WATER-BORNE CREOSOTE

by

John Krzyzewski

Creosote and water can be mixed in a wide range of proportions in the preservative called "Creoblend" (Patent pending - Canada and USA).

Properties:
Creoblend is suitable for preservation requirements. It is highly water-repellent, non-bleeding, stable in a wide range of compositions, and shows no evidence of sludging, separation, or emulsification. It can be frozen and thawed so long as the creosote proportion is above about 30 percent (vol.). At some point below 30% creosote, the water separates, but the limits have not been defined as yet.

Both indoor and outdoor (over winter) tests of storage have been going on for over 5 years. During this time the solutions remained stable and homogeneous.

Creoblend is easy to prepare, requiring no special equipment, excepting a mixing tank and a measuring device. At the time the original formulations were being prepared, the cost of the cosolvents was less expensive than that of creosote.

Once prepared, the stability of creoblend is not critical, i.e. if additional water is required, or additional creosote, these can be added without upsetting any balance, or causing separation, sludging, or emulsification.

Formulation Range:
The creosote content may be in the range of about 15 to 70 percent, and the remainder, water and cosolvents. Inorganic salts can be dissolved in the water phase in the range of about 1 to about 15 percent, and the cosolvents range from 5 percent upwards.

Water Absorption and Water Repellency tests:
Red pine sapwood blocks (3/4 in. cube) were tested by controlled soaking in water. The absorption is indicated as gain in weight using the air-dry weights of blocks as reference. The repellency tests were "Contact-water-angle" (a drop of water is placed on the end-grain of the wood and the time for the globule to soak into the wood is a measure of the water repellency.

The following results were obtained:

TEST SERIES	PERCENT GAIN (Wt.)	TIME FOR DROP TO SAG
1) Untreated controls	58%	2 min.
2) 8 pcf. Pole Treating Oil	38%	12 min.
3) 10 pcf. creosote	29	60 min.
4) Creoblend (6 pcf. creo/0.1 pcf. cu)	16	60 min.

Pressure treatments:

White spruce, squared, incised, heartwood specimens (3x8x48 in.), either side, or end-matched, at a low M.C. of 10.5 to 11.9 percent, were treated. Five sections each were treated with preservatives 1) and 3) (below), and two sections each were treated with 2) and 3).

The following results were obtained:

PRESERVATIVE	ABSORPTION PCF.	PENETRATION AV. (Mean) Min. (Mean)		CROSS-SECT. PENETR.
1) 50/50 Creo/Fuel Oil	14.8	Penetration - erratic		
2) Amm. Cu Arsen (CAA)	--	13.2 mm.	5.2 mm.	45.0%
3) Creoblend (16% creo/1.7% cu)	18.2	16.8 mm.	9.8 mm.	54.4%

In the above tests, the average depth was measured by Quartile point measurement procedure, and cross-section penetrated was determined by planimeter measurements.

Potential usage of creoblend:
Absorption of 35 pcf. were obtained in early tests. Accordingly, a 60 percent creosote solution containing 6 percent inorganic salts, would deposit 20 pcf. creo. and approx. 1 pcf. inorganic salts (per cu. ft.). Treatment of marine piling and other severe decay hazard applications may be envisaged.

Solutions containing less than 20 percent creosote with 1.5 percent inorganic salts may be suitable for railway crossties, and general ground contact usage.

ALTERNATIVE POLE SPECIES

by

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At a time when our pole treating plants are shut down or operating at a fraction of their capacity and wanting to sell poles to the Utilities in the worst way, I did not think a discussion on pole supply problems would generate much interest.

I, for one, do not believe that we should have a pole supply problem, although that could depend on whose statistics one chooses to believe. We know that from time to time pole supply problems do arise, but I do not believe that the shortages are created by a shortage of available trees in the forest. I believe that the shortages experienced are caused more by the fluctuating buying habits of Utilities and everyone else, which also follow the rise and fall of economic cycles. During peaks, the production capacities are over-taxed creating the shortage.

I am an optimist and believe that the genius of man will prevail to combat future supply problems through good management of the resource, better protection, the use of alternate preservatives systems and wood species.

This brings me to the subject that I choose, which is "Alternate Species". My interpretation of alternate species is any species other than Western Red or Yellow Cedar.

At B.C. Hydro we have relatively limited experience with species other than the cedars. Although we have been using Lodgepole Pine poles for something nearing 20 years, their use has been limited mainly to our Central Interior distribution lines. We find that this species treats well, takes uniform preservative penetration, achievable retention with relatively low pressure (approximately 120 psi.), provided poles are adequately seasoned. With the Thermal process, we have been able to get specified retention and experienced no problem in achieving minimum and 100% sapwood penetration with Penta/Petroleum solution, without incising, provided material was adequately seasoned (below 25% M.C.).

Our first experience with Douglas Fir (D.F.) poles was during the early 1970'pole supply crisis caused by the 1970/71 recession. During this span of time, Utilities depleted their pole inventories. The short period of recession, followed by the quick economic recovery, caused an unexpected growth rate which created an unprecedented service demand. With the Utilities already in a low pole inventory position, the suppliers were just simply not capable of coping with the extra demand. I believe we are presently in a similar situation, except that the recovery may be slow enough this time and may allow the pole suppliers the additional time to adjust to a more normal production flow. In any case, about 1973, because of the Cedar pole shortage at the time, B.C. Hydro bought approximately 6,000 D.F. poles, the acceptance of which resulted in some mixed feelings about using D.F. There was some resistance by linemen and others. We had some penetration problems, partly due to shallow sapwood. The poles appeared to be the type grown at the higher elevations. In addition, neither the existing Standards nor our specification were too clear on conditioning requirements or method used to determine moisture content (M.C.)

We did not buy any D.F. poles in any quantity again until 1982 and then it was only 2,000 pieces of Class 3 - 45's. Approximately one-half were treated with Penta/Petroleum Solution, and the other half treated with Ammoniacal Copper Arsenate (A.C.A.). The result of treatments were very satisfactory. In time for the 1982 D.F. pole purchases, our Materials Management Department had revised our treated pole specification which supplements Canadian Standard (CSA) 0.80 requirements. Our specification allows any manner of seasoning/conditioning permitted by CSA, provided M.C. is reduced to a specified level. Determination of M.C. is specified in accordance with the "Combined Species - Temperature Tables for Moisture Meters, VP-X-103". For Penta/Petroleum treatment, where Boulton drying is employed, we specify poles to be segregated into three groups of M.C. segregations: Dry (D) - less than 25%; Semi-wet (S) - 25 to 30%; Wet (W) - over 30%. We specify a final condensate rate of take-off based on cubic measure of a charge for the last hour of "boil". The stabilization time for the rate of take-off is varied in relation to initial M.C. In addition to a minimum penetration requirements, we also specify 100% sapwood penetration. Approximately 1,000 D.F. poles treated, ranged from 18 to 25% M.C., mostly air-seasoned, and a small quantity was kiln dried. The poles were further conditioned by the Boulton process for 16 to 22 hours. Press cycles were 4 hours at 140 psi. One hundred percent sapwood penetration was achieved up to 3" in depth. Retention by assay was consistent at 1.0 to 1.2 pcf. Acceptance rate was almost 100%.

A.C.A. treatment was successful except rejection rate was high and treating cycles were long. Sapwood depths of poles were 1" to 3", averaging about 2". All poles were partially air dried and virtually all kiln dried before treating to M.C. minimum 11%, maximum 25%, and average of 18%. The following is the treatment record of 1,000 pieces of D.F. poles treated with A.C.A.:
Solution concentration - Minimum 2.15%, Maximum 2.56%, Average 2.4%. Ammonia/Copper Oxide ratio - Minimum 1.6, Maximum 2.3, Average 1.9. Press cycle 48 hours at 145 psi. 100% sapwood penetration was achieved in 80% of poles treated. Retention by assay ranged from minimum 0.79, maximum 1.45, and average of 1.0 pcf. All rejected poles were successfully re-treated.

We found that when ammonia ratio dropped to the near minimum of 1.5, our penetration rejection rose. It is quite possible that had the ammonia ratio been raised to the maximum allowable of

3.5, press cycle times could have been lowered considerably. There was no attempt to condition poles after kiln-drying to relieve surface hardening which may also improve treatability.

We found that under our existing conditions, the alternate species can be treated successfully.

There may be a question of cost/benefit which is a subject in itself. However, the Manager of B.C. Hydro R & D materials research section has calculated that, based on today's replacement cost, if pole life was extended by one year, "the saving to Hydro would be around $5 million annually".