

Assessment of DCOI and Alternative Wood Pole Treatments



Background, Objectives, and New Learnings

Utilities install approximately 2.5 million¹ wood transmission and distribution (T&D) poles each year. Each of these poles is expected to last 30 years or more with minimal maintenance, even as they are continually exposed to the elements. To maximize expected life, the poles must be treated with a preservative to mitigate degradation caused by environmental stressors, fungi, insects, and animals. A large percentage of wood poles in North America are currently treated with pentachlorophenol (penta). However, production of penta is expected to end in 2022. As such, utilities are seeking alternative wood pole treatment options. One potential option is 4,5-dichloro-2-N-octyl-4-isothiazolin-3-one (DCOI), approved by the American Wood Protection Association (AWPA) for ground contact use in 2017.

In 2020, EPRI published DCOI Wood Pole Treatment—Overview of History, Research, and Commercialization ([3002018902](#)). The report revealed that there are many unknowns regarding the performance and long-term effects of DCOI as a wood preservative. The objective of this research is to address the following questions:

- How does DCOI affect wood pole strength and other mechanical properties compared to other preservatives?
- How effective is DCOI as a preservative compared to other treatment types?
- Does DCOI performance vary with pole species?

Project Highlights:

- Provides independent analysis of alternative wood treatment options as penta exits the market.
- Investigates how DCOI-treated poles compare with other options in terms of structural capability (for example, strength).
- Measures the fate and transport of DCOI in soil and groundwater.
- Demonstrates the efficacy of DCOI as a wood pole preservative compared with other available options.

- Are there any special inspection considerations for poles treated with DCOI?
- Can traditional remedial treatment options be used on DCOI-treated poles?
- What end-of-life options are available for poles treated with DCOI?
- What are the potential environmental impacts of DCOI?
- Does DCOI pose human health or aquatic toxicity risks?

The research conducted through this project aims to fill knowledge gaps regarding the mechanical and environmental performance of DCOI relative to other wood treatment types.

Benefits

This project is expected to enable utilities to:

- Develop practices to manage potential environmental, human health, and aquatic toxicity risks of DCOI
- Develop inspection practices for DCOI poles
- Define design criteria to account for different mechanical performance
- Establish pole fleet management practices that facilitate long pole life

Project Approach and Summary

This project intends to compare the performance and environmental impact of DCOI with other existing pole treatments, such as penta, chromated copper arsenate (CCA), copper naphthenate, and others. EPRI also plans to investigate the engineering performance of different treatment

¹ <https://www.steel.org/steel-markets/steel-utility-poles/>

types applied to various pole species, such as southern yellow pine, Douglas fir, and western red cedar. EPRI will work with project participants to prioritize the planned testing from among the following:

Mechanical Testing of Pole or Pole Sections

- Full-scale dynamic bending and impact.
- Small scale static bending and compression.
- Material hardness assessments to quantify climbability.
- Flammability testing to assess impact of fire exposure on pole performance:
- Loss in circumference, which is used to estimate relative strength loss by calculating section modulus for pre- and post-burn poles.
- Maximum char depth, affecting pole strength.
- Increase in check size, making it easier for decay fungi to enter the pole.

Preservative efficacy testing to examine how well a preservative protects wood from decay:

- Accelerated tests to evaluate wood preservatives to be used in ground contact.
- Field testing to scale with small-diameter posts and/or pole sections.

Preservative testing will be based on (AWPA standards that examine how well a preservative protects wood from decay by planting samples in the ground and exposing them to decay organisms.

Environmental performance of DCOI:

- Review published human health and aquatic toxicology data.
- Determine leaching rates from wood poles into soil and groundwater.
- Analyze degradation products produced in soil and groundwater.
- End-of-life options for DCOI-treated poles.

Data collection and analysis will take place over three calendar years. Testing is expected at sites that would allow the poles to remain in place, should members wish to collect long-term efficacy and environmental data.

Deliverables

- Periodic webcasts to update participants on progress and results.
- Interim report(s) as research results emerge.
- A comprehensive technical report reviewing literature survey findings, test approaches, research results, and how results can be applied.
- A workshop to transfer results and findings.

The non-proprietary results of this work will be incorporated into EPRI Distribution Systems R&D program, and made available to the public, for purchase or otherwise.

Price of Project

The cost to participate is \$120,000 which can be split over the three-year duration of the project. This project qualifies for Self-Directed Funding (SDF) or Tailored Collaboration (TC) funds. The project requires a minimum of six funders to begin and twenty funders to execute the planned scope.

Project Status and Schedule

This project is expected to begin May 2021 and conclude in 2024. The expected schedule would include:

- 2021: Complete literature reviews; establish stakes for leaching studies; and complete full-scale and small-scale mechanical tests.
- 2022: Complete balance of engineering tests; provide update on leaching and degradation tests.
- 2023: Provide update on leaching tests.
- 2024: Host workshop and final report.

Who Should Join

Utilities that currently use treated wood poles and are evaluating DCOI or alternative wood treatments could benefit from the results expected from this project.

Contact Information

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