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***GUIDANCE DOCUMENT H: EVALUATING PRESERVATIVES FOR REMEDIAL TREATMENT***

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Jurisdiction: Technical Committee P-6

Adoption: Previously Appendix H to the AWPAs Technical Committee Regulations, this document was converted to a Guidance Document by the AWPAs Executive Committee in January 2013.

This Guidance Document is not an AWPAs Standard. These are nonmandatory guidelines presented to aid the user in understanding the basic testing requirements for wood protection systems and to assist the AWPAs Technical Committees in the development of AWPAs Standards. The testing of products in accordance with this Guidance Document does not constitute conformance to any AWPAs Standard. No product can be considered to conform to an AWPAs Standard until it has been subjected to complete technical review and voting by AWPAs's Technical Committees, and procedural review and final action by the AWPAs Executive Committee pursuant to the AWPAs Technical Committee Regulations.

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**INTRODUCTION**

The purpose of this document is to serve as a guideline to sponsors for preparation of a technical data submission to support AWPAs Standardization of remedial wood preservative systems. For more specific guidance and recommendations, the sponsors are strongly encouraged to interact with the appropriate Technical Committees early in the preservative process. Remedial wood preservatives are characterized by a variety of physical states including, but not limited to the following:

- Thixotropic pastes and preservative greases.
- Oil borne and waterborne solutions and emulsions.
- Preservative rods and pads.
- Liquid and solid fumigants.

The various types of remedial wood preservatives have different modes of movement and efficacy. They also may be applied either externally or internally to a variety of wood structures for the control of decay fungi and/or wood destroying insects. Furthermore, they may differ greatly in their intended range, speed, and duration of efficacy, and may be intended as being supplemental to existing preservative treatments, or to protect previously untreated wood or commodities. As a result of these variables, the specific end use of a particular remedial wood preservative system will influence the data requirements for standardization.

Because of the wide range of potential remedial treatments and performance targets, standard test methodologies that are applicable to all remedial treatments will probably never exist. All technical data submissions for AWPAs Standardization of remedial treatments should provide a precise description of the intended target control, and a data submission to support that the intended target can be attained by the formulation or system. This will require data verifying that the remedial system provides the intended movement of active components in a timely manner for the application, and at concentrations that are effective.

At the present time, standardized test methodologies designed specifically for remedial wood preservative are limited; however, task groups have been established in various AWPAs Technical Committees to address this issue. However, standard laboratory and field-test procedures developed specifically for pressure applied preservatives may be applicable for evaluating some of the criteria outlined in this document. Until standard test procedures are developed for remedial wood preservatives, nonstandard methods, based on sound experimental principles, will be accepted. A decision on the acceptability of data generated through nonstandard test methods will be made by the appropriate Technical Committees.

Standardization of wood preservative systems requires the consideration of many factors with data on each factor needed to make a proper evaluation. An outline of the more important criteria for evaluation of remedial wood preservatives is provided below. However, it is again emphasized that the criteria outlined in this document are intended to serve as a guideline only and that the final decision on specific data requirements is the responsibility of the appropriate Nonpressure Technical Committees.

**1.0 CHEMICAL AND PHYSICAL PROPERTIES**

Relevant information concerning the chemical and physical properties of the remedial wood preservatives should be included along with the data submission. Specific examples include the following: specific gravity, viscosity, vapor pressure, boiling point, flash point, percent volatile, solubility in various solvents, hydrolytic stability, odor, and appearance. Some of these properties will be critical for evaluation of long term efficacy of the preservative in the wood. The weight percentages of the active ingredient(s) should also be provided. It should be noted that much of this information should be included in the Material Safety Data Sheet (MSDS) addressed in section 2.0. Pertinent physical properties of non-chemical components of remedial preservative systems should also be described, especially properties that may influence performance and long term efficacy of the overall treatment system.

## 2.0 ENVIRONMENTAL

An MSDS should be submitted along with information on the status of registration by Environmental Protection Agency (EPA) as well as by individual state regulatory agencies. If the wood preservative is registered with EPA, a specimen product label should also be provided. It should be emphasized that EPA registration is not a prerequisite for AWWA Standardization but rather is a requirement for commercial use.

## 3.0 ANALYTICAL METHODS

Analytical methods are required for all active ingredients in the remedial wood preservative formulation. Current AWWA Assay Standards (A) will be applicable to many active ingredients used in remedial preservatives. Any new or additional methods should be submitted to AWWA Committee P-5 for review and standardization. Analytical procedures for the following should be included or referenced in the data package:

**3.1 FORMULATED PRODUCT ANALYSIS:** Methods to analyze the concentration of all active ingredient(s) in the formulated product will be required for verification of product specifications.

### 3.2 WOOD ANALYSIS (CONCENTRATION AND PENETRATION):

A) Methods to analyze the concentration of all active ingredient(s) in the treated wood, as well as methods to determine preservative penetration, should also be provided. Due to their nature of application and mode of action (movement and penetration are not immediate, but expected or desired at a time from the application), remedial treatments will not generally require a set retention or penetration requirement as in pressure treated preservatives. Analysis methods in wood will be required to generate supporting data for efficacy of the remedial preservative systems as well as to provide methods that could be used as verification of performance in commercial applications. These methods shall be suitable to support that the remedial treatment can move from the point of application to the desired target area (penetration tests) and that the movement occurs at effective concentrations.

B) Determination of preservative penetration in wood is typically accomplished by the use of chemical color indicators such as those described in the applicable AWWA A Standards. Other non-visual methods such as closed tube bioassay for fumigant systems could also satisfy this requirement. It should be noted that in some applications, analysis of remedial preservative concentration and interpretation of spot tests for penetration may be confounded by the presence of an initial preservative treatment or extensive growth of mold or decay fungi.

## 4.0 EFFICACY

Data shall be provided to demonstrate that the remedial treatment formulation will perform at the application(s) that it is intended for. Data will be required on three interrelated areas of performance: first, the active ingredient can control the target organisms at some defined concentration; second, the active ingredients can move from the point of application to the area of concern at these effective concentrations; and third, the active ingredients are effective over what period of time. Data to support these requirements can be generated separately or concurrently using various laboratory and field tests.

Currently, limited standardized procedures are available for laboratory, simulated field or field testing of remedial wood preservatives. However, a task group has been established in AWWA Committee P-6 to develop appropriate methodologies. Current AWWA Evaluation Standards (E) for laboratory or field-testing of wood preservatives may provide data on the efficacy of certain remedial preservatives or active ingredients. However, the physical and chemical properties of many remedial preservatives (volatility and diffusibility) may make many of these procedures inappropriate for many remedial systems. Sponsors are encouraged to review the literature for laboratory and field procedures that have been previously used to evaluate remedial preservatives. Interaction with the appropriate AWWA Committee(s) early on in the standardization procedure is recommended to ensure that the test methods selected are appropriate to provide data supporting the efficacy of specific remedial systems.

**4.1 LABORATORY TESTS:** Due to the mobile and often transient nature of many remedial treatments, laboratory studies will often be essential to establish active threshold data to establish that the active ingredients, when present at a given concentration, will control the desired organisms. Laboratory tests can also be beneficial in defining the relative range and rate of movement of active components and limitations or requirements for that movement.

The Soil Block Test (AWWA E10) can be used to obtain information on the effectiveness of an active ingredient component or combination of active ingredients against common wood decay fungi. The contribution of solvents to the efficacy of the remedial preservative system should be evaluated by including the appropriate controls. However, weakness of an active ingredient(s) against a single wood decay fungus does not necessarily make the biocide a poor remedial preservative.

The Termite Test (AWWA E1) is recommended as an evaluation of either the formulated product or active ingredient(s). The

contribution of solvents to the efficacy of the remedial preservative system should be evaluated in this test by including appropriate controls as well.

The preservative system should also be evaluated as to its efficacy in relation to carpenter ants for either the formulated product or active ingredient(s). The contribution of solvents to the efficacy of the remedial preservative system should be evaluated in this test by including appropriate controls.

The test for *Evaluating the Efficiency of Diffusible or Volatile Internal Remedial Preservatives* (AWPA E15) is recommended as a test method for appropriate remedial preservative systems.

For many structures it is recommended that there should also be an evaluation of either the formulated product or active ingredient(s) and their efficacy in relation to carpenter ants. The contribution of solvents to the efficacy of the remedial preservative system should be evaluated by including appropriate controls as well.

**4.2 FIELD TESTS:** Overall, the most important component of a preservative evaluation program is the ability of the remedial preservative to protect wood from bio-deterioration when tested under exposure conditions representative of the intended end use. Individual test methods may provide data on the effectiveness of active ingredients against bio-deterioration organisms and/or the ability of the active ingredients to move away from the site of application to the site of desired activity. It is highly recommended that at least some test data be generated using actual end-use materials (both remedial systems and wood products) under field exposure conditions and submitted to support the intended use. It is also recommended that field data be generated from a minimum of two varied geographic sites. For certain remedial products, the submission of extensive field data may negate the need for laboratory efficacy data although the transient nature of many remedial actives makes it difficult to establish threshold values from field testing alone.

Supporting field data may be obtained for certain remedial preservatives using the present AWPA Standards E7, E8, or E9. Examples of field test procedures that have been used to evaluate remedial preservatives under actual end use conditions can be found in the following publications:

- IRG/WP/3392 “A New Approach to the Maintenance Problems of Wooden Railway Sleepers” W. Beauford and P.I. Morris
- Forest Products Journal, Vol, 37(3): 42-45
- Forest Products Journal Vol, 42(10): 47-54 “A Remedial Treatment of Douglas-fir and Southern Pine Poles with Methylisothiocyanate” J. J. Morrell, M. A. Newbill and C.M. Sexton

## 5.0 BIOCIDES DEPLETION

Data on preservative depletion will be necessary to evaluate the expected long-term efficacy of remedial systems and to recommend minimal treatment cycles. Because many remedial treatments are designed to be mobile for effectiveness, accelerated depletion tests will often be inappropriate. Preservative depletion studies should be conducted in conjunction with field studies, preferably in configurations as close to end use applications as possible. Chemical analysis of residual preservative levels in the anticipated zone of effective treatment should be performed at selected time intervals. Information regarding the duration of protection provided by a remedial preservative can be obtained by comparing residual levels of preservative to established threshold values or by performing fungal isolations or other bioassays in conjunction with the depletion studies. Depending on the intended use and goals of a remedial system, rapid depletion of active ingredients is not necessarily detrimental.

## 6.0 OTHER PROPERTIES

Besides the requirement that remedial preservative systems effectively control bio-deterioration in their target products, they shall also not be detrimental to other physical properties of the treated material. Three major areas of concern are strength effects, corrosion, and interaction with the initial preservative system, but other characteristics may be of concern depending on the type of product and application.

**6.1 STRENGTH EFFECTS:** Although only relatively small quantities of preservatives are used for in-situ treatment of wooden structures, their concentration at the application site can be very high. Most remedial chemicals do not strongly react with wood and can be expected to have minimal adverse effects on strength. Descriptions of required physical modifications to the pole such as drilling holes for internal application of products should be included so that the entire remedial system can be evaluated for strength effects.

**6.2 CORROSION EFFECTS:** Corrosion data should be provided if the remedial treatment preservative or treated wood may come into contact with metal or nonmetal materials associated with the wooden structure. This data may be available in the literature if active ingredients are also used for other non-remedial applications. Specific examples of corrosion data that may be required depending on end use include the following:

- Corrosion studies of carbon steel for remedial preservatives applied to the tie plate area of a railroad tie.
- Corrosion studies of galvanized steel for remedial preservatives applied to areas adjacent to utility pole hardware.
- Degradation studies of polyethylene for remedial preservative that may come into contact with power cables attached to utility poles.

Although standardized procedures specifically designed for evaluating the corrosion properties of remedial wood preservatives are not available, useful data may be obtained through AWWA Standard E12 and MIL 1914E.

**6.3 INTERACTION EFFECTS:** Interaction data should be provided if the remedial treatment preservative may come in contact with the initial preservative treatment of the product. This data should show no adverse effects on the efficacy or mobility of either treatment system as well as the strength of the product being preservative treated.

## 7.0 PROPOSED STANDARD

A proposed preservative Standard should be prepared and included in the technical data package. The Standard should include the following where appropriate:

- Chemical composition of the remedial preservative
- Physical and chemical properties
- Special handling and storage requirements
- Solubility data and recommended solvents
- Reference to analytical methods and minimum efficacy retention
- Method for measuring preservative penetration
- Target products (i.e. poles, ties, timbers, millwork, etc.)
- Target remediation (i.e. internal, shell, ground line or above-ground, etc.)
- Organisms to be controlled (insects, decay, remedial, preventative, etc.)
- Method of application
- Recommended application process and rate
- Recommended reapplication intervals
- Variations due to wood species, location within the structure or AWWA Standard U1, Commodity Specification D Deterioration Zone, where applicable