. Loom:

Attached for your information is copy of contract covering the purchase of refined tar that we used many years ago. The second sheet gives an idea of approximately what the analysis was supposed to be. The so-called specification apparently simmers down to take anything that Von Schrenk said was all right. This is the first time that I remember seeing the document.

I am returning the papers which accompanied your letter of the 2nd.

IS:wp
enc

Office Engineer

Brainerd, Minn., Feb. 5th, 1940.

MR. L. YAGER:

In response to your letter of February 2nd, I have prepared statements of our 1938 treating costs at Brainerd, Paradise, Hillyard and Seattle for direct comparison with Mr. Patterson's statement of treating costs on the Erie.

My figures are based on our Annual Report of Tie Treating Plant Operation, and instead of showing cost of treating Main Track Ties and Side Track Ties separately I am showing the number of each grade of ties treated at each plant as follows:-

Grade	FBM	Brainerd	Paradise	Seattle	Hillyard	Total
No.1	24.000	88,211	0	0	0	88,211
2	28.000	44,494	0	0	0	44,494
3	32.000	105,261	108,576	5,935	11,911	231,683
4	37.333	170,532	176,155	69,510	13,001	429,198
5	44.625	112,057	359,897	18,222	0	490,176
Total Pieces		520,555	644,628	93,667	24,912	1,283,762
Total F.B.M.		18,098,320	26,111,290	3,598,114	866,523	48,674,247

The F.B.M. at Brainerd and Paradise has always been based on nominal dimensions rather than actual volume which must be computed at Hillyard and Seattle, where we pay for treatment on an actual cubature basis. This gives very close figures for Paradise where ties are mostly all square sawed and very uniform as to size, but at Brainerd where we have so many slab sawed and hewed ties we estimate that cubature based on actual dimensions would be about 10% greater than shown.

Under cost of treatment at our own plants, all labor, supervision, material and supplies and interest and depreciation for the entire year are charged to the ties treated that year. This includes all salaries and expenses for periods when the plants are idle as well as when they are operating. The expense of my office, including my own salary and expense account, is charged out proportionately against treatment at each plant, under supervision.

Under cost of Adzing, Boring and Incising, at our own plants we do not charge to this item the cost of loading ties on flat cars or trams for movement to the machines, as this loading would have to be done whether we machined the ties or not. The items of cost shown against Boring, Adzing and Incising on the statement are as follows:-

	Brainerd	Paradise
Handling at Machines	$0.0210	$0.0190
Labor Operating Machines	.0050	.0050
Material & Supplies	.0020	.0017
	$0.0280	$0.0257

At Seattle and Hillyard, adzing, boring and incising are included in the unit price for treatment under contract.

Cost of preservatives includes invoice price plus foreign freight. No home line freight is included in our reports although an arbitrary charge is being made for switching, which in our annualreport is carried under Material & Supplies, and has raised this item considerable during the past four years.

The Erie statement does not show prices or quantities of preservatives used per tie or per cubic foot, so it is not possible to compare costs for this item.

"Yarding", I assume, means the storing of ties after treatment. This is not done by us in a normal program, so I have omitted this item. For storage of ties after treatment and subsequent loading on cars in addition to costs shown on the statements, the cost per tie would be $0.026 at Brainerd, $0.023 at Paradise, $0.04 at Hillyard and $0.01 at Seattle.

Our Total Cost of Treatment as shown, includes all expense of unloading, seasoning, treatment and shipment out of the yard as well as repairs and upkeep of the plant, and interest and depreciation. Six per cent for interest and depreciation on our own plants has been charged against the original investments in our annual reports for the past 32 years.

L
enc

NORTHERN PACIFIC RAILWAY COMPANY

Cost of Labor and Material for Treatment of Cross Ties During the Year 1938.
Railway Owned and Operated Plants
45-55 Creosote-Petroleum Mixture

	Brainerd, Minn.	Paradise, Mont.
Average Retention:		
Gallons per Tie	3.10	3.09
Pounds per Cu. Ft.	8.97	7.70
	Cost per Tie	Cost per Tie
Treatment	$0.1449	$0.1133
Adzing and Boring	.0280	
Adzing, Boring and Incising		.0257
	$0.1729	$0.1390
Preservatives	.2416	.2410
Total Cost per Tie	$0.4145	$0.3800
Number of Ties Treated	520,555	644,628
Av. FBM per Tie (Nominal Dimensions)	34.767	40.560
Average Cost per M. FBM:		
Labor, Suptce., Int. & Dep. @ 6% Boring, Adzing & Incising	$ 4.97	$ 3.42
Preservatives	6.95	5.94
Total Cost per M. FBM	$ 11.92	$ 9.36

Office of Gen'l Supt. Timber Preservation,
Brainerd, Minn., Feb. 5th, 1940.

NORTHERN PACIFIC RAILWAY COMPANY

Cost of Labor and Material for Treatment of Cross Ties During the Year 1938 at Commercial Treating Plants
45-55 Creosote-Petroleum Mixture

	Seattle	Hillyard
Average Retention:		
Gallons per Tie	3.07	2.79
Pounds per Cu. Ft.	8.08	8.10

	Cost per Tie	Cost per Tie
Treatment under Contract	$0.2404	$0.2621
Boring, Adzing & Incising (Included above)		
Railway Supvn. & Inspection (Incldg. Office Rent, Telephone, etc.)	.0369	.0176
	$0.2773	$0.2797
Preservatives	.2281	.2130
Total Cost per Tie	$0.5054	$0.4927
Number of Ties Treated	93,667	24,912
Av. FBM per Tie (Actual Cubature)	38.414	34.783
Average Cost per M. FBM:		
Labor	$ 7.22	$ 8.04
Material	5.94	6.12
Total Cost per M. FBM	$ 13.16	$ 14.16

Office of Gen'l Supt. Timber Preservation,
Brainerd, Minn., Feb. 5th, 1940.

ERIE RAILROAD COMPANY

Robert E. Woodruff and John A. Hadden, Trustees

Cost of Labor and Material per Thousand FBM of Cross Ties

	Paterson, N.J. 100% Tar		Bradford, Pa. 50/50 Sol.		Marion, O. 100% Tar	
	Main	Side	Main	Side	Main	Side
Treatment	$ .23	$ .175	$ .3131	$ .1596	$ .24	$ .19
Adzing & Boring	.065	- -	.06	- -	.055	- -
Yarding	.0375	.0375	.035	.035	.03	.03
	.3125	..2035	.3071	.1946	.325	.22
Preservative	.1908	.1442	.3528	.2726	.2124	.1609
	$ .5033	$ .3467	$ .6599	$ .4672	$ .5374	$ .3809
Ties	79,713	76,639	75,538	57,137	111,877	80,905
Avg. FBM	43.998	30.94	43.998	30,898	43.388	31.11
Avg. Cost M-FBM Labor	$7.27	$ 6.54	$ 7.14	$ 6.30	$ 7.49	$ 7.07
Material	4.44	4.66	8.21	8.83	4.90	5.17
T o t a l	11.71	11.20	15.35	15.13	12.39	12.24

Office Chief Engr. M. & W.,
Cleveland, Ohio
January 31st, 1940.

C O P Y

Brainerd, Minn., Feb. 2nd, 1940.

MR. LOWRY SMITH:

In response to your letter of January 31st, we have looked through our files carefully but fail to find anything pertaining to a specification covering straight coal tar, but I am sending you some old letters that I think may prove interesting. Evidently the file you refer to was destroyed in the fire as I have gone through all of the old records at various times and do not recall ever seeing it.

On Page 5 of his Manual on Preservative Treatment of Wood by Pressure, Mr. J. D. MacLean makes the statement that the various coal tars are, in general, unsuitable for wood preservatives when used alone because their relatively high viscosity makes it difficult to obtain satisfactory penetrations. This statement is made after many years of investigation, scientific research and experimental treatment by the Forest Products Laboratory. I do not know of any better authority on this subject.

In view of the present recommendations of the American Creosoting Co., I think Mr. Carl G. Crawford's letter of October 26th, 1917, in the enclosed file, is particularly interesting.

L
enc

See Forest Products Laboratory Circular dated June 1st 1922 Ref Tar

OFFICE OF
CHIEF ENGINEER
FEB
2 13
1940
NOR. PAC. RY.

3659

St. Paul, Minnesota
January 31, 1940

Mr. A. J. Loom:

Your letter of the 29th about use of straight coal tar for treating ties.

Please look through your files and see if you cannot find a specification under which we bought refined tar years ago. I am still very firmly of the opinion that there must be some requirements that tar used for this purpose must meet. Some tars as you know carry a very heavy carbon content and others a lot of ammonia. Both of these ingredients are of course objectionable, and I believe that it will be necessary to refine tars of such character but that there may be some change about meeting the characteristics of refined material and that they can be used as produced.

I know that there was a specification for refined tar, but whether it got cleaned out in the fire or not is something you will have to find out. If you can't locate it, it is possible that we may be able to find something down here that is a long ways back and the records of the Purchasing Department are of course entirely out of the question.

It may be that there is something in the Chief Engineer Maintenance of Way file.

LS:wp

Office Engineer



Brainerd, Minn., Jan. 29th, 1940.

MR. LOWRY SMITH:

In reply to your letter of December 20th concerning the use of straight coke oven tar as a preservative in treatment of ties.

On my recent attendance at the A.W.P.A. Convention at St.Louis I found that the treating plants I had intended to visit were not operating, but think I obtained all of the information about straight tar treatment that is available to us at present.

I was told by several members of the Wood Preservers' Association who are treating with 100% tar, that their success in obtaining satisfactory penetration depends on the kind of tar being furnished them. Some tars they state are equivalent, in their opinion, to a 50-50 creosote solution. When tar of this kind is available they claim fairly good penetration is obtained, but higher temperatures and longer pressures are required. One man states that he has been securing fairly good penetration in Pine and Oak, but not so good in mixed hardwoods, such as Beech and Maple. His results for the past four years in the treatment of mixed Oak ties have been as follows:-

Desired Retention	1936	1937	1938	1939
3.50 Gal. Tar. Main Track Ties	3.37	2.76	3.54	3.47
2.50 Gal. Tar. Side Track Ties	2.45	2.07	2.83	2.77

This is the most favorable report I was able to obtain in favor of tar treatment. He stated that the cost of the tar used was about half that of creosote and that it was for this reason only that they were using 100% tar.

It was reported at St.Louis that only four railroads are now using 100% tar, namely, The N.Y.C., the D.L.& W., the N.Y.,N.H.& H. and the Erie, only at two of its plants. The C.& O., P.M. and the Nickel Plate did to some extent, but have now returned to creosote-coal tar solutions. I was also told that the N.Y.C. has appointed a committee to investigate the results of their tar treatment.

Straight Tar

It was the common impression of all of the members I talked with that a selected quality of tar was necessary in order to obtain satisfactory treatment, but I was unable to get any definite information except that their Consulting Engineer, Dr. von Schrenk and Dr. Buckman of the American Creosoting Company were conducting experiments to obtain the results of this kind of treatment and to make changes or improvements if possible. The treating engineers now using this treatment informed me that they were not permitted to give out any information regarding it, although they invited me to visit their plants when they resume operation in April and May.

The A.W.P.A. and the Forest Products Laboratory do not recommend 100% tar as a wood preservative and as far as they know there are no service records to prove what results might be expected.

I will continue to obtain all of the information I can as to the quality and prices of tar available to us within reasonable haul to our plants, so we can make a direct comparison with the cost of our present creosote-petroleum mixture.

L

OFFICE OF CHIEF ENGINEER
JAN 29 1940
NOR. PAC. RY.
ST. PAUL, MINN.

Saint Paul, January 15, 1940

MR. H. E. STEVENS:

Your letter of December 20th, in regard to utilizing the services of Dr. Hermann Von Schrenk to analyze our tie situation and the tie plant practices:

I have known the Doctor personally for a number of years, and he is regarded highly as a timber technician and authority on treatment.

By training he is a plant pathologist, and that is one who deals with the physical characteristics and diseases of wood. His early connections were with educational institutions, I think in Saint Louis. He later was with the U.S. Department of Agriculture, and did a lot of investigating of wood preservation which at that time was carried on only to a slight extent in this country. On account of the more extensive use in Europe he made several trips of investigation, and in accordance with the Agricultural Department practice the reports were published and distributed to the public. Along about 1904 when the first real activity in wood preservation on the part of the central western roads began none of them had anyone in its organization that knew anything about it, and they were naturally interested in getting information from someone of recognized authority. Doctor Von Schrenk naturally fitted in, and he left the Department of Agriculture to set himself up as a Consultant.

Whether his advice would be helpful to us only a trial could tell, but I believe each railroad has certain individual problems to meet and solve that are due to location, species of wood available, costs, and other considerations.

A start in tie treating was made by the Big Four Railroad under a contract with the American Creosoting Company, which has since expanded so that with its affiliated organizations it has about 20 plants and has contracts with the New York Central, the New Haven Road, the Lackawanna, the Lehigh Valley, Boston and Maine, Rock Island, Frisco, Southern, Kansas City Southern, Chesapeake and Ohio, and others. I understand that Dr. Von Schrenk is consultant for a number of these roads that treat under contract. You will recall that a few years ago when we were asked to review a form of treating contract the Doctor was consultant for that road.

Since the practice of timber treatment has become general in this country a number of important railroads established their own plants and so far as I know none of them employ outside consultants. Undoubtedly in the earlier years Dr. Von Schrenk performed a great work and his services are still of importance to roads not having qualified technicians of their own.

I understand further that his working experience has been concentrated in the East and South, and particularly with the woods native to those sections. Doubtless however he has a knowledge of the woods of the Northwest.

While we have endeavored to establish our tie practices for the best interests of the company, we certainly desire to learn wherein such practices can be improved and accordingly if the President decides that he wants such a study made, it would be inconsistent to object, and we will be glad to give our assistance.

On receipt of your letter of December 20 I discussed Dr. Von Schrenk's new method with Mr. Lowry Smith, and found that Mr. Smith already had a file on the method and had instructed Mr. Loom to go to one or two plants using the new method and obtain first-hand knowledge.

Briefly, what is involved is the use of coal tar instead of creosote and fuel oil. Apparently what is back of it is the theory that creosote oil is distilled from coal tar so that the mother liquor contains all the toxic values for which we use creosote oil. Instead of going to the expense of distilling out the creosote oil, use the mother liquor. In this new process I understand the producers are interested, for it gives them a market for all of their coal tar products without special marketing.

You will recall that a number of years ago we added coal tar to creosote oil, but found it caused so much trouble on account of its stickiness that we changed to the creosote fuel oil mixture - which also resulted in a saving in preservatives. I fear that the coal tar method will result in the ties being so messy that we will run into difficulties with our Maintenance of Way employes.

One of the reasons we use fuel oil with asphalt base is to provide an oily material to fill cracks and act as a lubricant.

I understand that the coal tar treatment is not a secret or patented process; and I think that we will investigate it before passing judgment.

The woods in the Northwest are recognized as the most resistant to penetration of preservatives of any species used for ties; and the penetrating qualities of coal tar should be investigated with that in mind.

bb/s

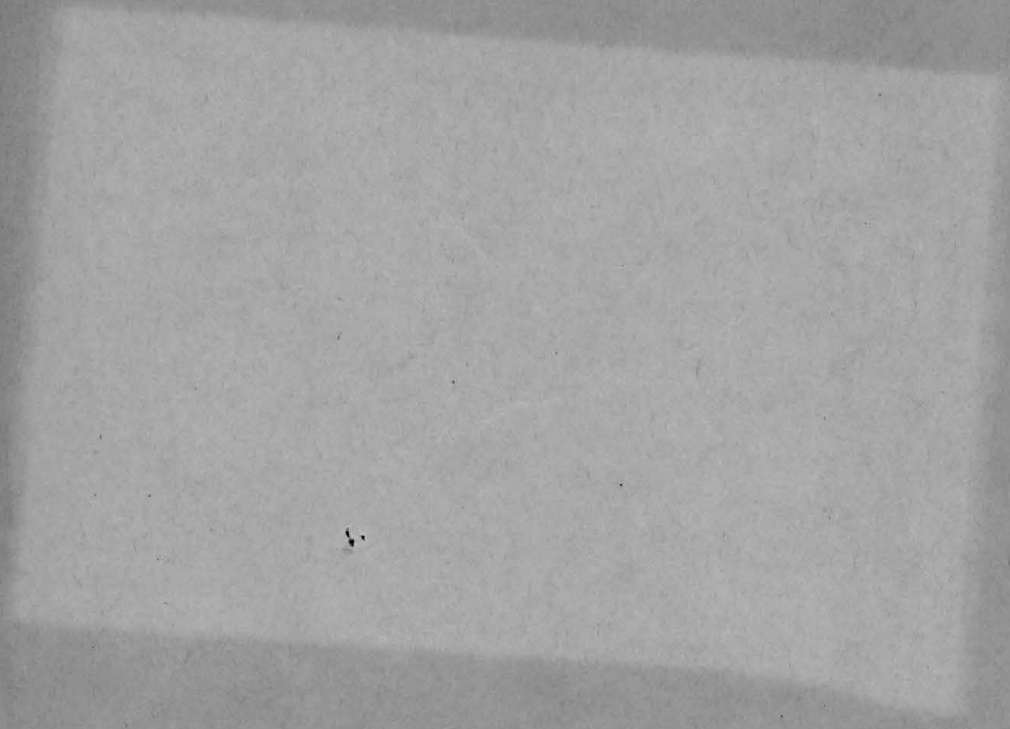
2x

St. Paul, Minn., January 12, 1940.

Mr. Bernard Blum:

Can you now let me have your comments and recommendations as to the necessity of employing Dr. Hermann Von Schrenk to make a complete analysis of our tie situation and tie plant practices?

H E Stevens



CHIEF ENGINEER
JUN 12 1970
NEW YORK, N.Y.

(This to follow "AA")

Whether his advices would be helpful to us on a trial only could tell but I believe each railroad has certain individual problems to meet and solve that [redacted] are due to location, species of wood available, costs and other considerations. [redacted]

Friday, January 5

It might be of some interest to know something of Drom Fahrenholz's background and how he attained and maintained the position he occupies.

By training he is a plant pathologist and that is one who deals with the physical characteristics and diseases of wood. His early connections were with educational institutions & think in St Louis. He later was with the U. S Department of Agriculture and did a lot of investigating of wood preservation which at that time was carried on to only a slight extent in this country. On account of the more extensive use in europe he made several trips of investigation and in common with the customs of the Agricultural Department practice the reports were published and distributed to the public.

Along about 1904 when the first

real activity in wood preservation in the part of the central western roads began none of them had any one in its organization that knew anything about it and they were naturally interested in getting information from some one of recognized authority.
Dr von Schrenk naturally filled in and he left the Department of Agriculture to set himself up as consultant, along with Fulks and Cammerer, [redacted] later went with the American Creosoting Company.
The start of the activity in treating ties was the contract made by the Big Four (CCC&StL) RR with the American Creosoting Company.
The American Company has since expanded as you know until with its affiliated organizations it has about twenty plants and treats material under very favorable contracts for the New York Central

Ayrton, the N.Y.N.H.+H., D.L.&W.
Boston and Maine, Lehigh Valley,
Kansas City Southern, C.R.I., Frisco,
Rock Island, C.+O. and others
that I do not recall.

It is my understanding that Dr von Schrenk
is consultant for practically all of the
roads having work done by the American
Company and I do not recall that
he is retained by any others.

I know of no road that does its own
work that employes him.

Dr von Schrenk is an able man with
a personality that has enabled him
to retain a position the need for which
has long been outgrown.

In the early days when the men
that knew anything about wood
preservation and preservatives were rare, there
was a very definite reason why he
should be in demand. There are
now many men in the country
just as good if not materially

better informed on wood preservation than he! In fact the men on the various roads that retain him are amply qualified to take care of their own problems.

Dr von Schrenks experience in the treatment of wood has been confined all most entirely to those of the East and south. While he has a talking knowledge of the woods of the northwest his experience has been limited to experimental work carried on by others that he has witnessed or received the reports of. He has been able through his pleasing and impressive personality to collect a tremendous amount of data from all kinds of sources and has an excellent talking knowledge of all phases of the industry and the ability to magnify a rather minor thing into a one of tremendous importance. He also has the ability to get in contact with high officers who

know little about the subject and who are greatly impressed by his profound manner and apparently equally profound knowledge.

If Mr Denny feels that he wants him to report on the Northern Pacific I do not see how we can consistently object to it for as far as I know we have nothing to be ashamed of and our results have certainly not been unfavorable. We of course know of a lot of things we would like to do but it is hard to justify increasing our costs for returns that are at least 20 years removed.

There may be some means of obtaining the same results at less cost and of course that is the thing that must be watched for.

The use of tar as a preservative is simply a move in the direction that we have been following for some time in the use of the creosote oil

Crude oil mixture. The use of tar from all I know was originated in Europe and was not the result of a demand for a better preservative but a cheaper one.

Creosote oil which is distilled from Coal tar only represents about 25 to 40 % of the volume leaving a residue of pitch to be disposed of. The manufacturers are naturally interested in promoting something that will avoid this as the disposing of the pitch has long been a problem.

The argument in its favor of course is that creosote oil is made from tar and why not use the mother liquor. As opposed to this are the facts that tar varies greatly in its characteristics, is more difficult to inject in to wood, is messy to handle and makes working conditions very objectionable. Regardless of all of this its use in this

Country is of comparatively short duration, I think about four years, and we do not know enough about it to speak with any great degree of certainty. I have told Mr Lunn to collect all the information he can and to visit two or three of the plants where it is used.

As I see it if it is an economic problem and if it should appear to be cheaper than our present treatment we can not ignore it on account of some inconvenience provided we can get it into the wood.

We know we should have an incising machine at Bramid and that the boring and adzing machines at both plants should be replaced. Such things in view of our financial situation as I understand it have been out of the question.

As you know there has always been a feeling of opposition to any expense in connection with the treating of ties and any suggestion for expenditure

in connection with the plants have not been met with favor.
I feel that we have ample knowledge to handle our problems if it will be given recognition and made use of.

Brainerd, Minn., Jan. 4, 1940.

MR. LOWRY SMITH:

Referring to your letter of December 20th about visiting some treating plants to obtain information on treatment with straight coal tar.

I expect to attend the A.W.P.A. Convention which will be held this year at St.Louis on January 23rd, 24th and 25th, and will pick up all the information I can while there.

From St.Louis I plan on going via New York Central System to Indianapolis, Marion, Ohio and Toledo, and will visit plants at these points where straight tar is being used. If I am unable to obtain full information at the plants mentioned I plan on going to Rome, N.Y., Patterson, N.J. and return to Chicago over the Erie and am ordering passes to make this possible.

However, it does not seem likely that I should have to go beyond Toledo, and if not, I will return to Chicago over the New York Central Lines and will not use the balance of the transportation unless I think it necessary.

Am enclosing pass requests herewith and shall be glad to accept any further suggestions that you may have in mind.

L
enc

OFFICE OF
CHIEF ENGINEER
JAN
15
1940
NOR. PAC. RY.

N. P. 1386 12-24

TELEGRAM—BE BRIEF

TIME FILED 3659 M.

Saint Paul, December 23, 1939 A F Stotler

Seattle

Form 202 approved transferring Hopkins to your roll at present rate effective January 1 1940. B-231

Mail Bernard Blum
Cy AJLcom (personal)

Also effective January 1 the salaries of Mr. Willcutt and Mr. Levi Johnson are made $210 per month with title of General Foreman.

Bernard Blum

R 12/26

St. Paul, Minnesota,
December 20, 1939

Mr. Bernard Blum:

Mr. Denney asked my opinion as to the advisability of employing Dr. Hermann Von Schrenk to make a complete analysis of our tie situation and tie plant practices. I advised Mr. Denney that we had kept in touch with all of Dr. Von Schrenk's theories and reports rendered to other lines and that in my opinion the operation of our plants was in line with the best practices as at present developed. Certainly our results compare favorably with such figures as we have been able to obtain from other operations.

It appears Dr. Von Schrenk is now advocating the use of straight crude oil as a treating medium instead of the fifty-fifty mixture.

I wish you would let me have your comments and recommendations at your early convenience as to the necessity of employing Dr. Von Schrenk.

3659

Saint Paul, December 20, 1939

MR. H. E. STEVENS:

In accordance with your letter of December 11th I am submitting herewith form 202 to cover proposed changes in the Tie Treating Plant organization, and for transfer of Mr. George Hopkins to Mr. Stotler's roll, in line with my letter of December 9th.

I have shown on the form that the change is to become effective January 1, 1940.

bb/s

3659

St. Paul, Minnesota
December 20, 1939

Mr. A. J. Loom:

Your letter of the 16th to Mr. Musselman about the use of straight coke oven tar instead of creosote oil, etc., for treating ties.

This is something that has been mentioned and I think it would be well for you to get complete information on it. The information should cover the following items and any others that may occur to you -

Surface condition of the material after treatment.
Is tar filtered or otherwise refined
From what point is it available
What is the f.o.b. cost as compared with grade one oil
What are its distillation characteristics
Ability to obtain penetration into the wood
Working temperatures and pressures.

I believe at the first opportunity you should also visit one or two of the plants where this material is being used so that you can see for yourself what the conditions are.

LS:wp

Office Engineer

N. P. 202 10-29

AUTHORITY FOR PAYROLL CHANGES

No. 188

Assistant Chief Engineer, Seattle

Engineering DEPARTMENT Tie Treating Plants DIVISION Dec.19, 1939 19

NAME OR LOCATION	OCCUPATION	PRESENT RATE	PROPOSED RATE	DATE EFFECTIVE
C. R. Hopkins	Asst.Gen.Supt.Tie Treating Plants	$285.00		
	to			
	Assistant Engineer, Seattle		$285.00	Jan.1,1940
C. L. Wilcutt	Yard Foreman, Paradise	*198.30		
	to			
	General Foreman "		$210.00	"
Levi Johnson	Yard Foreman, Brainerd	*198.30		
	to			
	General Foreman "		$210.00	

* Salary $174.90 per mo. plus overtime, 2 hours daily when plant operating: average monthly salary $198.30.

REASON FOR CHANGE: INCREASE ~~OR DECREASE~~ PER MONTH $23.40 PER ANNUM $280.80

C. R. HOPKINS transferred to Asst.Chief Engineer's payroll at Seattle, at his present salary, to supervise docks and to provide general supervision of property leased to shippers. This will result in a reduction of $285 per month in Tie Plant rolls.

To provide for proper supervision at tie plants it is proposed to increase the rate of the yard foremen to $210 per month to cover all services. This will result in a total payroll increase of $23.40 per month.

RECOMMENDED: Bernard B. Lamm	APPROVED:	APPROVED:
APPROVED:	APPROVED:	APPROVED: H. B. Stearns VICE PRESIDENT.
APPROVED:	APPROVED:	AUTHORIZED: J. H. Poore FOR THE PRESIDENT.

3659

Saint Paul, December 19, 1939

P e r s o n a l

MR. A. J. LOOM:

Our discussion about changes in rate of yard foremen at Brainerd and Paradise, making Mr. Wilcutt and Mr. Johnson general foremen:

I am submitting form 202 to cover, effective January 1,1940 and also providing for the transfer of Mr. Hopkins from the tie treating roll to Mr. Stotler's roll.

I have asked Mr. Stotler to explain the new line-up to Mr. Hopkins but inasmuch as Mr. Hopkins now reports to you I think it would be advisable for you to inform him of the new arrangements, which will take place on January 1st provided the Form 202 is approved.

cc-Mr. A. F. Stotler
x

bb/s

N. P. 1386 12-24

TELEGRAM—BE BRIEF

TIME FILED 3654 M.

St. Paul, Minnesota Dec. 18, 1939

A F Stotler

Seattle

S-119 Figure on submitting form 202 effective January first

Will you explain the new lineup to Hopkins B-181

BERNARD BLUM

N. P. 1386 12-24

TELEGRAM—BE BRIEF

TIME FILED M.

78 CF G

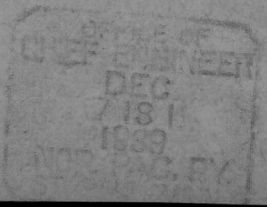
SEATTLE DEC 18 39 BERNARD BLUM

STPAUL.

YOUR PERSONAL AIRMAIL DEC 13. I CONCUR IN YOUR RECOMMENDATIONS AS UNDER THIS CHANGE WE WILL BE ABLE TO TAKE CARE NOT ONLY OF DOCKS IN SEATTLE AND TACOMA BUT ALSO OF ALL OTHER OPERATING AND LEASED STRUCTURES SEE NO NECESSITY FOR CHANGE IN RATE AS THIS WOULD COMPLICATE BALANCE PERSONNEL S 119

STOTLER

226PM


DEC
1939

Mr. Towny Smith

Brainerd, Minn., Dec. 16th, 1939.

Mr. C. B. Musselman
Supervisor Timber Preservation
Lehigh Valley Railroad Company
Manville, N. J.

Dear Mr. Musselman:--

Your letter of December 13th with mention of several railroads who have since 1934 been treating all of their ties with 100 percent coke oven coal tar is very interesting and I shall be glad to call it to the attention of our committee at once.

We had some very disagreeable experiences many years ago in our attempts to use a mixture of refined coal tar with No. 1 creosote which I have not yet forgotten so I am particularly interested in your report that so many railroads have in recent years been sold on 100 percent tar.

In my opinion a saving in first cost should not be confused with ultimate economy.

Copy to Committee Members

A. J. Loom

Chairman A.W.P.A. Committee 7-1

L. S.
Copy for your information.
12/17

(COPY)

Manville, N. J. Dec. 13th, 1939.

Mr. A. J. Loom
Chairman, Comm. 7-1
Tie Service Records
American Wood Preservers' Association
Brainerd, Minn.

Dear Mr. Loom:--

Since 1934 several railroads, among them the N.Y.C, the D.L.&W, the Erie, the N.Y.N.H&H and the C & O, have been treating all of their rairroad ties and switch ties with 100 percent coke oven coal tar. I am of the opinion that use of 100 percent coal tar should now be given very definite consideration by our committee.

Claims are being made by the users of 100 percent tar that ties and timber so treated can be expected to give a service life equal to that now being obtained from ties treated with either 100 percent creosote or any of the creosote-coal tar solutions.

To me this question of the use of 100 percent coal tar for treatment is very important. It is important first of all from an economical point of view as the use of 100 percent tar as compared with creosote or any of the creosote-coal tar soulutions represents a saving from 5 to 10 cents or more per tie.

It might be to the best interest of the association to call this matter to the attention of your committee before the annual meeting.

With best wishes and trusting to see you in St. Louis next month.

Sincerely

Signed - C. B. Musselman

Supv. Timber Preservation

3659

A i r m a i l Saint Paul, December 13,1939

P e r s o n a l

MR. A. F. STOTLER:

Attached is copy of my letter of the 9th to Mr. Stevens, in reply to which he has advised me that form 202 may be submitted to cover the changes proposed, including transfer of Mr. Hopkins to your roll.

I believe from our several discussions that this arrangement has your approval.

I would like to have your reactions immediately before submitting form 202.

In this connection, while talking the matter over with Mr. Loom he hinted to me for the first time that Mr. Hopkins was expecting an increase under the new arrangement. I did not have that in mind, and you will note that I made no reference thereto in my letter to Mr. Stevens.

Mr. Hopkins now receives $285 per month, which corresponds to the salary of three of our maintenance assistant engineers, and I believe that their positions are if anything superior to the proposed assignment for Mr. Hopkins. Following is the salary record of Mr. Hopkins:

Position	Period	Location	Monthly rate
Chainman	3/06-8/06	Cle Elum	$35.00
Rodman	8/06-9/07	"	50.00
Rodman	2/12-5/12	Lester	50.00
Inspector	5/12-11/12	Tacoma	75.00
Transitman	11/12-5/13	Upham	85.00
Inspector	5/13-7/17	Seattle	95.00
"	7/17-12/17	Various	100.00
"	1/18-8/19	"	110.00- 175.00
(Transferred to Tie Treating Plant)			
Yard foreman	9/19-8/21	Paradise	151.50
Watchman	9/21-6/22	"	.40 hr
Gen.Tbr Insp.	7/22-2/27	Seattle	225.00
Asst.Supt. T.T.Pl.	3/27-6/30	"	240.00
Asst.G.Sup.	7/30 -	"	275.00
August 1937, General Increase $10. Pres.salary			285.00

Mr. Hopkins' last increase was at the time of the readjustment in the Timber Treating department when Mr. Andrew Gibson retired. It would appear from the record that when he was working in the Engineering Department his rate was less than that of assistant engineers, so that his present rate is certainly not inconsistent with the pay of others in the Engineering Department.

Undoubtedly Mr. Hopkins will bring up the point that the perquisites now enjoyed at Paradise, of free rent, light, and possibly heat, are such that the new assignment involves pecuniary loss. That may be true but I do not believe that we can recognize such allowances as a compensation right to an employe.

On the other hand, in view of the discussion we have had with the President about the tie situation, Mr. Hopkins' tenure will be more secure in the new assignment.

bb/s

x

Mr Bleiri

You asked me to remind you
to send Air mail "personal" letter to
Mr Stoller this morning

MG 17/3/34

St. Paul, Minnesota,
December 11th, 1939

Mr. Bernard Blum:

Your letter of December ninth. You may submit Form 202 covering proposed changes in the tie treating plant organization and transfer of Mr. Hopkins to Mr. Stotler's roll.

OFFICE OF CHIEF ENGINEER
DEC 1 1939
MOR. PAC. RY.

3659

Saint Paul, Minnesota,
December 9, 1939.

MR. H. E. STEVENS:

When we were at Portland last week I mentioned to you a tentative setup that Mr. Loom, Mr. Smith, and I have been discussing concerning supervision of timber treating work.

About ten years ago we had a Superintendent of Timber Treatment, three assistant superintendents-who had charge of Brainerd and Paradise plants and looked after the treating work at the Seattle Plant. In addition we had a timber treating inspector located at Seattle.

When Mr. Gibson retired we did awey with two of the assistant superintendents, making the set-up as follows:

Mr. Loom, Supt. of all plants, supervising directly the work at the Brainerd plant.
Mr. Hopkins, assistant superintendent, in charge of Paradise plant.
Mr. Harding, inspector, at Seattle plant.

Subsequently, Mr. Stone-who incidentally is a chemist-was sent to succeed Mr. Harding who was assigned to the Alaskan Way improvement job.

At about this time Mr. Stotler's forces were reduced; and in recent years the work on the docks has increased, and various other problems in connection with leased properties have arisen so that Mr. Stotler has several times brought up the question of additional help. In this connection I might mention the desire of Mr. V.E.Williams to establish a superintendent of leased properties on the Tacoma Division.

I believe that a general improvement in the entire situation can be affected without any material change in total payroll.

Following is the present payroll set-up of the treating plants, and proposed set-up to provide supervision for all the treating work and at the same time provide additional help for Mr. Stotler:

PRESENT SET-UP	Av. monthly salary
G.R.Hopkins, Asst.Genl.Supt., $285 per mo.	$ 285.00
C.L.Willcutt, Yd.Foreman 174.90 "	
Overtime,2 hrs. daily when plant operating	198.30
Levi Johnson, Yd.Foreman 174.90 per mo.	
Overtime, 2 hrs a day when plant operating	198.30
S.H.Stone, Treating Inspector $210.00 per mo	210.00
T o t a l	$ 891.60

RECOMMENDED SET-UP		Av. monthly salary
C.L.Willcutt, Genl. Foreman, at	$210.00	$ 210.00
Levi Johnson, "	210.00	210.00
G.H.Stone, Treating Inspector	210.00	210.00
T o t a l		$ 630.00
Saving on Tie Plant Rolls		261.60
G.R.Hopkins (assigned to Mr. Stotler)		285.00
Net increase in System rolls due to establishing General Foremen		23.40

---ooo---

It is proposed to put Mr. Hopkins on Mr. Stotler's roll at $285 per month, his present salary.

Mr. Willcutt and Mr. Johnson, general foremen at Paradise and Brainerd now have a rate of $174.90 for 8 hours. During the operating periods they put in 10 hours and with overtime their monthly pay averages $198.30. It is proposed to set them up as general foremen at $210 per month to cover all services. In view of their having general supervision of the plants without definitely assigned superintendents over them it seems to me we are warranted in giving them this consideration, and owing to the fact that there are not regular superintendents assigned at each plant it is important that the man in charge have a title establishing his authority.

You will recall that on the recent trip question arose as to the duties of Timber Inspector Stone. In checking up Mr. Stone's activities I find that he has been looking after the treating of ties at Hillyard plant, which no doubt will be a continuing arrangement. He also inspects the odd lots of bridge timber and piling treated at the West Coast plant throughout the year, as well as the switch tie treatment. His inspection work includes the clerical requirements of billing the ties.

Under the new set-up it is proposed to use Mr. Stone when not busy at Seattle or Hillyard, at the Paradise plant. This additional help at Paradise will be necessary with the proposed transfer of Mr. Hopkins.

At this writing it appears likely that the reconstruction of pier 1 for the Alaska S. S. Co. will proceed. You will recall that the statements of valuation of the several docks has not been brought up to date. This work, as well as the increased supervision of the other leased properties suggests the desirability of providing additional help for Mr. Stotler.

I request authority to submit Form 202 to cover the proposed changes.

BERNARD BLUM

Chief Engineer

Brainerd, Minn., Dec. 6th, 1939.

Personal

B

Mr. Bernard Blum:

In reply to your letter of December 2nd about the duties of our treating inspector at Seattle.

This position was established July 1st, 1922 under the Assistant Chief Engineer's office in Seattle. Mr. G. R. Hopkins, who at that time was Yard Foreman at the Paradise Plant, left our service and accepted this position under the title of General Timber Inspector. His duties were to supervise the general maintenance of docks and other structures on the coast as directed by the Assistant Chief Engineer, and also to look after treatment of piling and other material that at that time was being treated for the Railway at commercial plants around Seattle.

When the contract was entered into for treatment of our material at the J. M. Colman Co. plant, our treating program was considerably increased and Mr. Hopkins was returned to us on March 1st, 1927 as Assistant Superintendent Timber Preservation with office in Seattle, under Mr. Andrew Gibson. Mr. Hopkins then had charge of our work at the Seattle plant, but also continued to help the Assistant Chief Engineer to considerable extent on various engineering jobs. It was evidently decided that on account of the engineering work he was doing, Mr. Hopkins could not be tied down to the routine work of treatment inspection which required full time, so on April 15th, 1927 Mr. C. L. Harding was appointed General Timber Inspector to take care of this part of the work. Mr. Harding filled this position until April 1st, 1933 when he was assigned to other Engineering Department work. He was succeeded by Mr. G. H. Stone, our present treating inspector.

On July 1st, 1930, when I succeeded Mr. Gibson, Mr. Hopkins was made my assistant and was moved to Paradise to fill the vacancy caused by my move to Brainerd.

Since 1930, Mr. Hopkins, Mr. Harding and Mr. Stone have all worked for Mr. Stotler during the intervals when their tie plant work was slack. They have had charge of all under-water inspections of piling in the docks, as well as marking of piles for removal and keeping up the continuous blue printed and book records of all piling renewed.

#2.

On May 1st of this year, as you know, Mr. Hopkins was assigned to special work under Mr. Stotler and has been so employed since that date. Mr. Stone has been helping Mr. Hopkins whenever his duties as treating inspector would permit. During the past year, Mr. Stone's time has been charged out as follows:

Seattle Plant Work	66%
Hillyard Plant Work	7%
Engineering Dept. work under Mr. Stotler	27%

In addition to 120,000 cross ties mentioned by Mr. Stone to be treated for 1940 renewals on the Tacoma Division, there will no doubt be the usual quantities of switch ties, piling, lumber and miscellaneous materials to be treated at both plants of the West Coast Wood Preserving Co. at Seattle.

I estimate that treatment of cross ties and switch ties at Seattle for 1940 will not take more than three months time if the plant gives us continuous service, but the miscellaneous small orders for piling, bridge material and lumber are never anticipated long enough in advance to permit satisfactory continuous treatment and therefore requires a correspondingly larger part of the treating inspector's time at Seattle. We do not stock untreated piling or lumber anymore and I feel that it is decidedly to our advantage not to do so. The treating company carries the stock and treats these materials for us on short notice whenever an order is received the year around. We believe that this results in least expense to the railway and that our treating inspection costs are lower than the average.

Shall be glad to talk this over with you at the first opportunity.

L

OFFICE OF CHIEF ENGINEER
DEC 3 1939
NOR. PAC. RY.
ST. PAUL, MINN.

3659

At Portland -
December 2, 1939

PERSONAL

Mr. A. J. Loom:

Your recent letter about certain re-alignment of supervisory forces:

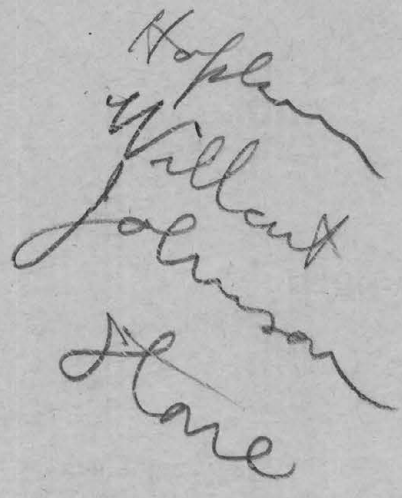
I discussed this with Mr. Stevens but before putting the matter to him formally I would like to have some information as to the exact duties and amount of work performed by your treating inspector at Seattle.

On the present trip we visited the West Coast plant and Mr. Stone met the President. Mr. Stone made the statement that there would be treated 120,000 ties, which immediately prompted the President to ask me what he did with the balance of his time. It is my understanding that, as a matter of fact, we will treat more timber than that although with the completion of the pile inspection his work can not be very onerous.

I wish you would give this a little thought and possibly the best thing to do is to come to Saint Paul after I return this coming Wednesday.

BB:m

BERNARD BLUM



Brainerd, Minn., Nov. 4th, 1939.

Mr. Bernard Blum:

Am submitting herewith, Form 202, covering changes and additions in force required for starting the Paradise plant on December 1st as planned, and assuming that Mr. Hopkins will be returned to us for supervision of this plant. Although assigned to special work under Mr. Stotler on May 1st., Mr. Hopkins has been carried on our Paradise Payroll regularly, so if he is coming back to us his return will not affect the 202.

In the event that Mr. Hopkins is not returned to us on December 1st, I would recommend the following payroll changes which show a saving of $ 182.53 a month or $ 2190.36 a year. This would result in a corresponding reduction in the monthly increase shown on the attached Form 202.

PRESENT SET UP

		Average Salaries Per Month
G. R. Hopkins	Ass't. Gen'l. Supt.	$ 385.00
C. L. Willcutt	Yard Foreman	198.30
(8 mo.@ $ 210.00 - 4 mo.@ $ 174.90)		
Levi Johnson	Yard Foreman	198.30
(8 mo.@ $ 210.00 - 4 mo.@ $ 174.90)		
		$ 681.60

RECOMMENDED SET UP

C. L. Willcutt	General Foreman	$ 210.00
Levi Johnson	" "	210.00
1 Laborer @ 47¢ Per Hour		
10 Hours a working day for		
8 Months out of the year		79.07
		$ 499.07
Payroll decrease per month		$ 182.53
" " " year		$2190.36

The present salary of our Yard Foremen at both Paradise and Brainerd is $ 174.90 a month at 8 hours per day. When the plants are in operation 10 hours are required and they are paid pro rata for the additional two hours which makes their salary around $210.00 a month.

During periods when the plants are not actually treating ties, usually 3 or 4 months out of the year, the yard foremen are paid on an 8 hour basis or $ 174.90 per month. These men have for several years felt that they should have the same monthly salary as is paid our Treating Inspector at the Seattle plant, which is $ 310.00 the year around without additional pay for time in excess of 8 hours a day. So far I have given them no encouragement and have informed them from time to time when they mentioned this matter, that circumstances would not permit my application for any wage increases. However, if Mr. Hopkins does not return I feel justified in presenting their request and would recommend that Mr. Willcutt be given supervision of the Paradise plant and Mr. Johnson of the Brainerd plant under the title of General Foreman at a monthly salary of $ 310.00 a month with no additional pay for time in excess of 8 hours a day.

At Paradise an additional man would be carried as laborer during the time the plant is operating so we can arrange to relieve Mr. Willcutt of some of his present duties, such as testing oil and water and various other minor chores that interfere with proper supervision.

A saving of $ 188.53 per month in our department should make it that much easier for Mr. Stotler to put Mr. Hopkins on his payroll if he still so desires.

If you will kindly advise we will plan accordingly.

Gen'l. Supt. Timber Preserv'n.

3659

St. Paul, Minnesota
September 19, 1939.

Mr. E. M. Willis:

Your letter of the 13th, File 166-9(a), about inquiry from the Milwaukee Road as to details making up the average cost of the treated ties which we used in 1938 as shown in the August 12th Railway Age.

As you state, the average cost for treated ties of $1.14 was taken from the I.C.C. report. I am wondering just how far you care to go in giving the Milwaukee breakdown of our treatment cost. Each company has its own method of making up its cost figures, and generally when requesting figures from some other company sends a detail of its own charges.

I am attaching a copy of Mr. Loom's letter of the 16th giving answers to the specific questions asked by the Milwaukee, but it must be realized that these answers are to a considerable extent estimates.

Question two deals with the cost of treating, and that is something that you said you were getting from the Accounting Department.

Before giving the information to the Milwaukee I suggest that you see that the costs as furnished by Mr. Loom and that by the Accounting Department agree. The Accounting Department figures are furnished by Mr. Loom's office which does its own accounting. However, [illegible] attempting to give a cost per cubic foot as against a cost per tie will very likely result in a difference as the average cubic foot per tie is something that has to be approximated.

I will be glad to discuss this with you before you reply to the Milwaukee if you care to have me do so.

LS:wp
enc

Chief Engineer

cc Mr. A.J.Loom

Brainerd, Minn., Sept. 16th, 1939.

Mr. Bernard Blum:

The following figures were compiled from records in this office in response to yours of September 14th and Mr. Willis' letter of September 13th requesting information for reply to questions asked by the Milwaukee about Northern Pacific cross tie statistics published in the August 12th issue of the Railway Age.

The article referred to is evidently a re-print from AREA Bulletin 411, June - July, 1939, Page 79, Preliminary Report of Committe 3 - Ties. "Report on Tie Renewal Averages and Costs per Maintained mile", for the year 1938 as reported annually to the Interstate Commerce Commission by U. S. Railroads.

I do not know who furnishes this information to the I. C. C. for the Northern Pacific but we find that it agrees with our records for the year 1938. As you know we do our own accounting so we are of course in position to furnish a break down of any of the cost figures that originate in this office as reported to the Accounting Department and to you in our annual "Report of Tie Treating Plant Operation", We do not send out any of this information except as directed by your office.

Questions

1. Kind of treatments (mixture details, net retention, etc.)

Ans. Cross ties are air seasoned from 3 months to a year and treated by the Lowry Process with Creosote-Petroleum mixture.45% Creosote and 55% Petroleum by volume. Net retention 8 pounds per cubic foot.

2. Cost of processing per cubic foot.

Ans. $0.128 for ties used in 1938.

3. Approximate percentage of each species of treated ties placed in track during 1938.

	Percentage
Ans. Minnesota, Wisconsin, Michigan Harwoods	34.856
Minnesota Jack Pine	5.692
Inland Empire Fir & Larch	28.910
Inland Empire Western Yellow Pine	23.245
Coast Douglas Fir	6.575
" Hemlock	.722
	100.000%

4. Approximate percentage of grades each species treated ties placed in track during 1938.

Ans. Grades	1	2	3	4	5	Total
Hardwoods	4.647	2.353	6.855	12.366	8.635	34.856
Jack Pine	2.224	1.112	1.344	.918	.094	5.692
Fir & Larch			4.942	7.035	16.933	28.910
Yellow Pine			4.444	7.700	11.101	23.245
Douglas Fir			.462	5.415	.698	6.575
Hemlock					.722	.722
Totals	6.871	3.465	18.047	33.434	38.183	100.000%

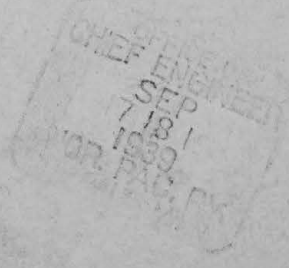
5. Are any treated ties stored at treating plants or are they shipped to divisions immediately after treatment and stored on the line until required?

Ans. Only about 10% of the treated ties used during 1938 were stored at the plants before shipment to divisions. The balance was shipped directly from tram cars immediately after treatment. It is not our practice to store ties out on the line. All treated ties are delivered only from the plants on individual requisitions approved by the Engineering Department or in accordance with Roadmaster's actual count of ties required on each section. Carloads are billed directly to the points where ties will be used or the nearest siding thereto.

Gen'l. Supt. Tbr. Preservation.

Average cost of treated tie before treatment .78 ±

" cu. ft. per tie


CHIEF
ENGINEER
SEP
1951
DIV. PROJ.

3659

St. Paul, Minnesota

September 14, 1939.

Mr. A. J. Loom:

Attached is copy of letter from Mr. Willis about cost of treating ties and miscellaneous information wanted by the Milwaukee.

Can you furnish approximate figures?

IS:wp

enc

Chief Engineer

C O P Y

St. Paul, Minn.,
Sept. 13, 1939

File 166-9(a)

Mr. Bernard Blum:

In the Railway Age of August 12 is an article containing cross tie statistics on various railroads by regions, in which the Northern Pacific average cost per treated tie in 1938 is shown as $1.14, and the Milwaukee Road cost as $1.37, these figures having been obtained from annual reports filed by the railroads with the Interstate Commerce Commission. This comparison has prompted an inquiry to me by the Purchasing Agent of the Milwaukee Road as to what our average cost of $1.14 comprises, and I am obtaining this information from the Accounting Department. The following additional questions are asked:

1. Kind of treatments (mixture details, net retention, etc.)

2. Cost of processing per cubic foot.

3. Approximate percentage of each species of treated ties placed in track during 1938, or if this information not readily available, approximate percentage each species purchased for 1938 renewals.

4. Approximate percentage of grades each species treated tie places in track during 1938, or if this information not readily available, approximate percentage of grades of each species purchased for 1938 renewals.

5. Are any treated ties stored at treating plants or are they shipped to divisions immediately after treatment and stored on the line until required?

I will appreciate your furnishing me with answers to these questions to the extent that the information is available, and to the extent that you consider it proper for me to pass along to the Milwaukee.

(Sgd) E. M. Willis

EMW/hc

St. Paul, Minn.,

September 13, 1939

File 166-9(a)

Mr. B. Blum,
Chief Engineer.

In the Railway Age of August 12 is an article containing cross tie statistics on various railroads by regions, in which the Northern Pacific average cost per treated tie in 1938 is shown as $1.14, and the Milwaukee Road cost as $1.37, these figures having been obtained from annual reports filed by the railroads with the Interstate Commerce Commission. This comparison has prompted an inquiry to me by the Purchasing Agent of the Milwaukee Road as to what our average cost of $1.14 comprises, and I am obtaining this information from the Accounting Department. The following additional questions are asked:

Average Costs
566 Report

1. Kind of treatments (mixture details, net retention, etc.

2. Cost of processing per cubic foot.

3. Approximate percentage of each species of treated ties placed in track during 1938, or if this information not readily available, approximate percentage each species purchased for 1938 renewals.

4. Approximate percentage of grades each species treated tie placed in track during 1938, or if this information not readily available, approximate percentage of grades of each species purchased for 1938 renewals.

5. Are any treated ties stored at treating plants or are they shipped to divisions immediately after treatment and stored on the line until required?

I will appreciate your furnishing me with answers to these questions to the extent that the information is available, and to the extent that you consider it proper for me to pass along to the Milwaukee.

EMW/hc


OFFICE OF
CHIEF
ENGINEER
SEP
13
1939

3659

St. Paul, Minnesota

July 24, 1939

Mr. A. J. Loom:

I am returning your requisition 7-1-P for Plibrico, etc., along with the papers attached to it and think it would be better for you to follow out your usual custom in making separate requisitions for each plant.

As far as we can go is to specify the material wanted and the Purchasing Department will arrange to make the purchases where and from whom they see fit. This is something that we have nothing to do with.

LS:wp

enc

Chief Engineer

Brainerd, Minn., July 21st, 1939.

MR. BERNARD BLUM:-

With return of the attached letters concerning our "Plibrico" requirements at Brainerd and Paradise, will you kindly advise what reply I should make with reference to Mr. Kennedy's requests and suggestions.

I wish to call special attention to the 25 anchor sets which he states are being shipped us, but are not covered by requisition. If these are necessary as he states, we will require the same number for Paradise, and I am therefore including 50 anchor sets on the ~~Paradise~~ attached requisition to cover requirements at both Brainerd and Paradise.

It seems that the Paradise order could be placed with Mr. Kennedy for shipment to Brainerd and we could forward the material from here.

I don't know what to tell him about the Brainerd order which it seems was placed with the Minneapolis representative.

Gen'l Supt. Timber Preservation.

L
enc

3659
6