Q. [Accounts 355.1 and 355.2] – As it relates to certain statements made in Mr. Wiedmayer's rebuttal testimony on pages 19 through 23 or in Appendix B pages 2 through 6, as it applies to Accounts 355.1 and 355.2 – Transmission Poles and Fixtures, please provide all support and justification, including all documents, for the claim that CCA-treated poles have a shorter life expectancy than other treated poles as referenced on page 4 of Appendix B.

A. The claim that "CCA - treated poles have a shorter life expectancy than other treated poles" relates principally to the use of such poles in the operating environment which exists in Newfoundland Power's service territory. This environment is often harsh with a large amount of precipitation, high winds and cold temperatures.[1]

Utility poles are typically replaced for one of four reasons; (i) decay, (ii) damage, (iii) loading or (iv) to obtain adequate clearance.

There is no evidence to suggest an appreciable difference in life expectancy between CCA or Penta poles due to decay. There is also no difference attributable to clearance.

Penta treated poles do, however, have at least 3 attributes which are superior to CCA treated poles in environments where ice and wind loading or damage from outside forces are significant concerns.

1. Penta treated poles have greater flex (due to oil content) than CCA treated poles, which are drier and stiffer. CCA treated poles will be more susceptible to breakage by ice, wind and storms.[2]

2. CCA pole treatment reduces the impact strength of a pole. A large portion of poles within municipalities are located along roadways. Damage by snow plows etc. or vehicular collision is greater along roadways.[3]

3. CCA treated poles are more susceptible to pole fires.[4]

The three attributes listed above give Penta treated poles an advantage over CCA treated poles within Newfoundland Power's service territory. Due to these attributes it is reasonable to assume that, in aggregate, CCA treated poles will have a shorter life

[1] The Canadian Standards Association has designated the eastern portion of the island of Newfoundland as a severe loading region. More than 50% Newfoundland Power's distribution plant is located in this severe loading region.

[2] See Attachment A

[3] The impact strength of poles treated with CCA is less than poles treated with Penta. This is based upon the reference "The reaction of waterborne preservatives with wood does not affect most strength properties. Resistance to impact is the only one appreciably reduced. Oil-type preservatives cause no strength loss." This statement is made in the online report *Selecting Preservative Treated Wood* available from the University of Minnesota Extension services available at the link http://www.extension.umn.edu/distribution/housingandclothing/dk0897.html

[4] See Attachment A

expectancy than Penta treated poles under the conditions experienced *in Newfoundland Power's service territory.*

In addition, utilities in Canada have experienced problems with the quality of CCA treatment. In the late 1990s Newfoundland Power had an issue with some of the CCA treated poles it received. In 2009, Hydro One identified premature decay on a significant number of CCA treated poles.[5] The problem was determined to be with the quality of the pole treatment.

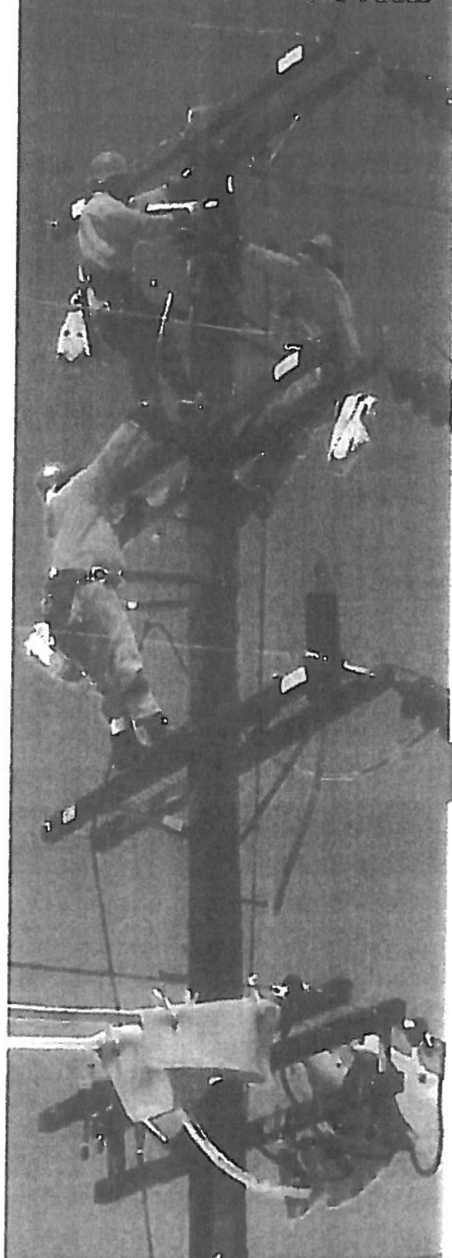
Given the comparative advantages of Penta treated poles and the requirement for increased use of CCA treated poles in Newfoundland Power's service territory, the increase in life expectancy from 44 years to 47 years as proposed in the 2010 Depreciation Study is reasonable and reflective of the Company's experience.

[5] See Attachment B for the Executive Summary of the report *Investigation into Premature Degradation of CCA-Treated Wood Poles and Recommendations to Ensure Their Reliable Performance*. The complete report see http://www.hydroone.com/RegulatoryAffairs/Documents/EB-2012-0136/ExhibitB_Tab2_Sched3_Att1.pdf

Attachment A

A **Cost-Effective** Choice

The **Facts**



Penta is a highly economical choice for preserving wood, particularly over the long-term. According to an independent analysis conducted by Engineering Data Management[1], treated wood is the most cost-effective option for utility poles, both in terms of initial costs as well as total life-cycle costs.

Of the preservatives available for treating wood, only penta is created from two basic and widely available chemicals: phenol and chlorine. This helps assure a reliable supply, which Penta has demonstrated for more than 60 years. Time and again, penta pole production has met emergency demand caused by natural disasters, such as hurricanes, ice storms and tornados.

What else makes penta such a cost-effective choice for utility poles? A number of factors.

Penta poles have a long useful life.

Once installed, penta poles typically last 40 years or longer because of penta's ability to resist damage from decay, fungi, moisture and brush fires.

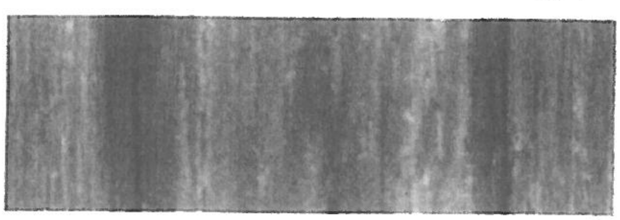
Penta poles' replacement rate averages less than four percent per decade with periodic maintenance, according to in-service records from several utility companies.

Penta repels termites and other wood-destroying insects, minimizing maintenance frequency.

Penta poles' re-use reduces disposal costs.

Because they are not considered to be a hazardous waste, penta poles can be reused and recycled in a number of ways, such as fence posts and farm lighting.

(over)



1 "Lifecycle Study Proves Wood is the Best Investment," *Wood Pole Newsletter*, *Western Wood Preservers Institute, Fall 1997*

More Cost Advantages of Penta Poles

Unloading and Storage
Unloading penta poles is a fast and smooth operation that typically does not require special slings. Once unloaded, poles can be stacked in space-saving piles. Dents and surface nicks that might compromise other materials do not harm penta poles, nor require repairs. Poles made from steel, concrete and plastic take an estimated 30 percent more time to unload, according to a study conducted by the Western Wood Preservers Institute.

Installation Penta poles do not require special installation equipment. If they need to be moved after installation, they can be relocated and reused without special equipment or transportation.

Maintenance Most maintenance is simple and can be performed by trained utility personnel or outside contractors. Drilling, reframing, and adding or changing hardware can be performed promptly on the spot. Normally, there is no need to remove the pole from service to do a treatment or modification. If linemen need to climb a penta pole, they can quickly attach gaffs and climb without delay—working on more poles, more quickly.

A **Cost-Effective** Choice

Penta can be burned for energy recovery in combustion units and industrial boilers that are permitted to burn penta-treated wood because penta **does not contain toxic metals**, unlike some other wood preservatives. This results in almost complete destruction of the penta, with dioxin/furan emissions comparable to that from ordinary particleboard.

Penta helps poles resist breakage and damage from the elements, minimizing the need for emergency repairs or replacements.

Penta poles can be remanufactured and reused as utility poles.

Penta poles are flexible, which helps minimize damage during ice and windstorms.

Penta's ability to resist moisture and repel water minimizes pole checking and twist, and corrosion of pole hardware.

Penta does not significantly change pole electrical conductivity, and therefore, does not require special insulators.

Penta poles resist undetected burning (afterglow) when exposed to grass or brush fires.

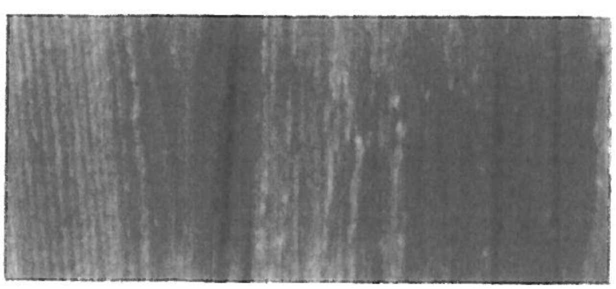
Penta Works on Moist and Hard Woods

As an oil-borne preservative, penta penetrates all treatable wood species effectively saving costs for Western utilities by enabling their use of local trees, such as the Douglas fir and red cedar for utility poles. Some water-borne preservatives have difficulty effectively penetrating certain wood varieties. This forces utilities to either pay to transport poles made from wood that accepts water borne wood preservatives, or perform labor-intensive "through boring" to ensure preservative saturation.

Penta poles are easy to install and maintain.

Penta poles are easy to handle, do not damage easily and rarely require special handling or equipment for installation or maintenance.

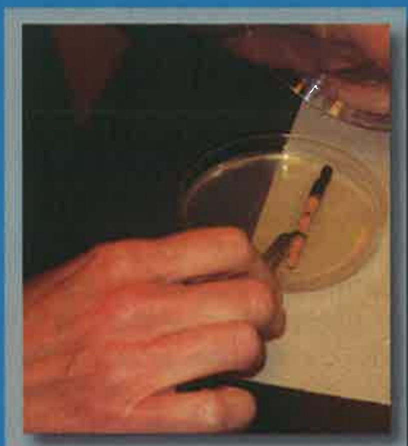
Their ease of use allows crews to handle more poles, more quickly, thereby increasing crew productivity.

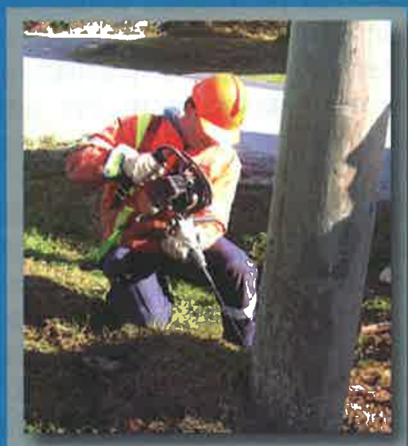


Penta Coucil, Inc.
www.pentacouncil.com

Investigation into Premature Degradation of CCA-Treated Wood Poles and Recommendations to Ensure Their Reliable Performance

Investigation into Premature Degradation of CCA-Treated Wood Poles and Recommendations to Ensure Their Reliable Performance





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EXECUTIVE SUMMARY

Hydro One Networks, Inc. (HONI) has identified a potential threat to the safety and structural reliability of select wood poles within its system. In response to the premature degradation of a portion of its wood pole facilities (poles supplied by a specific manufacturer), HONI requested assistance from the Project Team of EDM International, Inc. (EDM) and Oregon State University (OSU) to develop a better understanding of the problem and to formulate a recommended strategy in order to manage its resolution while mitigating safety and reliability risks.

During October 2009, Project Team personnel worked with HONI crews to inspect approximately 200 CCA-treated red pine poles obtained from a specific supplier. The purpose of the visit was to train crews in each operation center to evaluate and sample the CCA-treated red pine poles suspected of premature degradation. As part of the evaluation, core samples were extracted from the poles for evaluation of proper application of original CCA treatment and culturing for the presence of decay fungi.

Later, in July 2010, the Project Team and HONI Asset Management staff met in Perth, Ontario to dissect a sample of poles determined from the field study to exhibit degradation and/or cultured positive for the presence of decay fungi. The purpose of the degradation profiling was to determine 1) the extent/profile of degradation along the poles length, 2) the ability of the field inspections to accurately identify the extent of decay and 3) the accuracy of nondestructive testing (NDT) tools for identifying decay patterns and possibly identifying early stages of degradation. The following observations are offered for consideration:

- Preliminary visual assessment of preservative penetrations levels identified a significant percentage of the samples to be below the CSA minimum threshold requirements. Additional sapwood penetration analysis using a chemical sapwood indicator, performed during the degradation profiling phase of the project, substantiated the lack of preservative penetration and compliance to code. Subsequent retention analysis, which is the *best indicator of the adequacy of preservative treatment quality* (as it is a function of chemical level per volume of material within the assay zone), also indicated non compliance of approximately 73 percent of the [redacted] red pine poles to the code-specified minimum (9.6 kg/m^3).

- Of the 34 poles culturing positive for decay, 22 poles exhibited positive cultures above the ground level inspection region (greater than 1.5 m). While not a typical decay pattern, it substantiates the concern that the decay likely entered the pole prior to being placed in service. Traditionally, adequately treated poles will exhibit the greatest extent of degradation at the ground level where moisture conditions are ideal for propagating and supporting fungal attack. Poletop degradation, while not prevalent at this point, may become more extensive with time in service.

- The frequency of defects did not significantly differ along the pole length suggesting that the decay was introduced in the air-drying process prior to treatment and that sterilization temperatures sufficient to eliminate the decay fungi were not likely achieved in the seasoning or treatment process. This observation suggests that work practices will need to focus on areas above traditional ground level locations to indentify the extent of degradation and resulting course of maintenance action.

The investigation has shown that due to apparent improper manufacturing attributable to a particular supplier, a large number of wood poles have been placed in service in HONI's distribution system that have a propensity for and are experiencing premature deterioration (decay and insect damage). Alarmingly, it has also been noted that poles characterized by the conditions that are resulting in this problem were supplied to and utilized by HONI for an extended period.

Properly manufactured poles should provide several decades of reliable service before exhibiting significant signs of biological deterioration. In general, the onset of biological deterioration in properly manufactured wood poles typically occurs somewhere near the ground level whereas a significant percentage of the subject HONI poles are exhibiting significant deterioration at locations anywhere along the length of the poles. The nature of the problem is very serious and must be dealt with aggressively and systematically because it represents a significant threat to the safety of electric supply and communication line personnel, and to the public, property and system reliability.

An outline of a recommended approach to manage the resolution of the problem is offered below. The underlying premise is that the nature of the manufacturing problem and the ensuing premature biological deterioration is such that the only viable resolution strategy that properly accounts for the safety and reliability risks posed by these poles is systematic replacement supported by aggressive inspection and maintenance until such time that the issues with the suspect poles have been mitigated. Therefore the recommendations offered below are intended to facilitate a pole replacement effort in a prudent and systematic way over a reasonable time period (e.g., 10 years) while managing safety and reliability risks. Therefore, it is suggested that the following recommendations be acted on as soon as possible.

- Develop and implement improved specifications and requirements for pole manufacturing, procurement and QA/QC to ensure that poles obtained by HONI on an ongoing basis will be of an acceptable quality and provide acceptable long term performance.

- Develop and implement a set of criteria to be used by all line personnel (i.e., both electric supply and communication personnel) to assess whether a pole is "suspect" based on certain inventory and condition information most of which should be readily available from the pole brand/tag.

- Develop and implement a system patrol program designed specifically to collect the facility inventory information necessary for HONI to manage resolution of this problem in a systematic and rationale manner. It may be worthwhile to also conduct some basic inspection activities (e.g., visual inspection, sounding with a hammer, removing and saving at least one core from a pole for preservative penetration analysis, and photographing each pole) to provide additional information for prioritizing subsequent maintenance activities.

- Develop a methodology for prioritizing the poles for ensuing activities such as detailed inspection, maintenance and replacement based on information captured during the patrols. Analyze pole inventory and condition information as it becomes available from the patrols using the methodology to establish the priorities for various activities. Once the initial prioritization has been completed a detailed inspection should be performed on *high priority* poles to refine plans/schedules for pole replacements and help ensure that available resources are being targeted first on the highest risk poles.

- Develop and implement inspection criteria to be used by line personnel to assess the condition of poles on which they may need to perform various types of work to determine if they may proceed with that work without first replacing the pole, and if so, what precautions are necessary. Develop rules to guide line crews in determining what types of work should/should not be performed on various vintages and conditions of "suspect" poles.

- Develop and implement a system to track the inspection and maintenance activities that are performed on each suspect pole, and continuously update the activities that need to be performed as poles age and their conditions change.