


Copper Naphthenate for Railroads

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Historical Usage of Copper Naphthenate

- Late 1800's in wood poles, timber, shingles, and lumber
- Textiles and cordage
- Creosote extender during WWII
- Standardized by AWPA (P8) in 1949 for brushed, dipped and remedial applications
- Added to AWPA Pressure Treating Standards in 1989

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Why Copper Naphthenate ?

- Creosote supply - ?
- Regulatory and consumer pressure for a cleaner end product
- Cleaner handling characteristics
- Less odor than Creosote or Penta.
- Less regulation at the treating plant
- FPL studies show it works as well as creosote and Penta
- Cost competitive in today's market
- Approved preservative by Federal and State agencies
- Same lubricating and waterproofing qualities as Creosote, Creosote-Petroleum and Penta.

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Regulatory Status of Copper Naphthenate

- EPA non-restricted use pesticide
  - General Use Classification
- Non-hazardous waste
- Non-hazardous air pollutant
- No reportable quantity required
- Applicators do not have to be EPA certified

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Regulatory Status for CuNap Treated Wood

- Non-hazardous waste by RCRA
- No TCLP regulations
- Disposal in Class II or III landfills – regulations vary state to state and may override Federal regulations.
- Incineration of used ties in permitted facilities is an option.

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Copper Naphthenate Toxicity

- Low toxicity to mammals
- Toxic to wood-destroying fungi and insects
- Not on EPA's Persistent-bioaccumulative-toxic (PBT) chemicals list
- Not listed as a carcinogen
- Readily biodegradable

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Copper Naphthenate Treated Wood Properties

- Low acute mammalian toxicity by oral, dermal, inhalation routes of exposure
- Non-conductive: AAR/AREMA Test Show Less Conductivity Than Creosote
- Insoluble in water, low leaching rate

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Performance of Copper Naphthenate Ties in Track

Lewistown, PA

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Crosstie Performance

- Ties treated using copper naphthenate
- Treated by Burke-Parsons-Bowlby Corp., Spencer, WV plant, February 1988
- Installed August 1988 in Conrail (now Norfolk Southern) line in Lewistown, PA. Inspected June 2001.
- Harrisburg - Pittsburgh mainline, track #2
- Originally 34.3 MGT; Currently ~ 55 MGT
- 6° 49' curve; 0.46 percent grade

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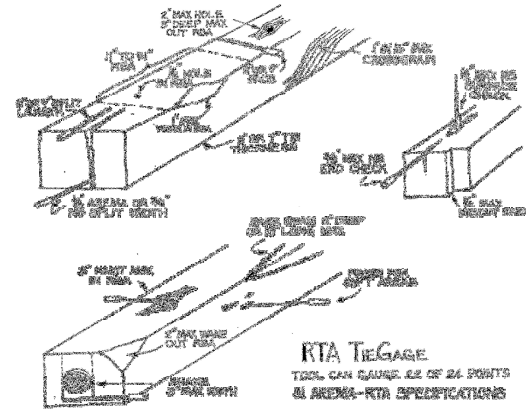
Inspection of Ties



- Length and volume of splits/checks measured using RTA "TieGage"

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Ties in Test - Lewistown, PA

- Copper Naphthenate (3.4 pcf of solution, or 0.03 pcf as Cu) - Air Seasoned
- Copper Naphthenate (5.0 pcf of solution, or 0.04 pcf as Cu) - Boulton Seasoned
- Creosote (7.8 pcf) - Air Seasoned
- Creosote (7.8 pcf)- Boulton Seasoned

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Ties in Test - Lewistown, PA

- Borate Dip Only (Timbor™ - U.S. Borax)
- Borate Dip / Air Seasoned + Copper Naphthenate (0.031 pcf as Cu)
- Borate Dip / Air Seasoned + Creosote

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Ties in Test - Lewiston, PA

- 120 Air Seasoned Copper Naphthenate
- 100 Air Seasoned Creosote
- 402 Boulton Seasoned Copper Naphthenate
- 100 Boulton Seasoned Creosote
- 100 Borate Dip + Copper Naphthenate
- 91 Borate Dip + Creosote
- 10 Borate Dip only

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General Comments from Crosstie Inspection

- Copper naphthenate and creosote tie performance, both air dried and Boulton seasoned, was not significantly different
- Plate cutting was slight in all cases, typically thickness of plate or less, and comparable with all preservative treatments
- Track curvature did not appear to influence the number of crossties that were replaced.

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General Comments from Crosstie Inspection

- There were no ties replaced in Section 7 (Boulton dried creosote); performance of those ties was influenced by the proximity of the grease box.
- Replacement crossties were installed in July, 1998 but were not included in these ratings.
- Spike plate fasteners were being replaced with clips, with some ties having both types.

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Average Rating after 13 Years

• Air Seasoned Copper Naphthenate	8.6
• Air Seasoned Creosote	8.9
• Boulton Seasoned Copper Naphthenate	8.7
• Boulton Seasoned Creosote	8.9
• Borate Dip + Copper Naphthenate	7.8
• Borate Dip + Creosote	8.6
• Borate Dip only	7.6

(10 = No degradation)

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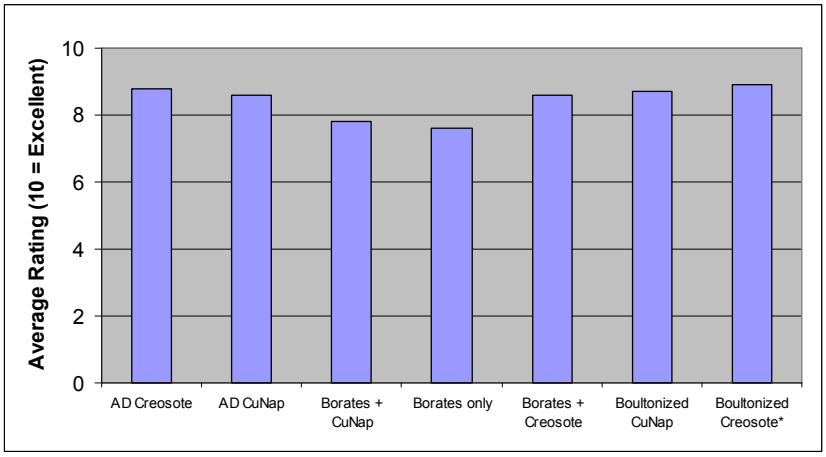
Average Rating after 13 Years



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Average Split/Check Volume, in^3

- Air Seasoned Copper Naphthenate 25.7
- Air Seasoned Creosote 17.2
- Boulton Seasoned Copper Naphthenate 24.0
- Bouton Seasoned Creosote 28.8
- Borate Dip + Copper Naphthenate 39.7
- Borate Dip + Creosote 46.5
- Borate Dip only 9.1

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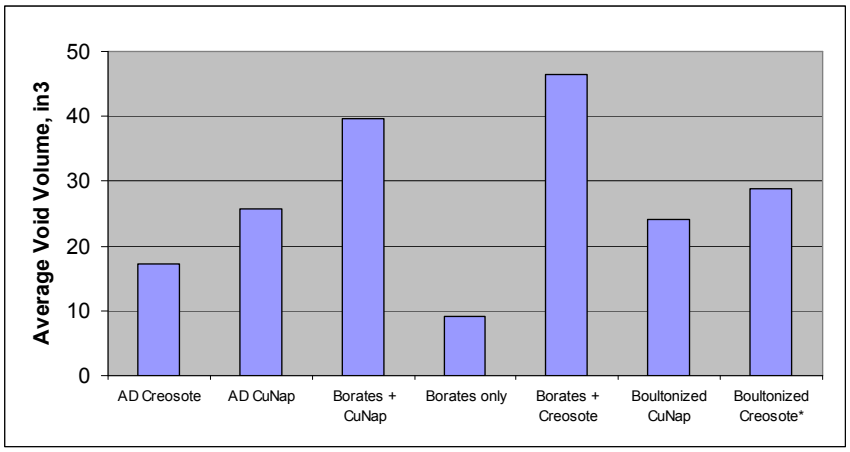
Average Void Volume of Ties in Test



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Tie Testing at FAST

- TTCI study at FAST includes copper naphthenate-treated ties (0.08 pcf Cu) made from various wood species, including softwoods and PSL composite wood ties
- Major focus is on fasteners and mechanical properties of ties treated with alternative preservatives under heavy axle loads rather than a preservative efficacy test
- More than 85 MGT loading on Heavy Axle Load circuit to date
- Less conductive than creosote-treated ties in standardized AAR/AREMA tests

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FAST Track – Pueblo, CO


FAST Track – Pueblo, CO

USDA Forest Products Lab Post Tests (1977)
SYP Fence Posts - Harrison, MS
Posts planted in 1949
These retentions are ½ of AWPA recommendations

Preservative	Retention	Avg. Life
Untreated	0.0	1.8
Fuel Oil	5.9	33
CuNap	**.03**	**42**
Penta	.30	42
Creo	5.9	37

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CuNap Standardized Uses

- AWPA – Railroad Ties – Standardized in January 2005. Will be in next AWPA manual
- ASSHTO – Approved for any commodity standard as listed in AWPA
- State DOT – Most DOT list CuNap as an approved preservative for Highway use or refer to ASSHTO and AWPA

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Newly Adopted AWPA Standard for Copper Naphthenate-Treated Crossties

- U1-03 Section 7, commodity specification C, crossties and switchties, in corresponding tables for UC4 (formerly AWPA Commodity Standard C-6: Crossties and Switchties)

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Section 3.0 RETENTION SPECIFICATIONS – UC4 PRESERVATIVE RETENTIONS (by gauge)

Preservative	Copper Naphthenate
Preservative Code Number	107
UC4, Species	
Oak and Hickory	0.88 kg/m^3 or Refusal (0.055 pcf or Refusal)
Mixed Hardwoods	0.96 kg/m^3 (0.06 pcf)
Southern Pine and Ponderosa Pine	0.96 kg/m^3 (0.06 pcf)
Coastal Douglas-fir	0.96 kg/m^3 (0.06 pcf)

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Who is Using CuNap?

- Several Shortline Railroads
- DOT Bridge projects nationwide
- USFS bridge projects nationwide
- Utilities & phone companies nationwide
- Fence posts and ag lumber
- DOT salt storage structures
- Major pole barn fabricators

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Copper Naphthenate Treated Ties and Bridge Timbers

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Copper Naphthenate-treated Ties and Bridge Timbers

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Section 3.0 PENETRATION SPECIFICATIONS – UC4

Preservative Penetration – Crossties and Switchties mm (in.)

Oak and Hickory	White Oak, 95% of Sapwood Red Oak, 65% of annual rings
Mixed Hardwoods	38 mm (1.5 in) or 75%
Southern Pine and Ponderosa Pine	63 mm (2.5 in) or 85%
Coastal Douglas-fir	13 mm (0.5 in) and 90%

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Clean to Work With

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Stringer & Tie Repair

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Copper Naphthenate-treated Ties

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Merichem Tie Treating Study

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Copper Naphthenate Products

Treated Timber Bridge

Utility Poles

Treated Glued-Laminated Beam

Treated Lumber

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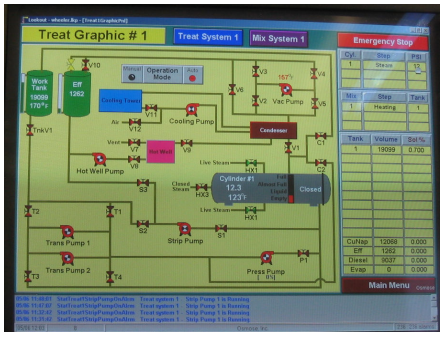
Computer Automated Treating Systems



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In Summary

Copper naphthenate is a viable preservative for crossties, switchties, bridge timbers and remedial treatments.

- An EPA unrestricted use pesticide
- Demonstrated performance/efficacy in hardwoods in lab, field stake and in-track tests

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Thank You

For more information contact :

www.merichem.com

or

1-800-795-4980

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