

## Reduced Assay Volume for Uncertainty Estimation in Treated Wood Retentions

Lumber used in outdoor construction must be pressure-treated with preservatives to prevent damage from decay and insects. The amount of preservative needed to protect the wood (called preservative retention) is initially determined by decay and termite testing prior to commercialization. Once in commercial use, the retention of every charge of treated lumber is checked at the treating plant to make sure it contains the intended amount of preservative. These retention checks are a key step in ensuring that treated wood products are durable.



Treated wood charge retention is currently checked by combining all the core samples for a single analysis.

### Background

Currently, charge retention is measured by removing core samples from 20 pieces in each charge, combining and milling them to obtain a composite sample, and then using an instrument to measure preservative concentration. A subset of these charges are also checked in the same manner by a third-party inspection agency; in some cases, retentions are also checked by other third parties. Unfortunately, charges that are found to meet the retention standard at the treating plant may not meet the standard when sampled again by a third party. This is because the current procedure provides only one retention value for each charge and does not provide a measure of variability of retention within a charge. A preferred method would provide multiple retention values for each charge, and thus provide a measure of charge variability that can be used for uncertainty

calculations. Recent research showed that instead of creating a single composite sample, treaters could separate cores into multiple groups and analyze them separately. A spreadsheet tool was developed to allow treaters to calculate a confidence level that a charge would meet the standard retention during a subsequent retention assay. By changing treatment conditions, the treater may be able to increase the likelihood that future charges will meet retention standards.

Although the value of this multiple retention assays approach is recognized, concern has been expressed that many more core samples would need to be removed from each charge. This concern is based on the belief that the instruments used to measure

retention require a minimum wood volume, and that 20 cores are needed to provide that minimum volume. However, preliminary research at the University of Tennessee indicates that the analysis may be conducted using fewer than 20 cores if the instrument is modified and calibrated. The goal of this project is to refine methods to use fewer cores, determine the accuracy and precision of this approach, and develop a draft standard for treaters to use when applying the multiple retention assay method. Once this information has been developed, treaters will be more likely to adopt this improved approach to evaluating retention.

### Objectives

The objectives of this project are to (1) refine devices for modifying instruments for use with fewer cores, (2) determine the minimum number of cores needed to conduct the analysis and develop accuracy and precision data for this approach, and (3) develop a draft standard for treaters to use when following the multiple retention assay method.

### Approach

Core samples will be removed from lumber that has been pressure-treated to a range of preservative retentions with common types of preservatives. These cores will be analyzed using conventional and reduced sample volumes on multiple instruments. Data will be used to determine the minimum number of cores that can be analyzed without a loss of accuracy or precision when compared to current methods using 20 cores. Potential variables to be addressed include wood species, treatment chemical, and instrument manufacturer.

### Expected Outcomes

A draft American Wood Protection Association (AWPA) standard will combine the composite sampling approach with a reduced volume cup technique to permit retention value estimation with an uncertainty value. Results and the draft standard will be presented at the AWPA fall technical meeting. This effort will provide treaters with an improved method for assessing variability of retention measurements within charges of treated lumber. The reduced volume cup method will be also be reported in a *Forest Products Journal* Technical Note.

### Timeline

The project will begin in May 2016, with the bulk of the laboratory research completed within the first year. Results will then be analyzed with the intent of providing a report and initial draft of a standard for the 2017 AWPA Fall Technical meeting. Following input from AWPA committee members, the draft standard will be finalized and a journal article will be prepared for publication.

### Cooperators

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### Reference

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