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2022 Power & Equipment Show

July 27, 2022

Wood Pole Preservatives
Why this is suddenly important

- History – review of the history of wood preserving
- Information about the current industrial wood pole preservatives
- Comparison of industrial pole preservative
- Use & specification – wood pole preservative
- DCOI – newest and fastest growing wood preservative

Why Preserve Wood?

Wood is an extraordinary material

- It is versatile – it can be shaped, sawn & drilled in the field
- It absorbs shock well
- It is a natural insulator
- It accepts pressure treatment comparatively easily

Not all wood is created equal

- Some wood have a decay resistant heartwood
- Species vary in strength characteristics

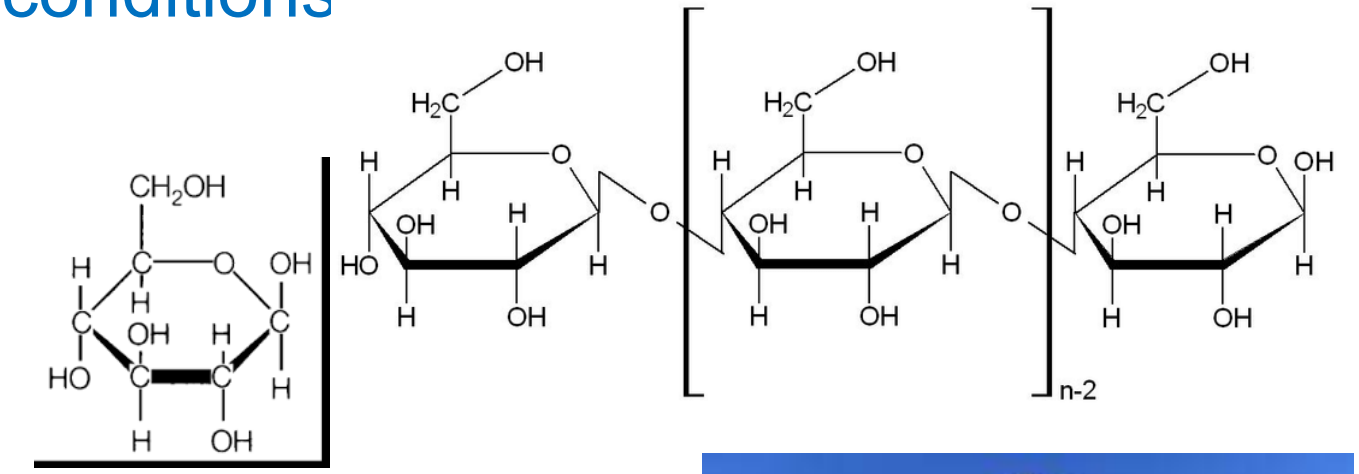
Wood is good but is susceptible to decay fungi and termites

- Proper pressure treatment can extend the life of a pole for one or more generations of trees to grow to pole size

History of the World – of Wood Preserving

Wood decays when the correct conditions exist

- Temperature
- Moisture
- Food source – the wood
- Oxygen



Before wood preserving

- Kept wood dry
- Used construction methods that protected wood especially end grain

Charring

- The temple of Diana sits on charred foundation piles

First Wood Preservation

First record was found in the Bible –

- Noah covered the inside and outside of the ark with pitch

The Egyptians were very good at preserving people – wood?

Greeks

- Building codes
- Natural woods

Romans

- Naturally durable
- Fire retardant
- Pliny - Cedar oils and pitch
- Pliny – garlic/vinegar

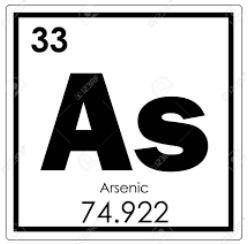
Chinese

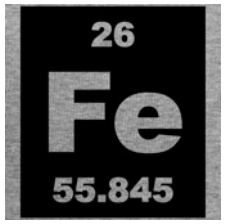
- Salt water – later Bowden 1815

The Next 1,000 Years

Most of the work during this period is a mixture of:

- **Charring**
- **Various oils**
  - Animal
  - Vegetable
  - Mineral
- **Metal & other formulations**
  - Arsenic
  - Mercury
  - Iron
  - Sulfur





Shipping was the lifeblood of many countries

- Tars and various oils

Innovations in Europe

- 1657 Johann Glauber, the famous chemist of Carlstadt, Germany, experimented with vegetable pyroligneous acid, the wood having been first carbonized by the action of fire, then covered with a coating of tar and immersed in the acid. (Pyroligneous acid is obtained by the distillation of wood. It is an acetic acid, holding in solution oily impurities.)
- 1756 Dr. Hales recommended linseed oil for the preservation of ship wood at waterline. Mast tops were also sometimes treated.
- 1828 Gossier proposed a mixture of salts including sulfate of iron and arsenate of soda.
- 1832 Kyanizing – Mercuric chloride

England – Institute of Civil Engineers 1800's

- Burt – reported on all of the earlier work that had been done (He was a wood preserver himself.
- Burnett – 1838 zinc chloride also popular in the US for crossties
- Bethell – made full cell creosote the viable preservative of choice
- Boulton- introduced a way to season in preservative – BUV
- Clark – reported on marine applications
- So much was revolving around creosote
  - What is it?
  - Where does it come from?

Wood Preserving in the United States

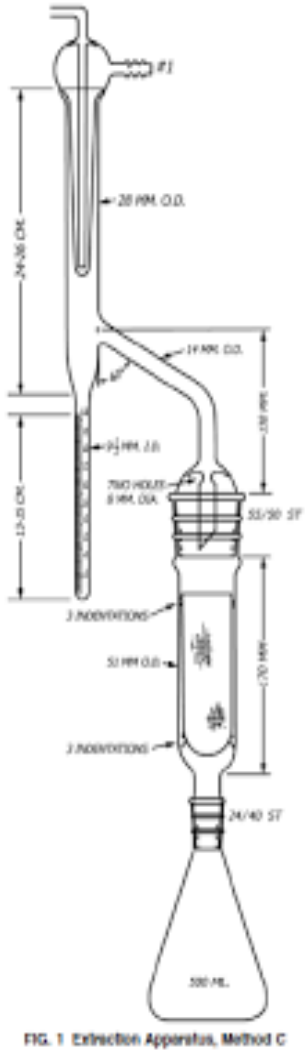
- First plant was in Connecticut – Kyanizing - locks
- Gold rush in California
  - Railroads to get there
  - Wharves to support shipping
- First move to “safer” preservative was by railroads
- Evolution of crossties
  - Quarried stone
  - Naturally resistant to decay
  - Kyanizing 1st 1838 Northern Central RR in Maryland
  - Zinc chloride
  - Creosote

Modern Age of Utility Pole Protection

- Creosote
- Penta
- ACA/ACZA
- CCA
- Copper Naphthenate
- DCOI
- Independent inspection history (Gauge to Assay)

Creosote

- Bolton/Rueping/Lowrey
- Specification
  - Weight
  - Origin
- Suppliers
- Gauge 8/10/12
- Assay 6/7.5/9
- Europe 2025
- Uses
- Advantages & shortcomings



Pentachlorophenol (Penta)

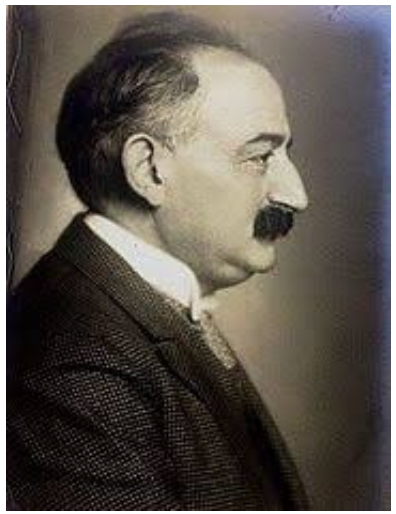
- Origin
- Specification
- Introduction
- Stockholm (SAOPOP)
- Uses
- Manufacturers
- Assay
- USA & Canada
- Advantages & shortcomings

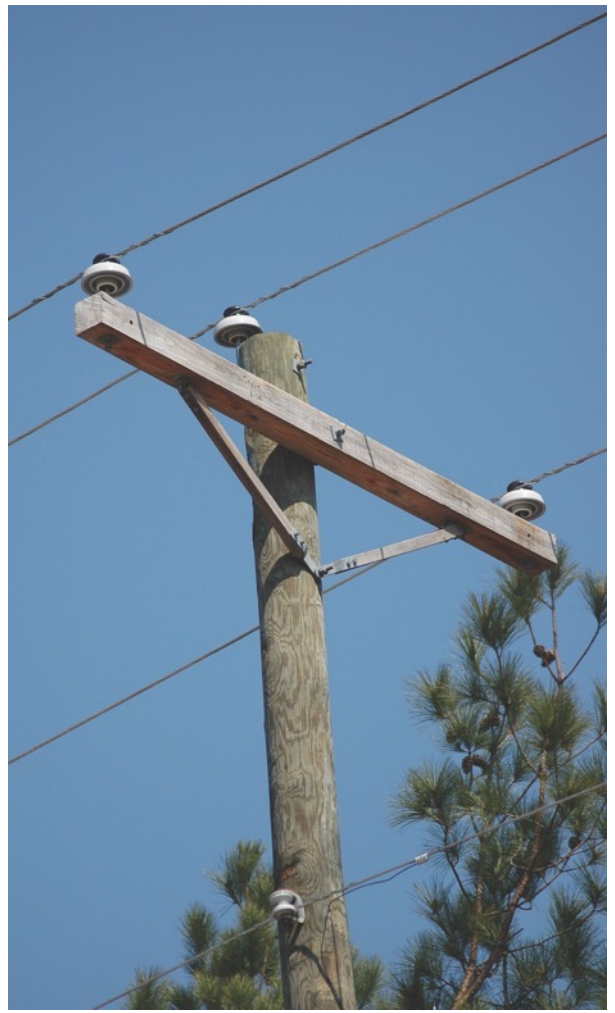
ACA/ACZA

- Ammoniacal Copper Arsenate/Ammoniacal Chromated Zinc Arsenate
- Accidental discovery
- Diamond Match Company
- Specification
- Manufacturers
- Assay
- Uses
- Advantages & shortcomings

CCA

- Chromated Copper Arsenate
- Sonti Kameson
- Evolutions
- History in the US
- Uses
- Manufacturers
- Assay
- Advantages & shortcomings





Copper Naphthenate

- Early uses and variants
- Development
- Renewed interest
- History
- Uses
- Manufacturers
- Assay - copper content only
- Advantages and shortcomings

DCOI

- Development – Rohm & Haas
- Renewed interest
- History - EPRI
- Uses - unique
- Manufacturers
- Assay – lowest pcf
- Advantages and Shortcomings

AWPA Pole Standards - SYP

Preservative	UC4A	UC4B	UC4C
Creosote	8 lbs. (6 lbs. assay)	10 lbs. (7.5 lbs. assay)	**12 lbs. (9 lbs. assay)**
Penta	0.30 pcf	0.38 pcf	**0.45 pcf**
CCA	0.60 pcf	0.60 pcf	**0.60 pcf**
Copper Naphthenate	0.06 pcf 11.75 > 0.51 pcf	0.08 pcf 11.75% > 0.68 pcf	**0.13 pcf cu** **11.75% > 1.10pcf**
ACZA (Douglas fir)	0.60 pcf	0.60 pcf	**0.60 pcf**
DCOI	0.10 pcf	0.13 pcf	**0.15 pcf**
	L - light	M - medium	**H - heavy**

SYP Treatments

Poles treated with:	Creosote	Penta	CCA	Cu Naph	DCOI
Easy to climb	Yes	Yes	Not w/out additive	Yes	yes
Treated with a Restricted Use Pesticide	Yes	Yes	Yes	No	No
Contain heavy metals (Copper or Arsenic)	No	No	Yes	Yes	No
Is Low to no odor	No	No	Yes	No	Yes
Active ingredient also used in residential applications	No	No	No	No	Yes
Contain dioxins or Furans	No	Yes	No	No	No
Protected with a Warranty	No	No	Yes	No	Yes
Contain PAH's (Polycyclic Aromatic Hydrocarbon)	Yes	No	No	No	No
American Wood Protection Association (AWPA) Standard Retentions (SYP UC4C) Book of Standards	9.0 pcf	0.45 pcf	0.60 pcf	0.13 pcf cu (cu is 11.75% of cunap molecule) Preservative 1.1 pcf	0.15 pcf

pcf – pounds per cubic foot

Treated Douglas fir poles

Poles treated with Preservative	Creosote	Penta	CCA	CuNaph	DCOI
Easy to climb	Yes	Yes	No	Yes	Yes
Treated with a restricted use pesticide	Yes	Yes	Yes	No	No
Contain heavy metals (copper arsenic)	No	No	Yes	Yes	No
Low to no odor	No	Yes	Yes	No	Yes
Used in residential applications (decks & railings)	No	No	No	No	Yes
Contain PAH's (Polycyclic Aromatic Hydrocarbon)	Yes	No	No	No	No
Contain dioxins furans	No	Yes	No	No	No
Warranty	No	No	Yes	No	Yes
American Wood Protection Association (AWPA) Standard Retentions (UC4C) Book of Standards	12.0 pcf	0.60 pcf	0.60 pcf*	0.15 pcf(cu) Cu is 11.75% of cunap molecule Just over 1.25 pcf	0.20 pcf

- Not recommended

What is DCOI?

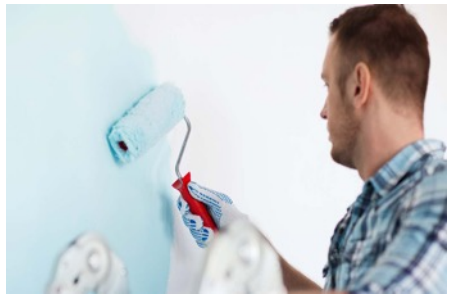
- It is an organic wood preservative.
- It is a broad-spectrum antimicrobial compound.
- It is an AWPA standardized wood preservative listed
- as P-39 in the AWPA Book of Standards since 1987.
- DCOI is the first new oil borne industrial wood preservative in decades.
- 4,5-Dichloro-2-n-Octyl-4-Isothiazolin-3-One

Effective

Decades of stake test data initiated by Electric Power Research Institute (EPRI) and monitored by Mississippi State University (MSU) indicate it performs well in the challenging environments in sub-tropical plots in Dorman Lake MS and Saucier MS.

Effective and Unique

- DCOI is a moldicide used in paints and coatings
- DCOI is an algaecide used in cooling towers
- Industrial microbicide in brewery pasteurizing and can warmer systems



Effective and Unique

- In fish nets, treated wood decks and hulls of ocean going vessels




- DCOI is in drywall, shower curtains and pool liners




Environmental Impact

- Preserved wood poles in general have superior life cycle environmental profile to competing materials
- End of life use as a co-gen fuel eliminates increasingly regulated and expensive land fill costs
- Not a restricted use pesticide
- DCOI is non-persistent in the soil breaking down to simple compounds
- DCOI has low water solubility of ≤5ppm
- DCOI has no metals to be released to the environment
- Lower retention equates to less chemicals overall in the environment

Environmental Impact - Water

- DCOI has low water solubility of ≤5ppm.
- Once introduced into an aquatic environment, DCOI will partition into sediment, where it will be rapidly degraded to readily biodegradable substances. DCOI is unlikely to persist in the environment. It will be removed from wastewater by wastewater-treatment facilities.
- Dissipation half life is reported to be 16.5 hours in surface water and 0.17 days in sediment.
- DCOI has a mean Koc of 6610 L/Kg - Soil Absorption Coefficient
  - A very high value means it is strongly adsorbed onto soil and organic matter and does not move throughout the soil.
- DCOI has a DT50 of 4.7 days in soil. As a result, ground water contamination is not considered likely.

DCOI – Summary of Properties

- Climbable
- Non-restricted use pesticide
- Non persistent in soil
- Low to no odor
- Effective at 1/3 the retention of pentachlorophenol
- Only industrial preservative also used for residential
- More disposal options
- No Dioxins, Furans or heavy metals
- 50-year Warranty

Specifying DCOI

SYP	UC4A	UC4B	UC4C
PENTA	0.30 pcf	0.38 pcf	0.45 pcf
DCOI	0.10 pcf	0.13 pcf	0.15 pcf

Brand or Tag

Suppliers Brand	Penta	DCOI
Plant Designation	A	A
Year & month of treatment	09-20	09-20
Species & Preservative	SPPA	SPDA
Retention	45	15
Class & Length	5-30	5-30

What worked in the past may not be today's best option.

https://treatedwood.com/utilities

Ultrapolenxt.com