SPECIFICATIONS FOR HARDWOOD AND SOFTWOOD CROSSTIES AND SWITCH TIES DUAL-TREATED WITH BORATE AND COPPER NAPHTHENATE

NOTE: This specification relates to preservative treatment only and should be inserted into existing railroad specifications covering inspection for acceptable wood species, strength properties and defects, framing tolerances, post-treatment handling, etc.

This procurement specification establishes the minimum detailed technical requirements for wood crossties and switch ties for use by _____ (hereafter referred to as "the Company"). Where current specifications or recommended practices of technical associations such as AREMA and the American Wood Protection Association (AWPA) are appropriate, they are made part of this specification by reference. Guidelines for dual treatment of wood ties treated with borates, in conjunction with other preservatives, are covered in AREMA Manual for Railway Engineering, Chapter 30 - Ties, Section 3.6.4.5.

Dual-Treatment with DOT Borate and Copper Naphthenate – The specifications and procedures used for dual-treated crossties are considered plant specific, depending on their treatment and seasoning processes in use, and are results oriented. The individual plants will submit their specification to the Company for approval. The specification must cover the processing and dual treatment of ties with disodium octaborate tetrahydrate (DOT) followed by overtreatment with copper naphthenate solution.

A. Borate Pretreatment – Green crossties to be air seasoned are given a "2-step" non-pressure treatment with a liquid DOT borate solution to protect against incipient decay (stack burn) and the resulting loss of wood strength.

1. The liquid DOT borate must be an EPA registered preservative and have a product label specifying its use in railroad ties. DOT borate solution concentration shall be determined using the current edition of AWPA Standard A40. Always read, understand and follow label directions.

2. Finished crossties must be treated to a minimum retention of 0.25 pcf DOT per AWPA Standard U1 Commodity Specification C: Crossties and Switch Ties.

3. DOT borate retention for each charge shall be determined by gauge or assay. DOT borate assay retention in wood shall be determined using current edition of AWPA Method A40, with 20 borings taken from an assay zone from the surface to a depth of 2". All borings shall be taken from a 6" or 7" face of the tie.

4. Each charge shall be assayed in this manner. Records of DOT borate weight uptake or assay retentions shall be maintained and available for review by the Company representatives.

5. DOT borate penetration is determined using a color test (AWPA A78) on cores removed from the midpoint of the ties and shows a red to orange color in the presence of borates.

6. The diffusion period after treatment is a critical part of the dual DOT borate-copper naphthenate treating process. The high concentration of borates near the tie surface must diffuse into the tie, which takes several months.

B. Seasoning – Drying green crossties prior to pressure treatment with copper naphthenate is required to provide adequate treatability as evidenced by penetration and retention of copper. Consult AREMA Manual Chapter 30, Section 3.6.3 and AWPA Standard T1 for seasoning guidance and limitations.

Air seasoning is the preferred method to dry crossties after borate pre-treatment. After the diffusion period, ties are stacked into an air-drying configuration and moved to the air-drying yard. A suitable pile cover shall be placed on the top of each individual stack to minimize DOT borate leaching by rainfall.

C. Copper Naphthenate Treatment – Wood crossties and switch ties will be treated with Copper Naphthenate in accordance with the latest version of the AREMA Manual Chapter 30 – Ties, Sections 3.6.4.3 and 3.7.2.3, which reference the current version of AWPA Standards U1, T1, P36 and HSA. Ties should be copper naphthenate-treated using the same procedures applied to dry non-borate treated ties, except where noted in the following specific requirements:

1. Sterilization pretreatment is not required for dual-treated crossties when DOT borate treated before air seasoning.

2. Treatment shall be by the empty cell method with a copper naphthenate solution in accordance with AWPA Standard P36. Copper naphthenate treating solutions shall contain between 0.5% - 1.5% as copper metal, preferably 0.8-1.0% copper, with the exact concentration used that provides adequate retention and penetration in the wood. The minimum solution concentration for treatment to refusal is 0.8% as copper metal.

3. The copper naphthenate concentrate shall be an EPA-registered product and shall be diluted in petroleum-based oils that conform to AWPA Standard HSA (formerly P9-A). Always read, understand and follow label directions.

4. The preservative solution shall be tested prior to each charge in accordance with AWPA Standard A9, A21 or A88 for copper concentration, with a copy retained for inspection by the Company representatives.

5. Treatment shall comprise a minimum 130 psi (psig) pressure but not to exceed 150 psi for Douglas-fir and most western softwoods, 200 psi for Southern Pine, and 250 psi for hardwoods. Refer to AWPA Standard T1 Section C: Crossties and Switch ties.

6. Copper naphthenate treatment should be conducted at 140° - 185°F (60° - 85°C). Preservative temperature during the entire pressure period shall not exceed 212°F (100°C).

7. A final vacuum of not less than 22” Hg shall be applied and maintained until the wood is free of dripping preservative when removed from the cylinder.

8. Dual-treated borings may be sprayed with the 2-part curcumin solution of AWPA Standard A78 to visually check for borate penetration. These should be the same borings used for the visual determination of copper naphthenate penetration.

9. Penetration in material treated with copper naphthenate can usually be determined visually due to the dark coloration. When depth of penetration is indistinct or questionable, penetration shall be determined using indicators in accordance with AWPA Standard A69 (Chrome Azurol S) or Standard A72 (Rubeanic Acid).

10. The Company <u>minimum</u> copper naphthenate retention for dual borate + copper naphthenate treatment of crossties and switch ties is 0.04 pcf (as copper), unless higher retentions are expressly specified.

11. Retention of copper naphthenate (pcf as copper metal) may be determined by gauge or assay. Copper assay shall follow AWPA Standard A9, A21 or A88.

12. Records of assay and gauge copper retentions shall be maintained and available for review by the Company representatives.

D. Care and Handling After Treatment – All post-treatment cuts, daps, drilled holes and injuries such as abrasions, nail and spike holes which may penetrate the treated zone shall be field treated with copper naphthenate containing 2% copper in accordance with AWPA Standard M4.