

TECHNICAL BULLETIN

Preservative Options for Wood Utility Poles

Prepared by:

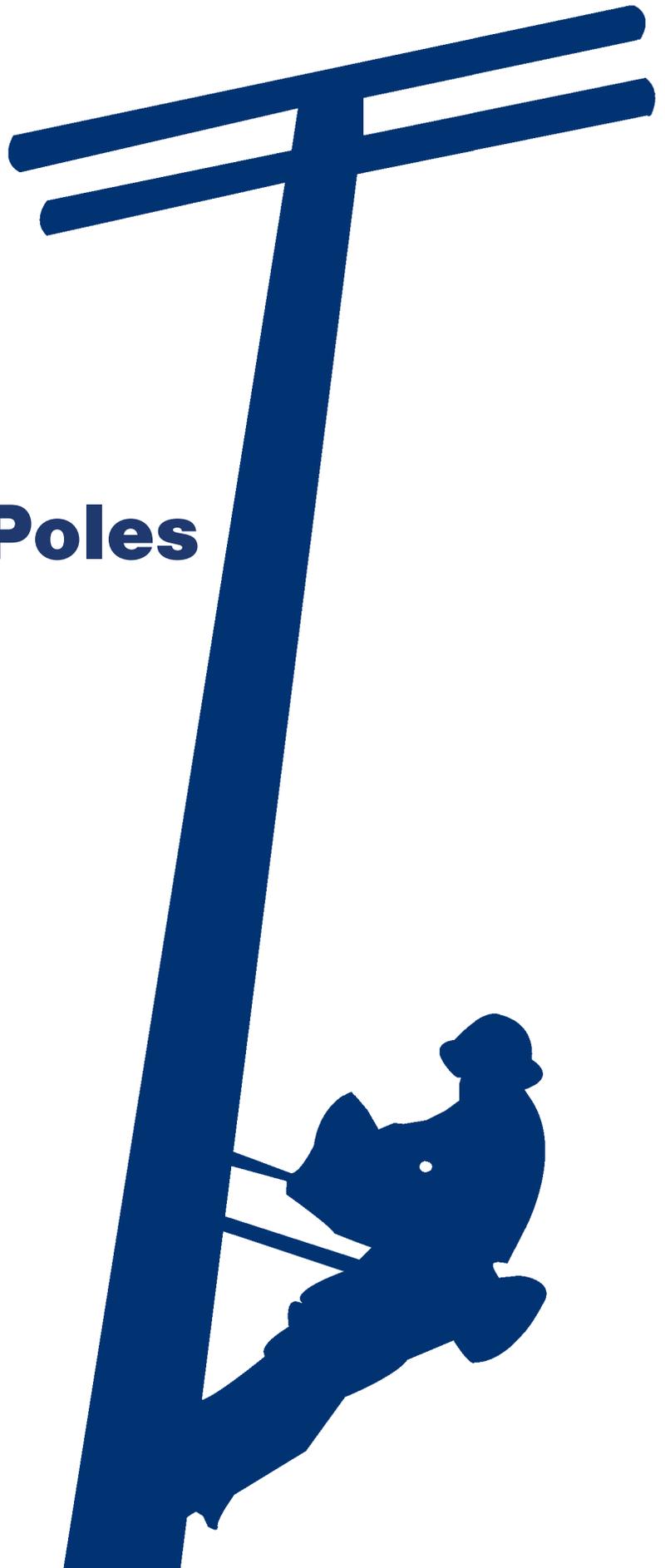
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About NAWPC

The North American Wood Pole Council (NAWPC) is a federation of three organizations representing the wood preserving industry in the U.S. and Canada. These organizations provide a variety of services to support the use of preservative-treated wood poles to carry power and communications to consumers.

The three organizations are:



Western Wood Preservers Institute

With headquarters in Vancouver, Wash., WWPI is a non-profit trade association founded in 1947. WWPI serves the interests of the preserved wood industry in the 16 western states, Alberta, British Columbia and Mexico so that renewable resources exposed to the elements can maintain favorable use in aquatic, building, commercial and utility applications. WWPI works with federal, state and local agencies, as well as designers, contractors, utilities and other users over the entire preserved wood life cycle, ensuring that these products are used in a safe, responsible and environmentally friendly manner. Website: wwpinstitute.org



Southern Pressure Treaters' Association

SPTA was chartered in New Orleans in 1954 and its members supply vital wood components for America's infrastructure. These include pressure treated wood poles and wood crossarms, and pressure treated timber piles, which continue to be the mainstay of foundation systems for manufacturing plants, airports, commercial buildings, processing facilities, homes, piers, wharfs, bulkheads or simple boat docks. The membership of SPTA is composed of producers of industrial treated wood products, suppliers of AWPA-approved industrial preservatives and preservative components, distributors, engineers, manufacturers, academia, inspection agencies and producers of untreated wood products. Website: spta.org



Wood Preservation Canada
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Wood Preservation Canada

WPC is the industry association that represents the treated wood industry in Canada. WPC operates under Federal Charter and serves as a forum for those concerned with all phases of the pressure treated wood industry, including research, production, handling, use and the environment. WPC is dedicated to promoting and supporting a stronger Canadian wood treating industry; informing the public on the benefits to be gained from the use of quality wood products; and preserving the integrity of the environment through the promotion of responsible stewardship of our resources. Website: woodpreservation.ca

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Introduction

At the end of 2021, the sole manufacturer of pentachlorophenol (penta) ceased production of the wood preservative most commonly used in pressure treating wood utility poles. It is expected that penta will remain available for a number of years as current supplies of the preservative are used up.

While the cessation of penta manufacturing in no way affects poles already in service, the impending loss of penta from the market has many utilities concerned about shifting to a “new” preservative.

So what does this mean and should utilities be concerned?

This Technical Bulletin provides an overview of the alternative preservatives available to replace penta and how those preservatives are approved for use based on their performance in protecting the wood against deterioration.

Preservative Standards

Penta was originally developed in the 1930s and gradually became the preservative of choice for many utilities. While penta was a popular choice, there have been alternative preservatives available for many years. Each has been proven effective in protecting wood poles from deterioration.

All preservatives used by utilities, including penta, are standardized under the American Wood Protection Association (AWPA). The AWPA was founded in 1904 and is a consensus, American National Standards Institute accredited standards writing group.

AWPA’s membership includes a balance of chemical suppliers, wood treaters, treated wood users such as utilities and general interest members. It operates under a technical committee structure that evaluates data on preservatives and sets minimum consensus standards for their use on a variety of wood materials.

AWPA sets minimum criteria for standardizing a new preservative and then determines how much of a given chemical should be delivered to protect against a given risk of decay. The standards define

five different Use Categories where the higher the number, the greater the risk for deterioration.

Utility poles are listed under Use Category 4, which is intended for applications where the wood is in contact with the ground or in conditions similar to ground contact exposure. Within this Use Category, there are three sub-groups: UC4A, for non-critical components; UC4B, for difficult to replace components; and UC4C, for critical structural components.

Preservative Performance

AWPA is extremely careful about bringing in new preservative chemicals, especially for a critical infrastructure element like a utility pole. The process for adopting a new preservative into the standards involves a combination of short- and long-term testing covering a variety of performance attributes.

Typically, the process of reviewing data will not begin until a proponent has at least three years of field performance data. They are also expected to perform a series of related performance tests that differ with Use Category. The tests required for consideration are shown in Table 1.

An AWPA task group then examines these data and develops consensus recommendations to the appropriate Preservatives or P Committee for the system as a wood preservative. If the respective P Committee approves the proposal by two thirds vote, then the preservative chemical is listed in the Preservative Standards with a minimum retention recommendation for a given Use Category.

The preservative is then considered for inclusion in a Treatment Standard under the Treatment or T Committees. The T Committees are based upon commodity end use; poles are covered under the T-4 Poles and Posts Committee, which includes a number of utility members.

The proponent provides the same performance data as well as data demonstrating that the preservative system can be delivered into the wood at the recommended retention. The T-4 Committee

Table 1**Data required to support preservative approval for AWWPA Use Category 4**

Preservative Efficacy - Laboratory	
Basidiomycetes	Mandatory
Soft Rot	Mandatory
Termites	Mandatory
Simulated Field Tests	
Fungus cellar	Recommended
Field Tests	
Field stakes	Mandatory
Posts	Recommended
Termites	Mandatory
Field Depletion	
Field stake	Mandatory

Source: AWWPA Guidance Document A

Preservative Depletion - Laboratory	
Water leaching	Mandatory
Soil leaching	Recommended
Evaporative aging ¹	Mandatory
Physical Properties	
Strength	Mandatory
Electrical conductivity ²	Mandatory
Hygroscopicity	Mandatory
Corrosion	Mandatory
Preservative corrosivity	Mandatory
Preservative fixation rate ³	Recommended

¹ Evaporative aging is applicable to preservative systems with one or more organic active ingredients with a significant vapor pressure.

² This conductivity requirement applies only to components of utility line structures and railway ties.

³ Fixation rate only applicable to reactive waterborne inorganic wood treatment systems.

reviews the data and can accept this recommendation by two-thirds vote or propose higher levels.

In addition to the three years of data, adoption of a new preservative involves a minimum of 13 mandatory performance tests which typically takes four to five years to complete (Table 1). There are also a number of recommended tests that may be conducted to ensure adoption of the data on preservative performance.

Adopting Preservatives into Standards

It often takes five to eight years before a preservative is listed in the AWWPA *Book of Standards* for use on poles. It takes many more years for utilities to consider adopting a new preservative system.

As a result, all preservatives currently listed in the AWWPA *Standard U1 Commodity Specification D: Poles* have five to 10 years or more of supporting data.

Once adopted, the standards require a five-year cycle for reviewing the preservative. In each five-year review, additional data must be presented as it develops to ensure continued performance.

To meet these requirements, the preserved wood research community, chemical manufacturers and other interested parties continually perform tests on preservative systems to measure their performance.

This research, as well as the required scheduled renewal, ensures the approved preservative systems as listed in the AWWPA *Book of Standards* show continued performance over a wider variety of environments and an extended period of time.

The process is designed to minimize the risk of an inadequate system entering the standards and provides continuous assessment of preservative systems.

Approved Preservatives for Poles

At present, there are seven preservatives typically available for use on one or more pole species. In some cases, a system may not be standardized for all wood species because data have not been submitted.

As more research data are collected, the AWWPA T-4 Committee may consider proposals for additional species to be adopted for a selected preservative.

In some cases, a specific preservative may not be compatible with a wood species. For example, CCA is an excellent preservative, but previous testing has shown it is difficult to obtain acceptable treatment of Douglas fir poles with this system. Thus, CCA treatment of Douglas fir is possible, but is not recommended.

The preservatives currently recommended for wood poles are:

- Creosote
- Penta - pentachlorophenol
- CuNap - Copper Naphthenate
- DCOI - 4, 5-Dichloro-2-N-Octyl-4-Isothiazolin-3-1
- CCA - Chromated Copper Arsenate
- ACQ - Alkaline Copper Quaternary
- ACZA - Ammoniacal Copper Zinc Arsenate

These are listed with their recommended minimum assay retention values for all UC4 classifications in Table 2.

Table 2**Preservative retentions for utility pole species for AWWPA Use Category 4**

Species	Preservative	Retention pcf		
		UC4A	UC4B	UC4C
Douglas fir	Creosote	9.0	9.0	12.0
	Penta	0.45	0.45	0.60
	CuNap (as Cu)	0.075	0.095	0.150
	DCOI	0.15	0.15	0.20
	CCA	0.60	0.60	0.60
	ACQ	0.60	0.60	0.60
	ACZA	0.60	0.60	0.60
Southern Pine	Creosote	6.0	7.5	9.0
	Penta	0.30	0.38	0.45
	CuNap (as Cu)	0.060	0.080	0.130
	DCOI	0.10	0.13	0.15
	CCA	0.60	0.60	0.60
	ACQ	0.60	0.60	0.60
	ACZA	0.60	0.60	0.60
Western Red Cedar	Creosote	20.0	20.0	20.0
	Penta	1.0	1.0	1.0
	CuNap (as Cu)	0.120	0.12	0.12
	DCOI	0.33	0.33	0.33
	CCA	0.60	0.60	0.60
	ACQ	0.60	0.60	0.60
	ACZA	0.60	0.60	0.60
Red Pine	Creosote	10.0	10.0	12.0
	Penta	0.50	0.50	0.60
	CuNap (as Cu)	0.075	0.095	0.150
	DCOI	0.17	0.17	0.20
	CCA	0.60	0.60	0.60
	ACQ	0.60	0.60	0.60
	ACZA	0.60	0.60	0.60
Western Larch	Creosote	16.0	18.0	16.0
	Penta	0.80	0.80	0.80
	CuNap (as Cu)	0.120	0.120	0.150
	DCOI	0.27	0.27	0.27
	CCA	0.60	0.60	0.60
	ACQ	0.60	0.60	0.60
	ACZA	0.60	0.60	0.60

Source: AWWPA Book of Standards

PCF - pounds per cubic foot

How to choose a replacement

The AWPA protocols are designed to test the ability of a preservative to protect wood poles against degradation without negatively affecting other properties such as strength, corrosion, conductivity, hardness and a host of other issues.

All testing procedures require inclusion of an existing preservative system as a control with a goal of demonstrating equivalency to a standardized system. This means that any of the systems listed within UC4A through UC4C for utility poles will provide equivalent biological performance at that retention.

Utilities obviously want a preservative that will provide a long, reliable service life and the standards assure that. However, individual utilities also have specific attributes that they find important. These might include cost, color, perceptions about climbing, prior performance or other attributes relevant to their service territory.

All preservative systems listed in *Commodity Specification D* in the *AWPA Book of Standards* will provide adequate protection against wood-destroying organisms. Preservative choice is something each utility needs to decide based on other specifications generated by the unique attributes of their network and workforce.

Conclusion

While penta will eventually be phased out as an available pole preservative, a number of equally effective alternatives are readily available to meet a utility's wood pole needs.

Preservative manufacturers can provide specific information on their respective preservatives and answer questions about their use in utility poles. Consult the **WoodPoles.org** website for links to manufacturers of each preservative in the Preservatives section under the Why Wood Poles menu.

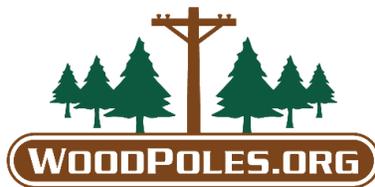
About the Authors

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